

# SMART box

## smart air flow controller

### for central ventilation systems

The company ATREA developed and offers a unique comprehensive system for central ventilation based on the central air conditioning unit and local smart VAV controllers, allowing independent control of each section.

The system is particularly suitable for residential houses, office buildings, schools, hotels and all other buildings with multiple independently ventilated sections.

#### Main parts of the system

**1) Central air conditioning unit** can be any unit DUPLEX with RD5 control – e.g. the unit of the series DUPLEX Multi, MultiEco, Flexi, Roto, Silent etc. Depending on the specific layout, the unit may be designed for internal or roof use. Besides recuperation and filtration, the unit can also provide complete adjustment of the supply air (heating, cooling) according to the needs.

**2) SMART boxes** are intended for each ventilation section. According to the object's size and topology, 2–63 boxes may be connected to a central unit. The SMART box controls the flow at the supply and exhaust from the section so as to always ensure equal pressure (possibly a predefined difference in flow). Based on the optional connected sensors, the flow can be adjusted completely automatically, or the system can be controlled manually through a variety of controllers. For larger sections – e.g. the apartment – the supply can be divided, and the zones can be controlled automatically (e.g. day, night). Optionally, also the supply air temperature (heating) can be locally adjusted.

**3) Cabling** provides interconnection between the central unit and the individual SMART boxes. Thanks to the mutual communication, the entire system is permanently and immediately controlled so that the central unit gives exactly required amount of air. This ongoing optimization leads to significant savings in operating costs (electricity to power fans, energy for backup heating/cooling), and, among others, reduces the system operating noise.

**4) Internet access** allows detailed user control of the individual SMART boxes via smart phones and PCs, and, for administrators, allows centralized control of the entire system, automatic fault reporting and ultimately provides basis for cost allocation for the central unit operation for the individual SMART boxes (especially useful for residential houses).



SMART box

#### ATREA SMART Box system advantages

- System unique solution for the SMART boxes with the central air conditioning unit
- Optimization of the central unit performance according to the requirements of the individual SMART boxes significantly reduces power consumption and noise
- Sophisticated control system of all individual parts with the central administration
- Various locations due to various design
- Wide range of applications thanks to a comprehensive range of sizes
- Compact dimensions enable installation e.g. in suspended ceilings
- Accurate flow control throughout the declared range of use ensures perfect equal pressure in the system
- Wide range of accessories connectable to each SMART box increases user comfort and reduces operating costs
- The central system control at the user and the administrator level with many premium features (e.g. possibility for cost allocation for the central air conditioning unit operation)

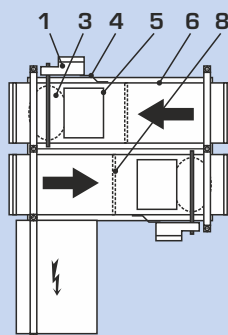
#### SMART BOX – GENERAL DESCRIPTION

The SMART box consists of two separate tubes and a distribution board module that can be interconnected by means of a fixing frame. One tube is used for the air supply and the other for the air exhaust, both are equipped with their own servo drive and independent accurate measurement of the air flow. The intention of the supply and exhaust tube can be adjusted via regulation.

Each tube is additionally insulated and equipped with an inspection opening for the service access to movable components without disconnecting piping. The tubes can optionally be supplemented by a cover in silver colour, independently for each part.

The marshalling cabinet can stand independently or can be connected to any side of the tube installation frame. The marshalling cabinet includes a control module that provides control of the entire SMART box as well as connection of all optional accessories.

The SMART box is designed for installation in interior spaces with normal environment according to CSN 33 2000-5-51.



#### Legend:

- 1 Servo drive with built-in flow measurement
- 2 Connecting terminals with the digital module
- 3 Regulating valves including sealing
- 4 Servo drive holder
- 5 Inspection opening for access to inner parts
- 6 Tube including self-adhesive 15 mm thermal insulation
- 7 Handle of the inspection opening cover
- 8 Accurate flow measurement
- 9 Supporting frame of the individual parts – demountable

#### SELECTION SOFTWARE



For detailed design of the entire system with SMART boxes we recommend using our dedicated selection software. You can find it on our website at [www.atrea.eu](http://www.atrea.eu) or request a CD at our office.

**Atrea**<sup>®</sup>

UNIT VENTILATORS & HEAT RECOVERY

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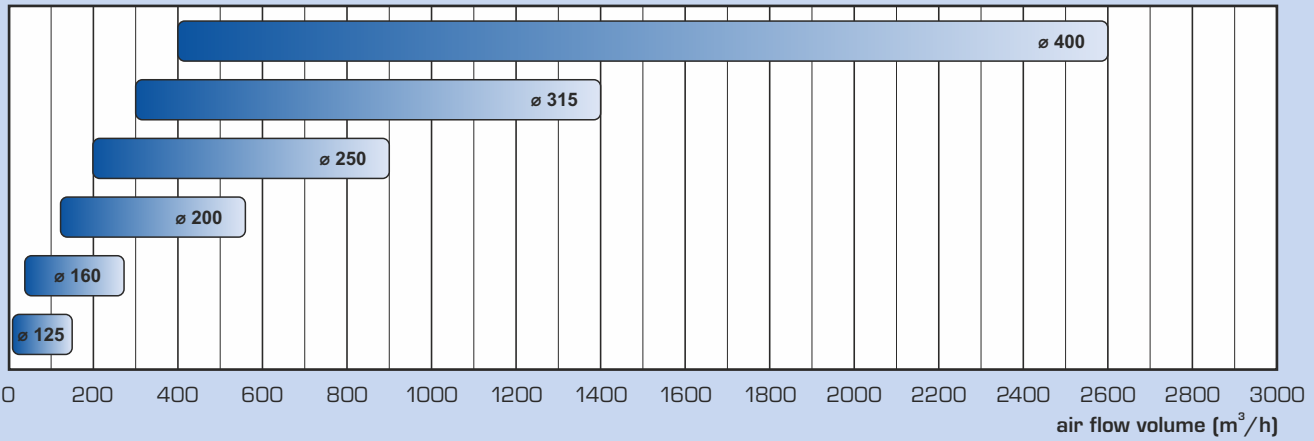


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# TECHNICAL DATA

## SMART BOX SIZE SELECTION

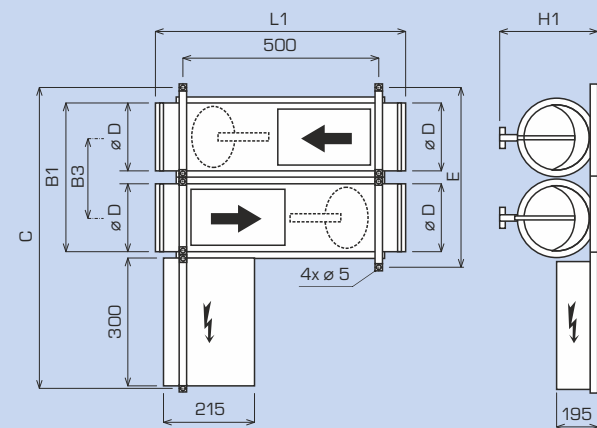


## ACOUSTIC PARAMETERS

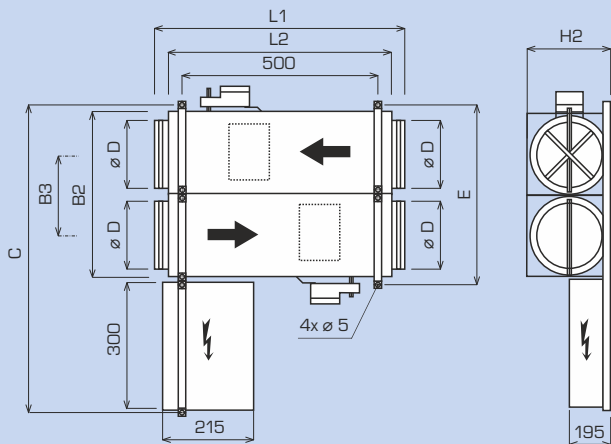
| SMART box | working point      |                        | acoustic performance $L_{WA}$ (dB) |     |     |     |      |      |      |      | $L_{WA}$ (dB) |
|-----------|--------------------|------------------------|------------------------------------|-----|-----|-----|------|------|------|------|---------------|
|           | pressure loss (Pa) | air flow volume (m³/h) | 63                                 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |               |
| 125       | 50                 | 125                    | 45                                 | 44  | 43  | 41  | 33   | 31   | 22   | 19   | 41            |
| 160       |                    | 175                    | 49                                 | 47  | 48  | 45  | 37   | 26   | 21   | 17   | 45            |
| 200       |                    | 550                    | 46                                 | 53  | 49  | 47  | 44   | 40   | 39   | 31   | 50            |
| 250       |                    | 850                    | 56                                 | 43  | 43  | 45  | 45   | 42   | 36   | 28   | 49            |
| 315       |                    | 1 400                  | 56                                 | 43  | 43  | 49  | 45   | 42   | 36   | 28   | 50            |
| 400       |                    | 2 600                  | 45                                 | 46  | 46  | 48  | 35   | 33   | 26   | 22   | 46            |
| 125       | 150                | 125                    | 49                                 | 50  | 54  | 53  | 47   | 44   | 41   | 42   | 54            |
| 160       |                    | 175                    | 43                                 | 54  | 52  | 54  | 48   | 43   | 37   | 32   | 54            |
| 200       |                    | 550                    | 52                                 | 57  | 55  | 53  | 50   | 46   | 44   | 36   | 55            |
| 250       |                    | 850                    | 50                                 | 55  | 53  | 51  | 48   | 44   | 42   | 34   | 53            |
| 315       |                    | 1 400                  | 52                                 | 57  | 55  | 53  | 50   | 47   | 45   | 37   | 56            |
| 400       |                    | 2 600                  | 50                                 | 55  | 58  | 51  | 48   | 45   | 43   | 37   | 55            |
| 125       | 300                | 125                    | 44                                 | 48  | 58  | 60  | 52   | 51   | 50   | 51   | 60            |
| 160       |                    | 175                    | 52                                 | 52  | 57  | 60  | 53   | 49   | 45   | 43   | 59            |
| 200       |                    | 550                    | 56                                 | 60  | 59  | 57  | 52   | 52   | 49   | 40   | 59            |
| 250       |                    | 850                    | 56                                 | 60  | 59  | 56  | 53   | 50   | 48   | 40   | 59            |
| 315       |                    | 1 400                  | 58                                 | 30  | 56  | 55  | 56   | 53   | 51   | 43   | 60            |
| 400       |                    | 2 600                  | 53                                 | 56  | 61  | 57  | 55   | 53   | 45   | 40   | 60            |

## DIMENSIONS

### SMART box without cover



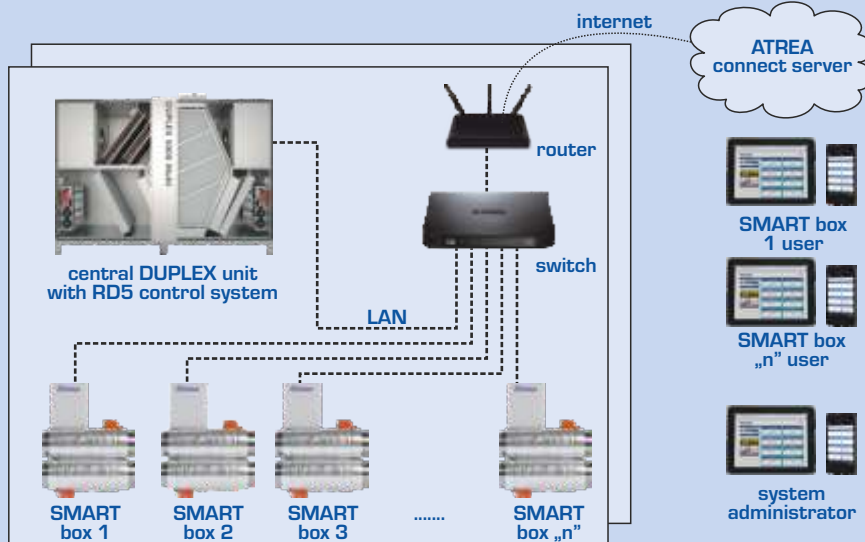
### SMART box with cover



| SMART box | B1 (mm)   | B2 (mm)     | B3 (mm)   | C (mm) | ø D (mm) | E (mm) | L1 (mm) | L2 (mm) | H1 (mm) | H2 (mm) |
|-----------|-----------|-------------|-----------|--------|----------|--------|---------|---------|---------|---------|
| 125/125   | 387       | 397         | 230       | 800    | 125      | 429    | 590     | 540     | 155     | 185     |
| 160/160   | 457       | 467         | 265       | 870    | 160      | 499    | 590     | 540     | 190     | 220     |
| 200/200   | 537 (588) | 547 (659)   | 304 (358) | 1 055  | 200      | 685    | 600     | 550     | 230     | 265     |
| 250/250   | 642 (698) | 647 (781)   | 362 (418) | 1 175  | 250      | 804    | 700     | 650     | 280     | 315     |
| 315/315   | 765 (826) | 777 (905)   | 419 (480) | 1 300  | 315      | 929    | 850     | 800     | 345     | 380     |
| 400/400   | 904 (950) | 917 (1 308) | 505 (569) | 1 470  | 400      | 1 099  | 930     | 850     | 446     | 475     |

Values in brackets are valid for SMART box ø200-400 with servodrives inside

## CENTRAL VENTILATION SYSTEM - BASIC TOPOLOGY

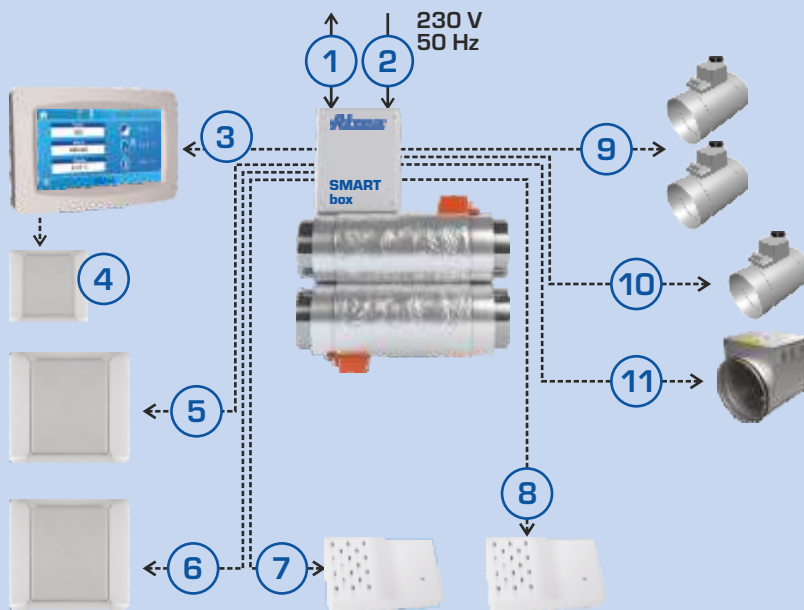


The system framework consists of the individual SMART boxes and the central air conditioning unit of DUPLEX series equipped with the digital control RD5. All devices are connected in a closed communication network (Ethernet interface), which enables continuous communication of the individual components and their mutual optimization.

The router connects the entire system to the Internet and thus to ATREA connect server. Through a system of passwords, this service enables remote administration of the entire system as well as access to each individual SMART box control for the individual users.

## SMART BOX - INTERNAL WIRING

Each SMART box allows connecting to a wide variety of optional components – both at the inputs and outputs. The functionality of the entire system can thus be customized to the specific application, e.g. for the ventilation of apartments in the residential buildings or classrooms at school. Each SMART box is controlled independently of the other boxes by its own section and transmits its requirements to the central unit.



### Required connection

1. LAN connection with the switch (with the central unit and other SMART boxes)
2. Power supply – 1x 230 V/4 A char: B

### Optional connection

3. Controller for the user control (see "Control")
4. External room temperature sensor
5. External inputs – e.g. signals from toilets, bathrooms
6. External inputs – e.g. a signal from a kitchen
7. Analog input 1 – e.g. air quality sensor
8. Analog input 2 – e.g. relative humidity
9. Outputs for 2-zone supply valves (e.g. day/night)
10. Outputs for 1-zone switching exhaust valve (e.g. kitchen)
11. Air heater – hot water or electric heater

## CONTROL

### Mechanical controllers

**CP 10 RA** – ventilation performance adjustment using the rotary switch with the switch off option

**CP 10 RT** – ventilation performance and supply air temperature adjustment (if fitted with the heater) using the rotary switch with the switch off option

### Digital controllers

**CP Touch** – comfortable controller for setting all modes with detailed status display, including failure indication. Allows user access to common functions, weekly schedule setting and adjustment of the entire system. The controller also allows setting a temporary party / holiday mode. Normally includes the built-in room temperature sensor. All values can be set on the well structured colour touch screen. Possibility of more colour variants.

### Remote control

Due to connection of the entire system to the Internet, smart phones and computers can be used for the control. With an intuitive interface, the system can fully control and adjust all parameters.

### Remote administration

The system includes standard and user-friendly menu for the administrators – the system can be remotely monitored and adjusted, the option to automatically receive (e.g. by e-mail) information about errors and failures can be selected. A multilevel system of passwords prevents unwanted intervention.



CP 10 RT controller



CP 10 RA controller



CP Touch controller



CP Touch controller



Control via the **phone**



Administration via **PC**

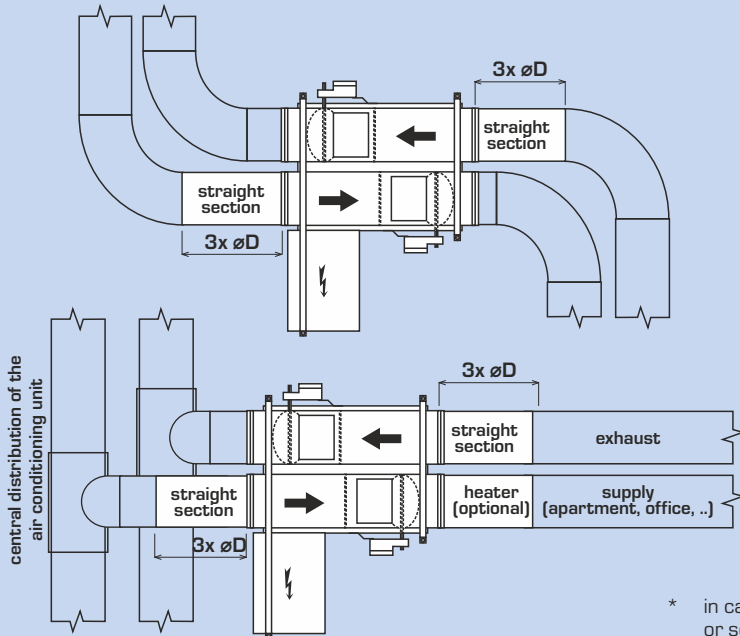
# INSTALLATION

## INSTALLATION

### Straight sections

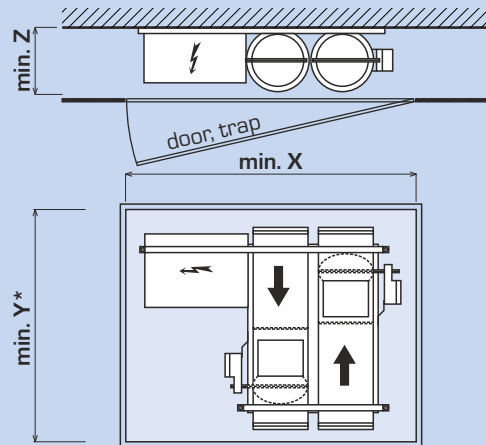
During installation, it is necessary to observe the flow direction through each tube defined by the arrow (measuring element → valve direction), it does not matter whether it is the supply or exhaust tube (defined as a parameter when commissioning the system).

To achieve adequate precision of the flow control it is necessary to keep straight section min.  $3x \varnothing D$  after a change in direction (elbow, etc.) before the tube.



### Access

The SMART box must remain permanently accessible for commissioning of the system and its maintenance – e.g. a door in the ceiling.

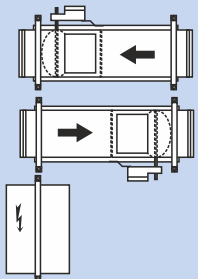


| SMART box | X (mm) | Y* (mm) | Z (mm) |
|-----------|--------|---------|--------|
| 125/125   | 750    | 500     | 225    |
| 160/160   | 850    | 500     | 225    |
| 200/200   | 1 000  | 650     | 270    |
| 250/250   | 1 100  | 750     | 320    |
| 315/315   | 1 250  | 850     | 385    |
| 400/400   | 1 450  | 900     | 480    |

\* in case of the connected heaters (electric or hot water) it must be increased, or solved via private access to the water heater

## CONFIGURATION

### GENERAL CONFIGURATION - DIVIDED \*

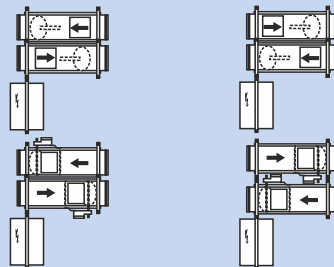


Example of marking  
2x SMART box UNI 125  
1x SMART box RD5

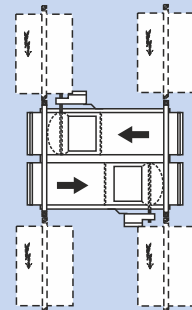
DIAMETERS  
ø125-160

DIAMETERS  
ø200-400

### TUBES CONNECTION - UNIVERSAL \*\*



### TERMINAL CONNECTION - UNIVERSAL \*\*\*



\* maximum distance of RD5 from tubes is 20 m  
\*\* after connection of the supporting frames, a view plan connection terminal with the control system can be connected to any side using the supporting frame  
\*\*\*

## ORDER NUMBERS

|  |   |                  |
|--|---|------------------|
|  | <b>SMART box UNI 125</b> (VAV control tube ø 125)                   | Ord. No. A701012 |
|  | <b>SMART box UNI 160</b> (VAV control tube ø 160)                   | Ord. No. A701016 |
|  | <b>SMART box UNI 200</b> (VAV control tube ø 200)                   | Ord. No. A701020 |
|  | <b>SMART box UNI 250</b> (VAV control tube ø 250)                   | Ord. No. A701025 |
|  | <b>SMART box UNI 315</b> (VAV control tube ø 315)                   | Ord. No. A701031 |
|  | <b>SMART box UNI 400</b> (VAV control tube ø 400)                   | Ord. No. A701040 |
|  | <b>SMART box C 125</b> (metal cover for SMART box UNI 125 - silver) | Ord. No. A701112 |
|  | <b>SMART box C 160</b> (metal cover for SMART box UNI 160 - silver) | Ord. No. A701116 |
|  | <b>SMART box C 200</b> (metal cover for SMART box UNI 200 - silver) | Ord. No. A701120 |
|  | <b>SMART box C 250</b> (metal cover for SMART box UNI 250 - silver) | Ord. No. A701125 |
|  | <b>SMART box C 315</b> (metal cover for SMART box UNI 315 - silver) | Ord. No. A701131 |
|  | <b>SMART box C 400</b> (metal cover for SMART box UNI 400 - silver) | Ord. No. A701140 |
|  | <b>SMART box RD5</b> (measurement and control part, universal)      | Ord. No. A701000 |

|  |  |  |
|--|--|--|
|  | <b>CP Touch controller</b><br>- touch-screen<br>- 4 color versions<br>(white, ivory, grey, anthracite) | Ord. No. A170130<br>Ord. No. A170131<br>Ord. No. A170132<br>Ord. No. A170133 |
|  | <b>CP 10 RT controller</b><br>- white, two temperature ranges  | Ord. No. A170140<br>Ord. No. A170141   |
|  | <b>CP 10 RA controller</b><br>- white color  | Ord. No. A170286   |
|  | <b>Electric heater EPO-V</b>   | according to size  |
|  | <b>Electric heater EPO-PTC</b>   | according to size  |
|  | <b>Router</b>  | Ord. No. A700901   |
|  | <b>Switch 8-port</b>   | Ord. No. A700905   |
|  | <b>Switch 24-port</b>  | Ord. No. A700906   |