GREEN box Net

Variable air volume (VAV) controller set



GREEN box Net

System characteristics:

A set of two variable air volume (VAV) controllers with flow measurement and a **direct communication link** to the ventilation unit. Intelligent bidirectional communication between the controllers and the central unit allows for realtime continuous optimization of fan speed based on current flow requirements and immediate damper positions. The solution is designed for operation in various types of buildings where reliable air exchange and high user comfort are required. It is applicable in residential and public buildings such as hotels, hospitals, schools, or shopping centers.

Advantages of the pressure-independent control system:

- Maximum energy efficiency
- Minimization of pressure losses across the flow control dampers
- Significantly reduces the risk of aerodynamic noise throughout the system
- Option for operating cost allocation
- Remote control and management of the entire system

Advantages of the flow controllers:

- Precise flow measurement even at low airflows
- Simple installation, commissioning, and maintenance
- Option for air reheating according to customer requirements
- Advanced aMotion control
- Wide selection of optional accessories
- Intuitive and user-friendly operation

Flow controller parameters:

- Tube dimensions DN 100, 125, 160, 200, 250, 315, 400
- Operating range of measurable airflows 4–3166 m^3/h (at velocities 0,2–7 m/s)
- Tube air leakage DN 100–400 ATC4(B) (by EN 1751)
- Damper blade air leakage: DN 100–160 class 2 (by EN 1751); DN 200–400 class 3 (by EN 1751)
- Measurement accuracy: DN 100–160 ± 2% (at 3 m/s); DN 200–400 ± 5% (at 3 m/s)

GREEN BOX NET SET



- **2× GREEN box UNI** (supply and extract) – tube with control damper, actuator, and airflow measurement
- **1× control module with Net control level** including power supply, terminal block, and main control board

CONTROL OPTIONS

- aDot wall controller
- Signals from buttons/switches for ventilation power adjustment
- Air quality sensors (CO_2, rH, VOC, PIR)
- Zone or change-over dampers
- Remote control via mobile app (requires system internet connection)
- Integration capability with superior BMS/control systems (Loxone, Somfy, general Modbus)



DESIGN SOFTWARE



For a detailed design of the entire system with GREEN boxes, we recommend using specialized design software.

You can find it on our website **www.atrea.eu**.

Atrea®

VENTILATION UNITS, HEAT RECOVERY

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Czech Republic

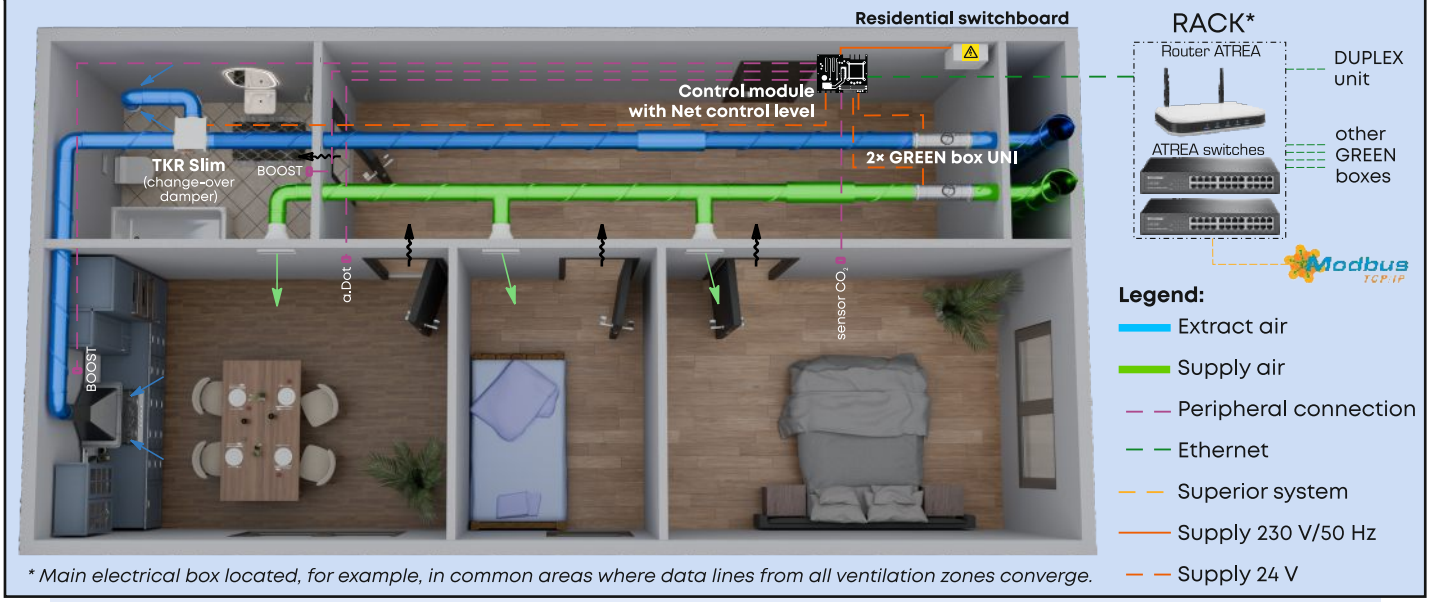
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GREEN box Net - Variable Air Volume Controller Set - Edition r6433-26-03

TECHNICAL DATA

SAMPLE APPLICATION



** Main electrical box located, for example, in common areas where data lines from all ventilation zones converge.*

It is recommended to connect **a maximum of 50 GREEN boxes Net** to one central HVAC unit. A higher number of controllers may lead to an excessively large duct network, increased pressure losses, decreased energy efficiency, higher unit noise, and greater difficulty in commissioning and balancing the system.

For requirements exceeding this number of flow controllers per unit, please contact **development@atrea.com.**

GREEN BOX NET CONSTRUCTION

Tube design for GREEN box UNI (two solutions based on DN)

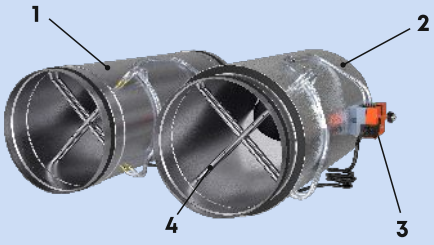
GREEN box UNI tube DN 100–160



Legend:

1 Galvanized sheet metal tube
2 Optional 13 mm thermal and vapor-proof insulation
3 Integrated actuator with control damper and flow measurement via hot-wire anemometer (inside the tube)
4 Internal coupling dimension insert
5 Clamp with seal

GREEN box UNI tube DN 200–400



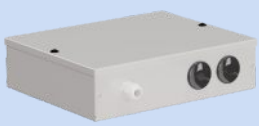
Legend:

1 Galvanized sheet metal tube
2 Optional 13 mm thermal and vapor-proof insulation
3 External actuator with control damper
4 Flow measurement via pressure differential

Design of control module for the Net control level module

Sheet metal enclosure

- Low construction height (75 mm)
- IP 30



Plastic enclosure

- Suitable for areas with higher humidity
- IP 54



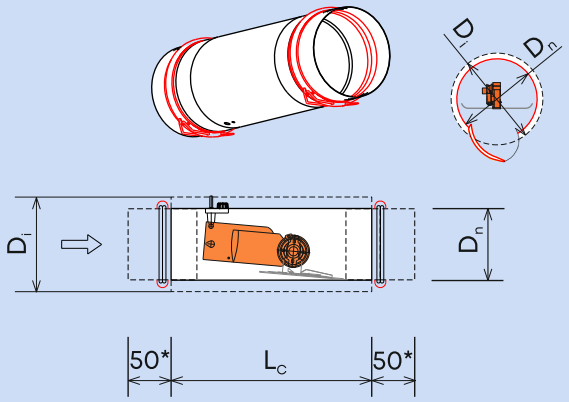
DIN rail module

- Requires 13 positions (modules)
- IP 20

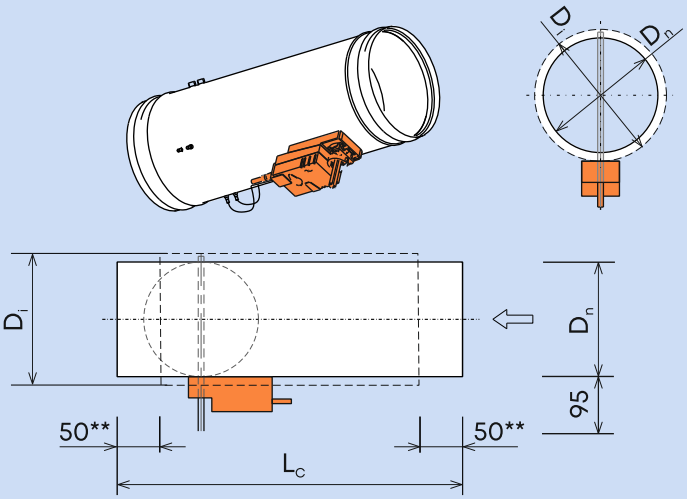


DIMENSIONAL SCHEMES AND DESIGN OF GREEN BOX UNI DN 100–400

GREEN box UNI tube DN 100–160



GREEN box UNI tube DN 200–400



Clamp **Actuator**

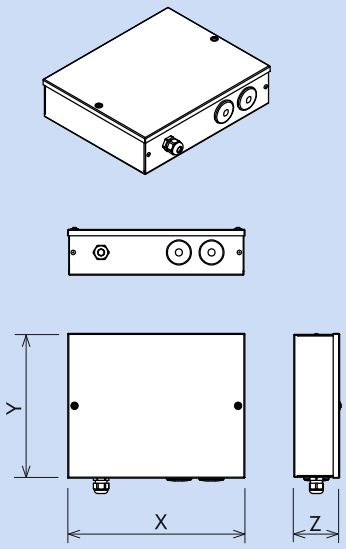
* circular spigot with rubber seal + clamp

** circular spigot with rubber seal

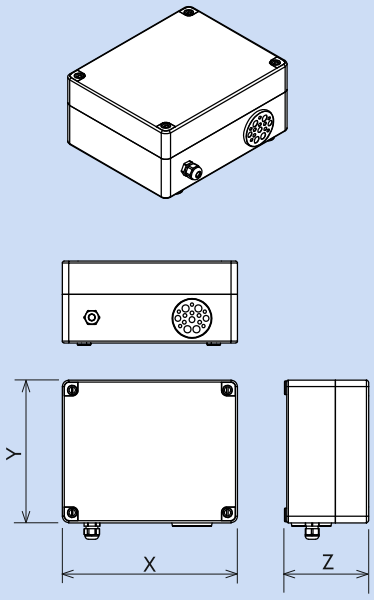
Tube name	⌀ D_n (mm)	⌀ D_i (mm)	L_c (mm)	Connection
GREEN box UNI tube DN 100	100	130	410	L_c + 2 × 50 mm (tube + clamps)
GREEN box UNI tube DN 125	125	155	410	
GREEN box UNI tube DN 160	160	190	410	
GREEN box UNI tube DN 200	200	230	550	Without clamps (direct connection)
GREEN box UNI tube DN 250	250	280	650	
GREEN box UNI tube DN 315	315	345	700	
GREEN box UNI tube DN 400	400	430	700	

DIMENSIONAL SCHEMES AND DESIGN OF ELECTRICAL ENCLOSURES

Sheet metal enclosure



Plastic enclosure



Name of control module	X (mm)	Y (mm)	Z (mm)
GREEN box Net sheet metal enclosure	272	223	75
GREEN box Net plastic enclosure	205	220	140

If the control module (both sheet metal and plastic) is installed separately, the recommended size for the inspection opening is at least 300x300 mm.

TECHNICAL DATA

TECHNICAL PARAMETERS – TUBE

GREEN box UNI tube DN 100–400		DN 100	DN 125	DN 160	DN 200	DN 250	DN 315	DN 400
Tube construction	Weight	2 kg	2 kg	3 kg	3 kg	5 kg	6 kg	8 kg
	Spigot dimension*	Ø 100 mm	Ø 125 mm	Ø 160 mm	Ø 200 mm	Ø 250 mm	Ø 315 mm	Ø 400 mm
	Insulation	Tubes are manufactured both with and without insulation.						
Actuator	Supply/ Extract	Belimo CMV100MP	Belimo CMV125MP	Belimo CMV160MP	Belimo LMV-D3.MP			
	Max. power consumpt.	1,5 W	1,5 W	1,5 W	2 W	2 W	2 W	2 W
	Position	Integrated in the tube			External on the tube			
Electrical connection	Power supply	24 V						

** Direct connection to the ductwork (inner diameter according to EN 1506).*

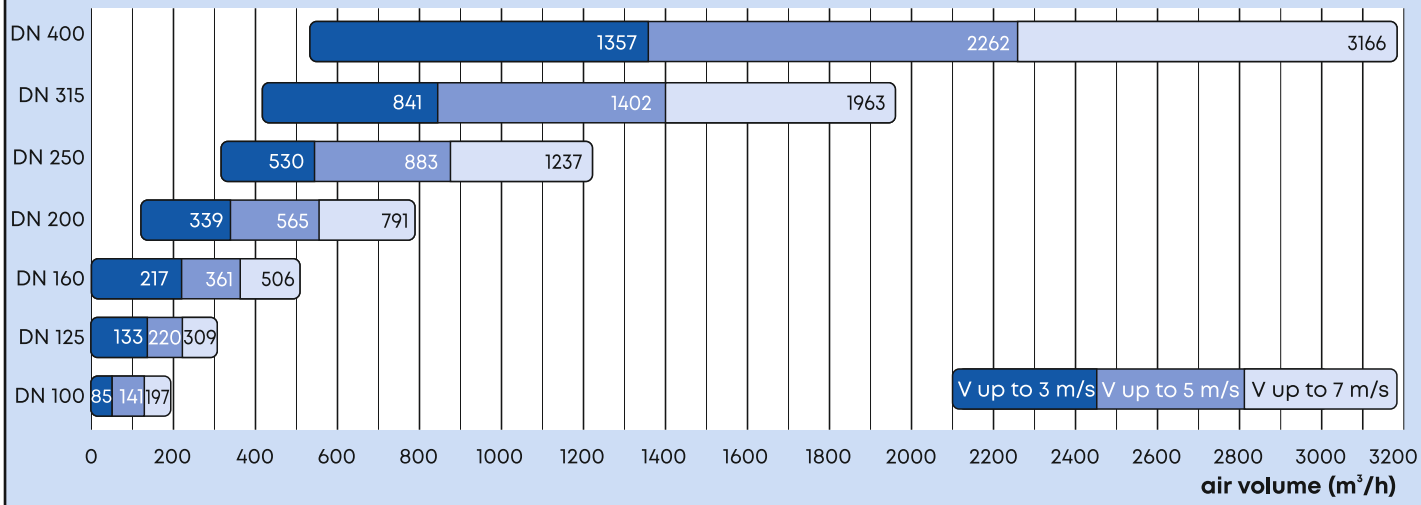
Tube can be supplied with vapor-proof rubber insulation.

ELECTRICAL ENCLOSURE TECHNICAL PARAMETERS

Type of el. enclosure GREEN box Net	Plastic	Metal	DIN rail module
Protection (fusing)	1×4 A char. B		
Power consumption	60 W		
Protection	IP30	IP54	IP20
Power supply	230 V / 50 Hz		
Control power source	24 V		
Max. source load	2 A		
Input	2× Analog (0-10V)/3 x Digital (0/1)		
Output	1× Analog (0-10V)/1 x Digital (0/1)		
Communication links between servo drives	MP-Bus protocol between control modules and tubes		
Control	aMotion		
Operation	Web interface / Mobile app aDot controller (optional)		

Digital input and output signals are volt-free.

CONTROLLER OPERATING RANGES



1) The graph illustrates the airflow range across the entire operating spectrum of individual GREEN box UNI units.

2) Each GREEN box UNI has a defined minimum measurable limit, designated as V_{min}. This is the lowest airflow at which the GREEN box UNI is still capable of measuring and regulating the air volume.

3) The V_{max} value represents the maximum airflow capacity the given GREEN box UNI is capable of handling. For each DN, this value corresponds to an air velocity of 7 m/s.

4) In each project, a design air volume is determined for a specific GREEN box UNI, designated as V_{nom} or V_{draft}. This value is subsequently configured in the controller as a new maximum that will not be exceeded in standard ventilation mode.

When sizing a flow controller, it is essential to consider its operating range and the ability to effectively regulate airflow, particularly the minimum measurable flow V_{min}. Oversizing is not recommended, as it can negatively affect regulation capabilities, measurement accuracy, and the acoustic performance generated by airflow throttling.

PERFORMANCE CHARACTERISTICS

The table indicates airflow values in m³/h. When dimensioning the controller, it is necessary to take into account the airflow velocity, which is determined for individual types of buildings (see below).

DN	V_{min}	V_{max} at 3 m/s	V_{max} at 5 m/s	V_{max} at 7 m/s
100	4	85	141	197
125	7	133	220	309
160	11	217	361	506
200	158	339	565	791
250	247	530	883	1237
315	393	841	1402	1963
400	633	1357	2262	3166

Recommended design velocities for various types of applications:

3 m/s – residential buildings, hotels, hospitals, cultural buildings (e.g. theaters), educational and upbringing facilities (classrooms)

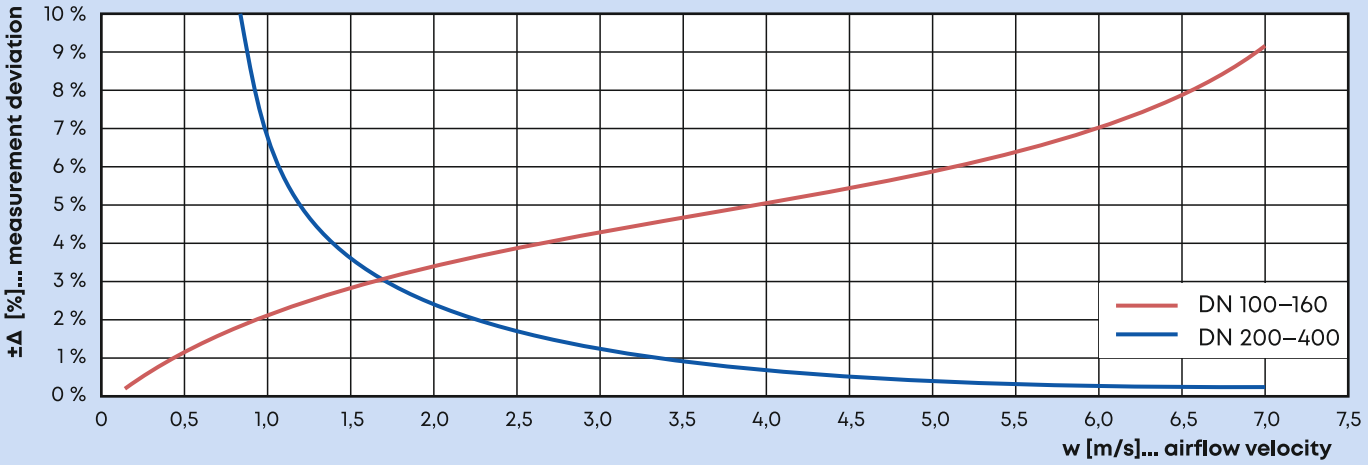
5 m/s – shopping centers, communication spaces (corridors) in social buildings

7 m/s – industrial halls, logistics areas, warehouses, etc.

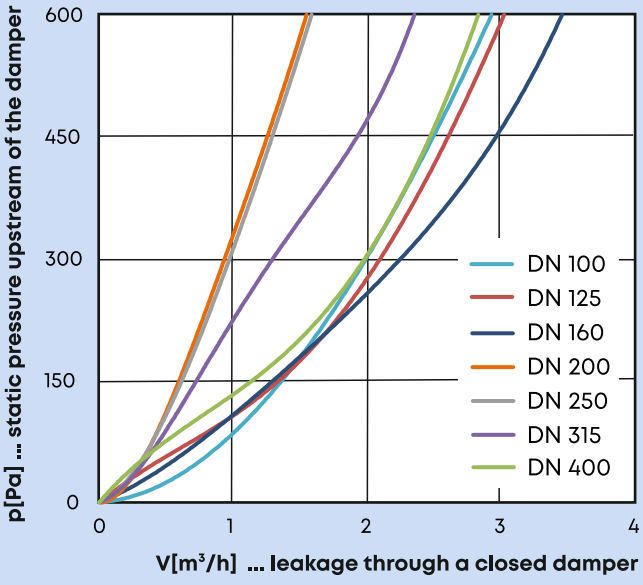
The maximum velocity and thus the max. adjustable airflow is determined by a service technician during commissioning, or the factory setting at a velocity of 7 m/s is maintained.

MEASUREMENT TOLERANCE AND CASING LEAKAGE OF CONTROLLERS

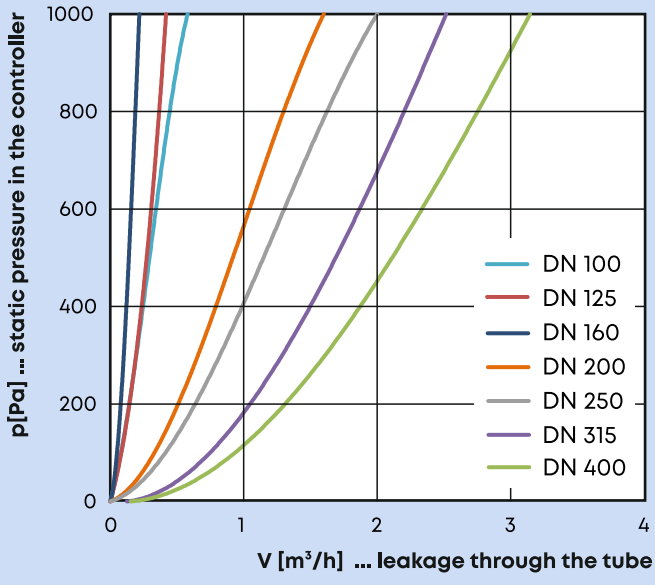
Graph of measurement deviation dependence on airflow velocity for GREEN box UNI tube



Graph of airflow dependence through a closed damper in relation to static pressure



Graph of airflow dependence through tube leakage in relation to static pressure



INSTALLATION

- Airflow controllers are installed under the ceiling or on the wall in any position.
- Parts must be fixed to the supporting structure. Anchoring accessories are not included in the delivery.
- For declared airflow measurement, there must be a straight duct section **before** the controller inlet with a length of at least three times the connection diameter.
- When using a sound attenuator as a stabilizing section, it is necessary to account for an increase in measurement deviation of up to 10%.

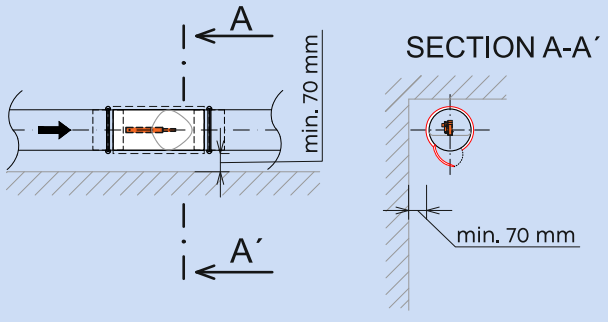
STABILIZING SECTIONS



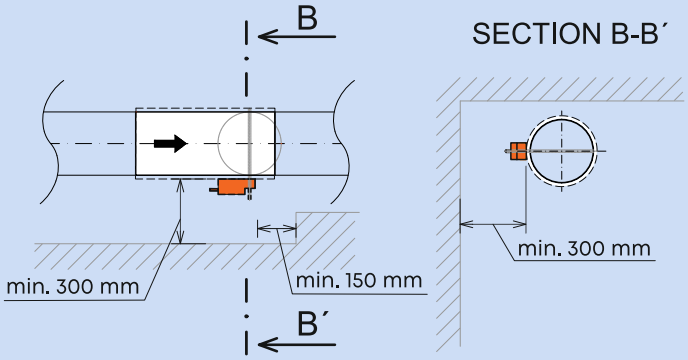
The maximum distance between the GREEN box UNI and the electrical enclosure, specifically the length of the cable connection from the actuator to the enclosure, must not exceed 75 m.

DISTANCES

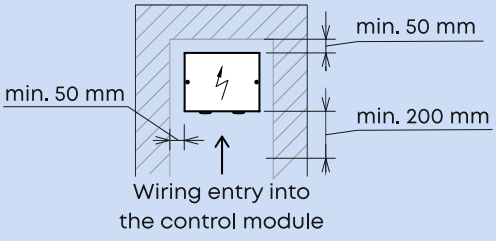
GREEN box UNI tube DN 100–160



GREEN box UNI tube DN 200–400

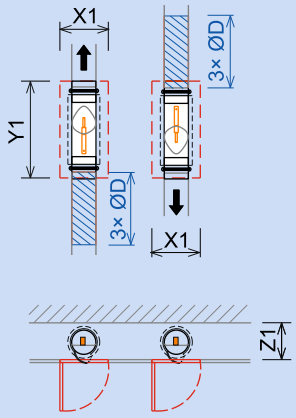


Control module (sheet metal/plastic)



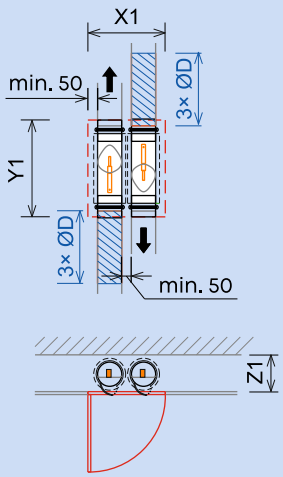
MAINTENANCE ACCESS

Offset GREEN box UNI*



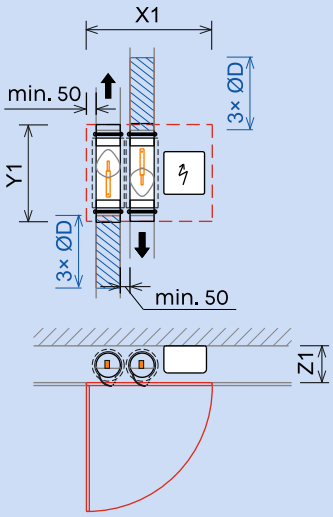
DN	X1	Y1	Z1
100	250	500	155
125	250	500	180
160	300	500	210

GREEN box UNI units placed together above a single maintenance access*



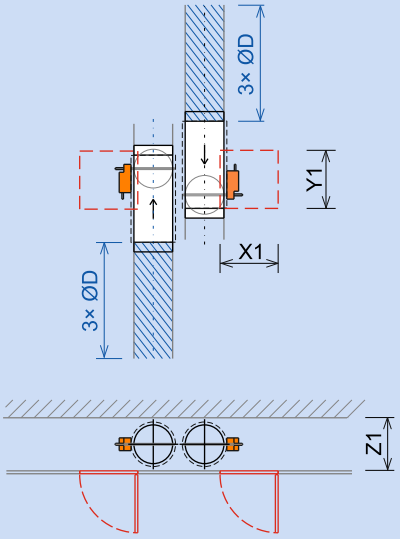
DN	X1	Y1	Z1
100	400	500	155
125	400	500	180
160	500	500	210

GREEN box UNI units placed together with a plastic control module above a single maintenance access



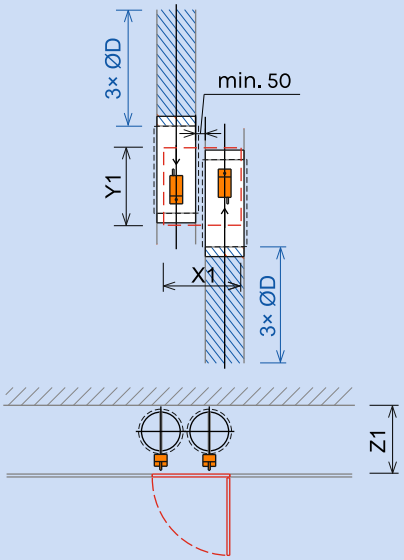
DN	X1	Y1	Z1
100	600	500	155
125	650	500	180
160	700	500	210

Offset GREEN box UNI*



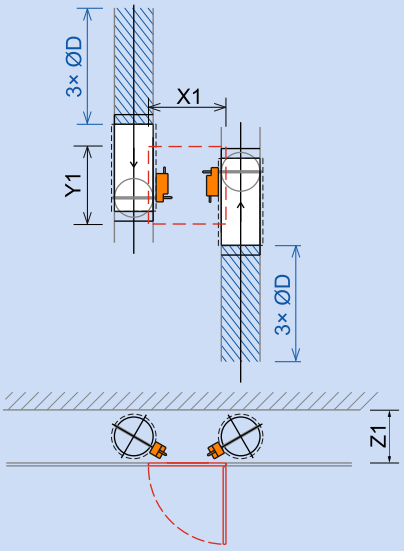
DN	X1	Y1	Z1
200	300	300	240
250	300	300	290
315	300	300	355
400	300	300	440

GREEN box UNI units placed together with a common maintenance access*



DN	X1	Y1	Z1
200	400	400	355
250	500	400	405
315	550	400	470
400	600	400	555

GREEN box UNI units placed together above a single maintenance access*



DN	X1	Y1	Z1
200	400	400	240
250	400	400	290
315	400	400	355
400	400	400	440

* For the sheet metal enclosure variant, it is possible to use the maintenance access for the casings and place it freely or install it within the suspended ceiling.

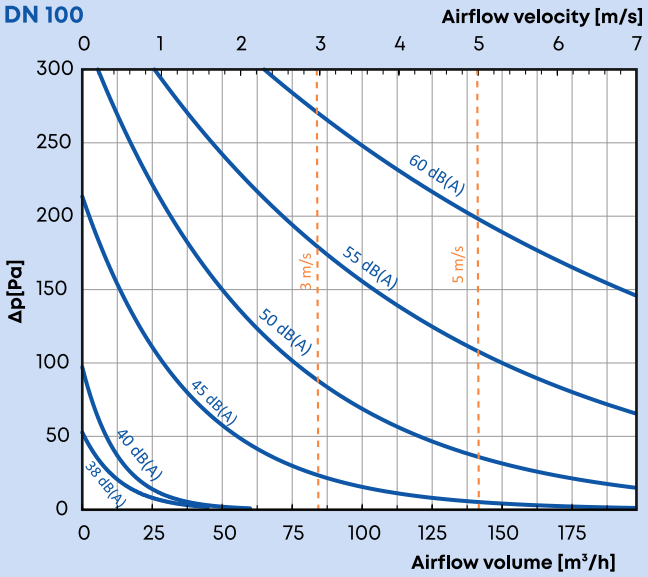
The maintenance access for the sheet metal or plastic enclosure version, if installed separately, shall be **300×300 mm.** If using a tube equipped with insulation, increase the Z1 value by 30 mm.
If the distance between the casings and the enclosure exceeds 500 mm, it is necessary to extend the factory-supplied cable connection.
To determine the height of the ceiling void, it is recommended to start from the minimum Z1 value and add the permitted deflection of the horizontal structure.
For the plastic enclosure variant, it is recommended to provide a separate maintenance access.

ACOUSTIC PARAMETERS

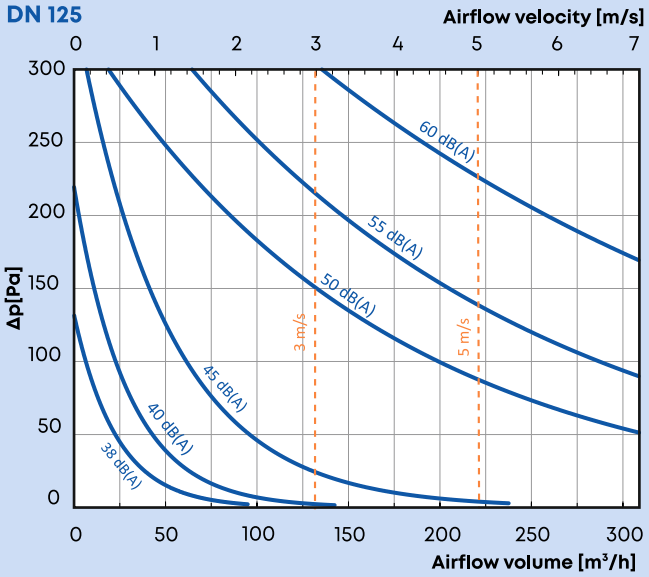
SOUND POWER LEVEL DIAGRAMS

The graphs show the sound power levels L_{WA} [dB] radiated into the ductwork for individual regulator dimensions.
The sound power levels are determined according to EN ISO 5136.

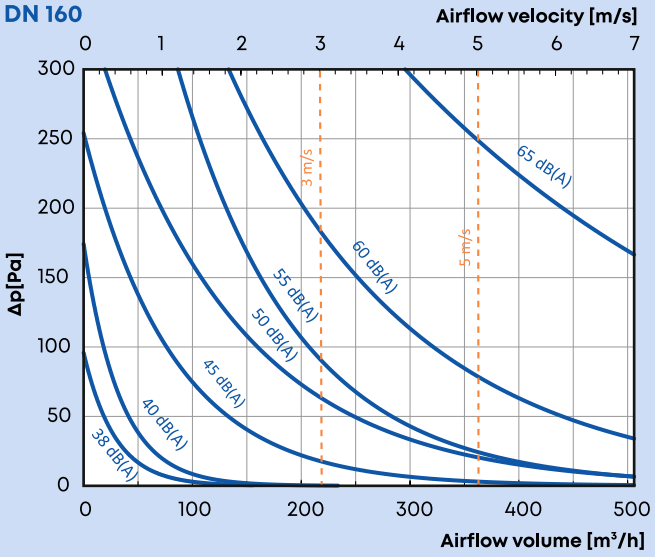
DN 100



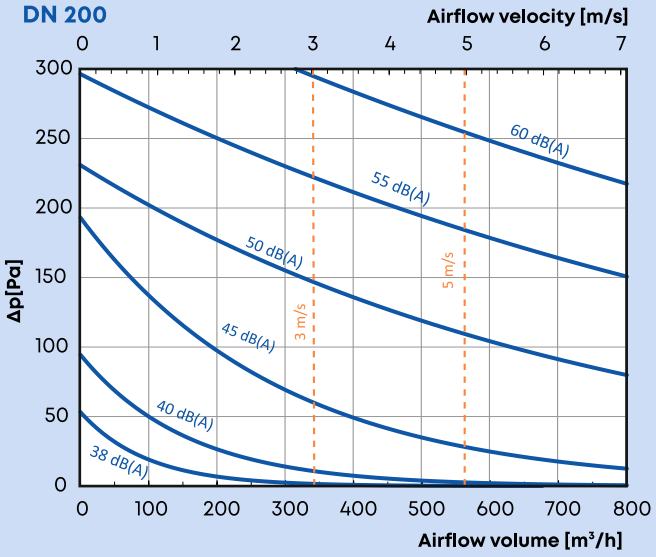
DN 125



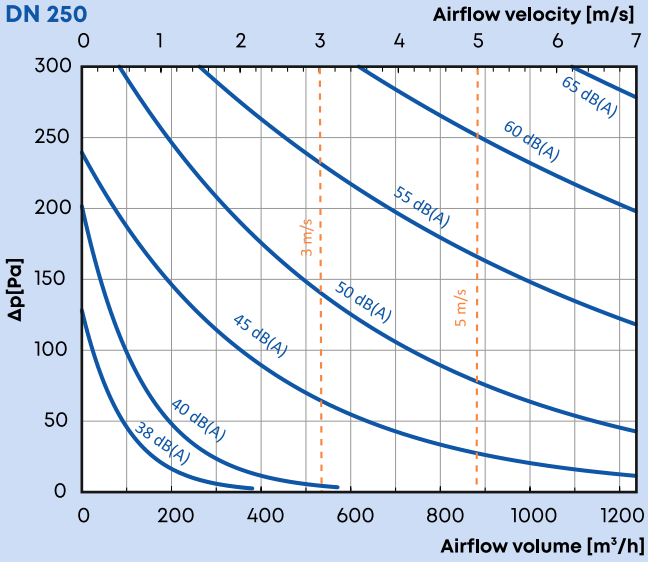
DN 160



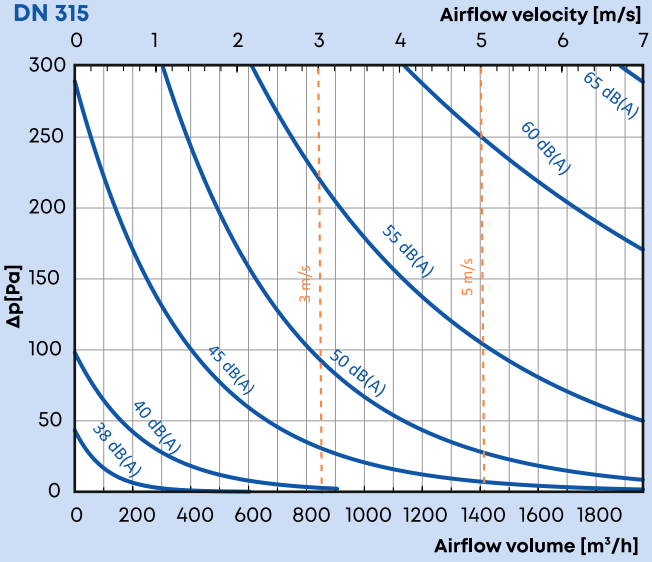
DN 200



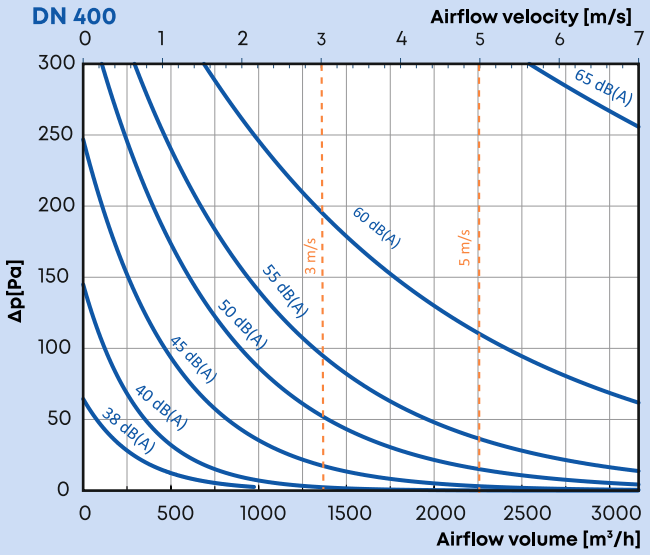
DN 250



DN 315



SOUND POWER LEVEL DIAGRAMS

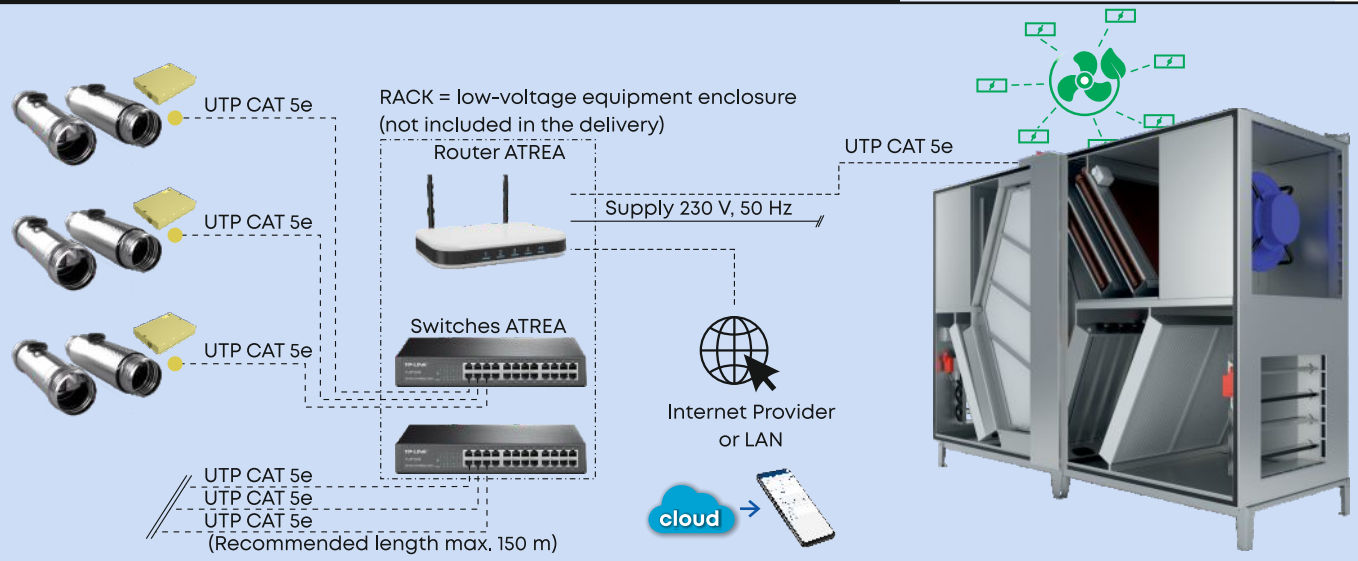


Acoustic parameters for specific operating points, broken down into octave bands, can be obtained from the design software.

aMotion Control – main functions

- Autonomous control for managing supply and extract airflow regulators.
- The control system ensures a balanced airflow ("equal flow") between supply and extract within the flow range of both regulators.
- Ventilation output and other parameters are configured via intuitive controls.
- Utilization of ventilation scenes and a weekly schedule.
- Connection of external inputs to adjust ventilation output (signals from sanitary facilities, kitchens, bathrooms, etc.).
- Control of zone dampers on both the supply and extract air sides of the ventilated space.
- Connection of air quality sensors and continuous (proportional) ventilation output control based on their demands.
- Built-in web server or communication via the ATREA cloud, including a mobile app for iOS and Android.
- Standard communication via Modbus TCP/IP protocol for higher-level management systems (SMART home, Loxone, Somfy).
- The aManager application, intended for property managers, is available as an option. It facilitates clear monitoring, the development of control scenarios, and shared access to specific devices.

GREEN BOX NET AND AHU – COMMUNICATION TOPOLOGY



The system consists of individual **GREEN box Net** units and a central **DUPLEX** series air handling unit. All devices are equipped with aMotion digital control and interconnected via a closed communication network (Ethernet interface). The network connection ensures continuous two-way communication between individual components and their mutual optimization.

To ensure full system communication, it is necessary to establish a low-voltage connection between the air handling unit and the individual GREEN box Net control modules.This Ethernet network and the distribution enclosure (RACK), including equipment (patch panels, 230V sockets, etc.), are provided by the building contractor (ELV/Low-voltage systems). It is recommended to place the RACK enclosure in a technical or electrical room, where all data cables (UTP Cat.5E) from both the individual ventilated zones / GREEN boxes and the air handling unit must be routed.The ATREA delivery includes active components – network switches and a router – which are installed in the RACK enclosure. Their specifications (type and number of ports) are dimensioned according to the system scale and the required level of equipment.

COMMUNICATION AND CONTROL

WIRING DIAGRAM, CONTROL AND MANAGEMENT OPTIONS

POWER SUPPLY

230 V / 50 Hz (CYKY 3J×1,5)
Fusing – 4 A, char. B

GREEN box UNI

CYSY 3O×1,5
(Extension)

CYSY 3O×1,5
(Extension)

Cable from the tube:
1 m, 4×0,34 mm²

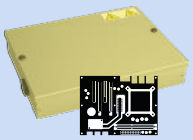


Supply – MP1



Exhaust – MP2

Control module
Regulation level
Net



COMMUNICATION WITH THE CENTRAL UNIT

Ethernet (UTP CAT 5e)

→ WEB server

Router*
(for the entire system)



→ Higher-level system

Modbus



* Part of delivery

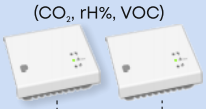
CONTROL

2× analog input (0–10 V)

aDot controllersup to 4 pcs



Air quality sensor (CO_2, rH%, VOC)



3× digital input

Digital external signal
(button, motion sensor, ...)



SYKFY 2×2×0,5

SYKFY 2×2×0,5

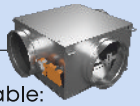
SYKFY 2×2×0,5

ACTIVE ELEMENTS (optional)

CYKY 3O×1,5
(Extension)

CYKY 3O×1,5
(Extension)

Zoning/redirection



TKR switching damper
(two-position control)

Damper cable:
1 m, 4 × 0,34 mm²



TKR switching damper
(multi-position control)

SYKFY 2×2×0,5

according to size and dimensions

Reheaters



EPO-V electric
duct reheater

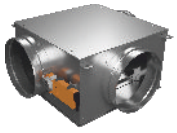
+



ANS 120 duct
temperature sensor

ORDER NUMBERS

 	**GREEN box UNI** – tube DN 100 – tube DN 125 – tube DN 160 – tube DN 100 insulated – tube DN 125 insulated – tube DN 160 insulated	**Order No.:** A702200 A702210 A702220 A702201 A702211 A702221
 	**GREEN box UNI** – tube DN 200 – tube DN 250 – tube DN 315 – tube DN 400 – tube DN 200 insulated – tube DN 250 insulated – tube DN 315 insulated – tube DN 400 insulated	**Order No.:** A702230 A702240 A702250 A702260 A702231 A702241 A702251 A702261
	**Control module with Net regulation level** – sheet metal enclosure	**Order No.:** A702810
	– plastic enclosure	A702800
	– DIN rail module	A702820
 	**aDot Controller** – white – black	**Order No.:** A145551 A145550

	**TKR SLIM 125 RL** – DN125 (male)	**Order No.:** R150121
	TKR SLIM 125 T – DN125 (male)	R150122
	TKR SLIM 125 RL-MP – DN125 (male)	R150123
	TKR SLIM 125 T-MP – DN125 (male)	R150124
	TKR SLIM 160 RL – DN160 (male)	R150161
	TKR SLIM 160 T – DN160 (male)	R150162
	TKR SLIM 160 RL-MP – DN160 (male)	R150163
	TKR SLIM 160 T-MP – DN160 (male)	R150164
	TKR SLIM 200 RL – DN200 (male)	R150201
	TKR SLIM 200 T – DN200 (male)	R150202
	TKR SLIM 200 RL-MP – DN200 (male)	R150203
	TKR SLIM 200 T-MP – DN200 (male)	R150204
	**Electric reheater EPO-V**	**Order No.:** by size
	**Router**	**Order No.:** A700901
	**Switch** – 8 port – 24 port	**Order No.:** A700905 A700906

ORDER EXAMPLE

Order No.:	Description	UOM	Quantity	Unit Price	Total Price
	GREEN box Net DN XXX:				
A7022XX	GREEN box UNI tube DN XXX			XX €	
A7022XX	GREEN box UNI tube DN XXX	kpl	XX	XX €	XX €
A7028XX	GREEN box Net, control module – XXX			XX €	

If you are ordering GREEN box Net DN 125 and the project includes an insulated supply tube, a non-insulated extract tube, and a sheet metal distribution board, then the order for 20 sets will be as follows:

Order No.:	Description	UOM	Quantity	Unit Price	Total Price
	GREEN box Net DN 125:				
A702211	GREEN box UNI tube DN 125 insulated			- €	
A702210	GREEN box UNI tube DN 125	kpl	20	- €	- €
A702810	GREEN box Net, control module (metal design, IP30)			- €	

Herewith you receive an offer for 20 insulated tubes DN 125, 20 non-insulated tubes DN 125, and 20 sheet metal control module in the **Net** regulation level. In the case of more complex combinations, an itemized approach to orders can also be chosen.

The control module cannot be ordered without a pair of flow regulators.

PROJECT SPECIFICATION

TECHNICAL REPORT DESCRIPTION

Control principle of the ventilation system

The GREEN box Net system is based on a direct communication link between the flow regulators and the central HVAC unit.Individual flow regulators continuously transmit data regarding current flow rates and damper positions to the central unit. Based on this real-time data, the unit optimizes fan speeds and the operating point of the entire HVAC system.This ensures stable flow regulation within the ventilated zones while simultaneously minimizing pressure drops, eliminating system operating noise, and achieving maximum energy efficiency.

System Advantages

- Optimization of the fan operating point without the need for constant static pressure control in the duct network.
- Significant reduction in operating energy consumption.
- Minimization of pressure drops across the regulation dampers.
- Lower aerodynamic noise in the ductwork due to reduced flow throttling.
- Remote monitoring and management of the entire system via a web interface or mobile application.
- Fault detection and identification of non-standard behavior in flow regulators.
- Individual setting of ventilation modes and states with practically unlimited variants.
- Ability to allocate operating costs to individual ventilated zones.
- Rapid system commissioning and centralized configuration.

Pre-installation requirements

- Implementation of an Ethernet data network (UTP CAT 5e or higher) between individual GREEN box Net control modules and the central HVAC unit.
- Installation of a RACK cabinet for low-voltage equipment (provided by the contractor/construction) to house network components.
- Option to connect the entire system to a local network or the internet for remote access and service diagnostics.

DESCRIPTION FOR THE SCHEDULE OF QUANTITIES

For better clarity, the recommended method of reporting boxes for the needs of the Project Documentation (PD) is provided below.
XXX – rewrite according to the project

Position	Description	Quantity	OUM	Unit price	Total price
	GREEN box Net DN XXX: **Supply tube** Circular variable air volume (VAV) controller, DN XXX, length XXX, with a requirement for a straight section of 3×DN upstream of the regulator inlet. The tube is insulated with rubber insulation and equipped with an actuator located inside/on the regulator tube.Design airflow rate V_{nom} = XXX m³\h. Sound power level radiated into the duct L_{WA} = XX dB(A). The VAV regulator is designed for direct connection to the ductwork (internal coupling dimension according to EN 1506). **Extract tube** Circular variable air volume (VAV) controller, DN XXX, length XXX, with a requirement for a straight section of 3×DN upstream of the regulator inlet. The tube is insulated with rubber insulation and equipped with an actuator located inside/on the regulator tube.Design airflow rate V_{nom} = XXX m³/h. Sound power level radiated into the duct L_{WA} = XX dB(A). The VAV regulator is designed for direct connection to the ducting (internal coupling dimension according to EN 1506). **Control module** In a version for a sheet metal, plastic enclosure, or DIN rail.The control module for the management, power supply, and control of flow regulators allows for the input of up to two independent analog inputs 0-10 (e.g., CO_2 sensor), up to three independent external 0/1 signals (e.g., boost button/switch), up to four aDot controllers, up to 2× zone/switching dampers, and standard Modbus TCP/IP communication for a high-level control system. It includes a cloud service and the option for remote control when connected to the internet. To ensure data communication between the control module and the central ventilation unit, an Ethernet connection (UTP CAT 5e or higher) must be provided. Power supply 230V/50 Hz, protection 1×4 A char. B, power consumption max. 60 W.	XX	kpl	XX €	XX €

The texts provided above are recommended for use in project documentation.
For a specific project, their wording must be adjusted according to individual requirements.