

SMART box

sophisticated variable air flow controller (VAV controllers)

Purpose:

Variable air flow controllers SMART boxes are designed to control the air flow in central ventilation systems (VAV systems), which are mainly used in apartment buildings, schools, kindergartens and administrative buildings.

Description:

The air flow controllers are available in six different size variants differing in the maximum possible air volume flow. Each variant includes a precise flow measurement, a control damper of the relevant size, a power distribution board and installation rails for fixing the SMART box to the building construction.

Advantages:

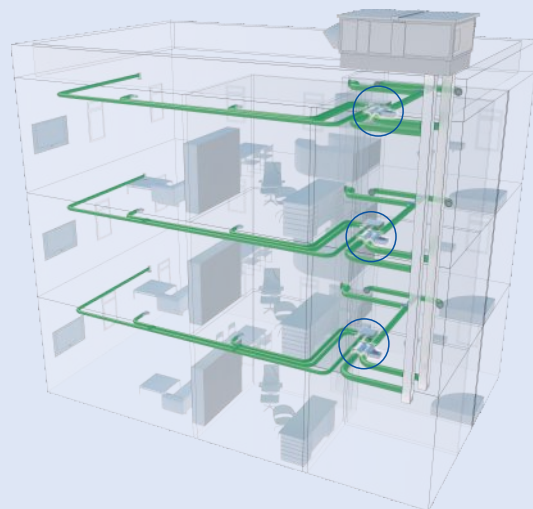
- Accurate flow control throughout the declared range
- Wide range of accessories connectable to each SMART box
- High ventilation comfort based on exact air volume flow control
- Remote control via web interface with internet connection

Advantages central ventilation systems with SMART boxes:-

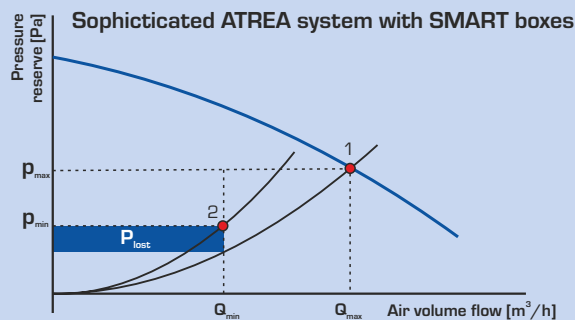
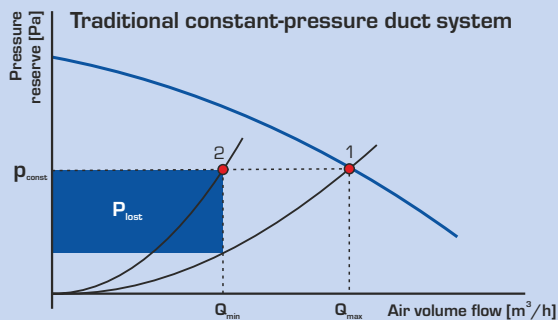
- Unique system solution working on the principle of optimizing the operating point of the central air handling unit according to the requirements of individual SMART boxes.
- Lower noise and energy consumption than traditional constant-pressure duct systems
- Remote control of the complete system
- Possibility calculation of ventilation costs according to information from individual SMART boxes



SMART box



VAV SYSTEM COMPARISON



SMART BOX - GENERAL DESCRIPTION

The whole SMART box includes a two tubes, an electrical distribution board and installation frames. One tube is used for air supply and the second for air exhaust. Both are equipped with a servo drive, control damper and exact air flow measurement. The electrical distribution box includes a control module that provides control of the complete SMART box.

From a design point of view, there are two different variants.

For diameters 125 and 160 is the flow measurement together with the control damper and actuator located inside the tubes, which are

made of galvanized sheet metal with a thickness of 0.6 mm and are insulated with 15 mm thick self-adhesive insulation.

For diameters 200 to 400 are installed crossed in the tube to measure the flow. The servo drive is located outside the tubes, which in this case are made of sheet metal with a thickness of 0,8 mm. They are insulated as in the previous variant.

Both variants also include a revision port for the possibility of service.

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

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.



UNIT VENTILATORS & HEAT RECOVERY

ATREA s.r.o., Čs. armády 32
466 05 Jablonec n. Nisou
Czech Republic



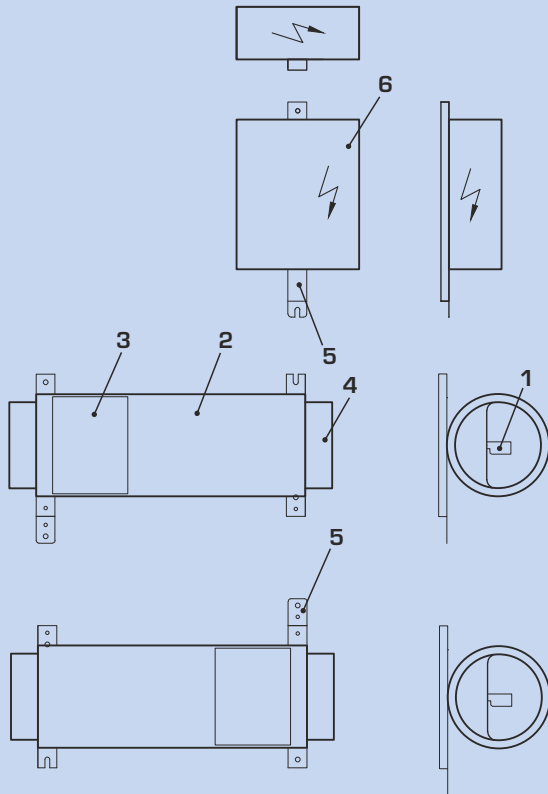
www.atrea.eu

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TECHNICAL DATA

SMART BOXES CONSTRUCTION

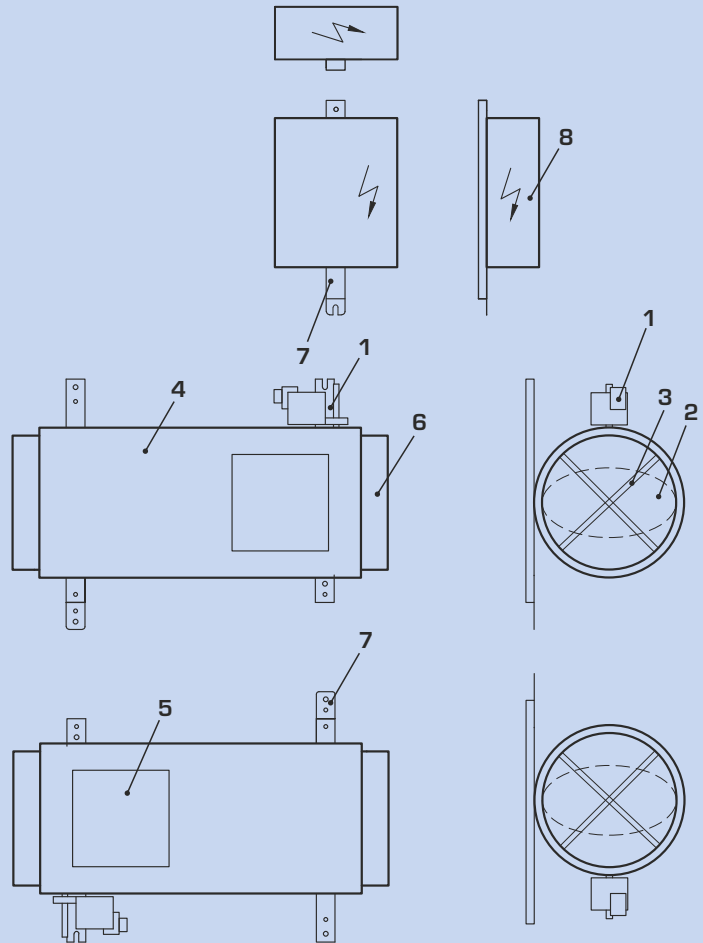
Diameters 125 and 160



Legend:

- 1 Servo drive with regulation damper and flow measurement
- 2 Tube including 15 mm thermal insulation
- 3 Inspection port for access to the inner part
- 4 Outer connection of port dimension
- 5 Supporting frame of the individual parts
- 6 Terminal

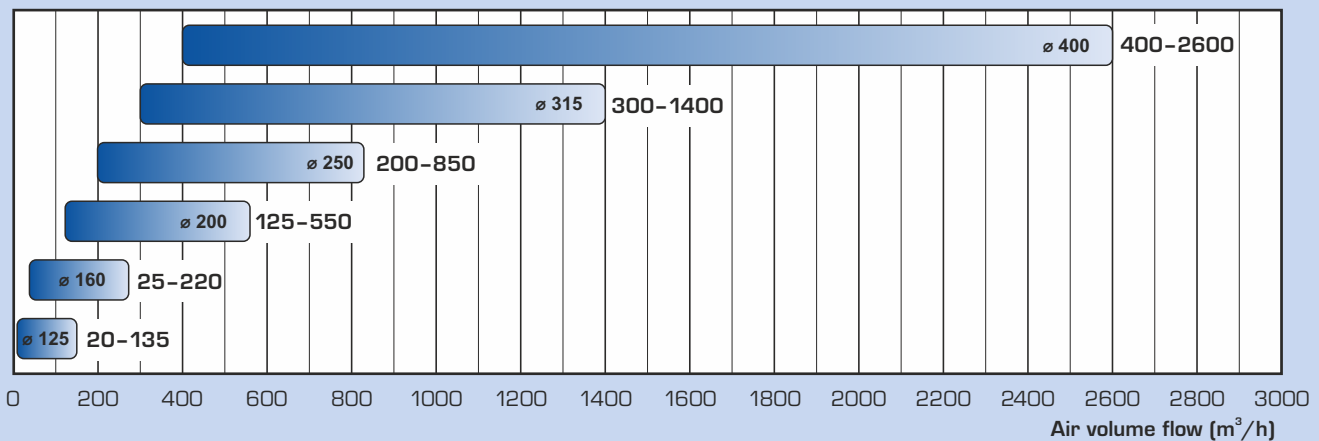
Diameters 200, 250, 315 and 400



Legend:

- 1 Servodrive
- 2 Regulation damper
- 3 Measuring cross
- 4 Tube including 15 mm thermal insulation
- 5 Inspection port for access to the inner part
- 6 Outer connection of port dimension
- 7 Supporting frame of the individual parts
- 8 Terminal

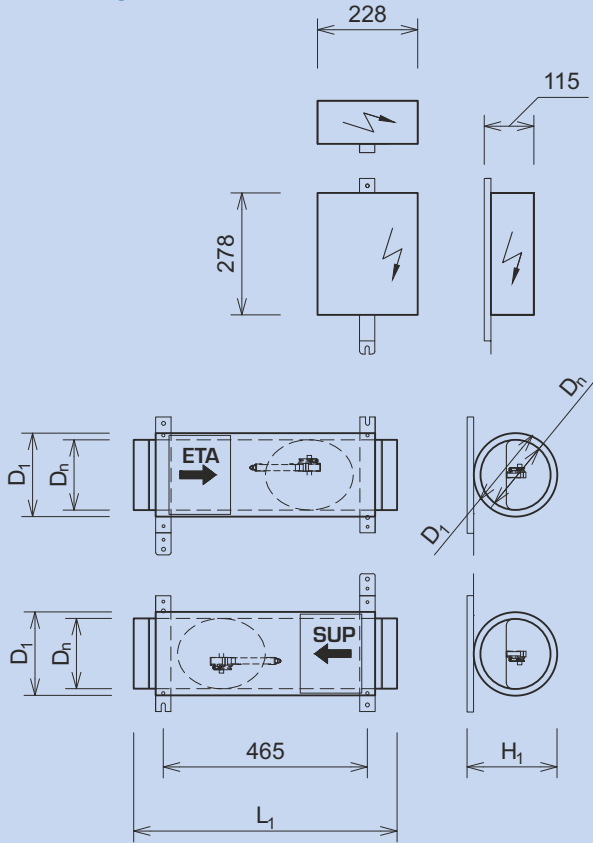
SELECTION OF THE SMART BOX DIMENSION



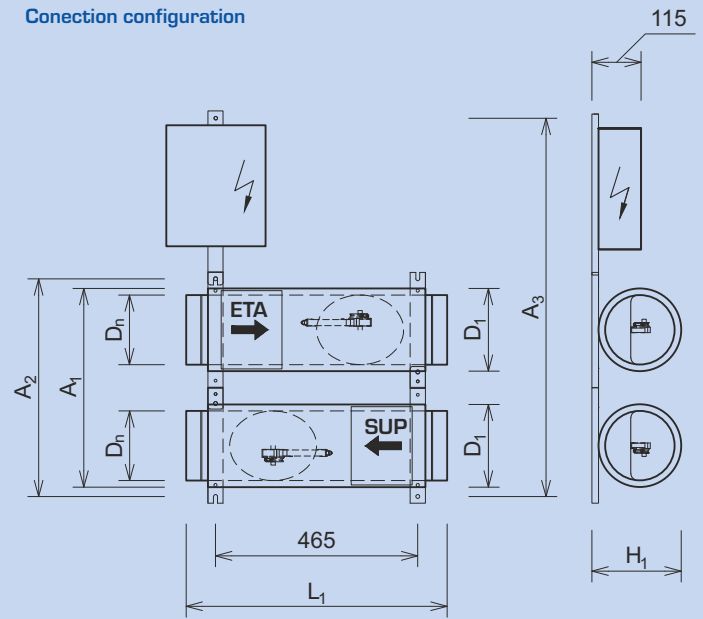
- 1) The graph shows the nominal air volume flow (V_{nom})
- 2) The range of values shows V_{min} and V_{max} for a specified dimension
- 3) V_{min} is set to 20% of V_{nom}
- 4) V_{max} is adjustable from 20-100% of V_{nom}

DIMENSION DIAGRAMS AND DESIGN OF THE SMART BOX - DIAMETERS 125 AND 160

Devided configuration



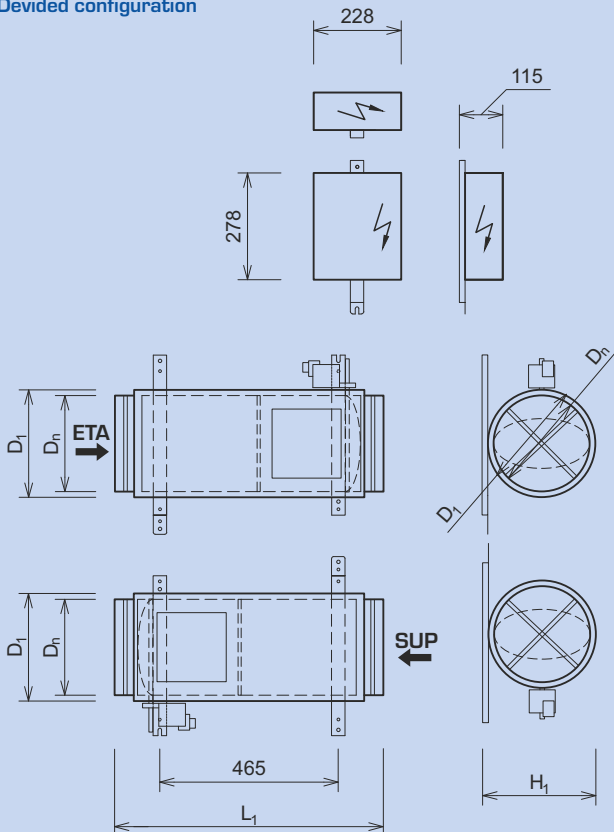
Conection configuration



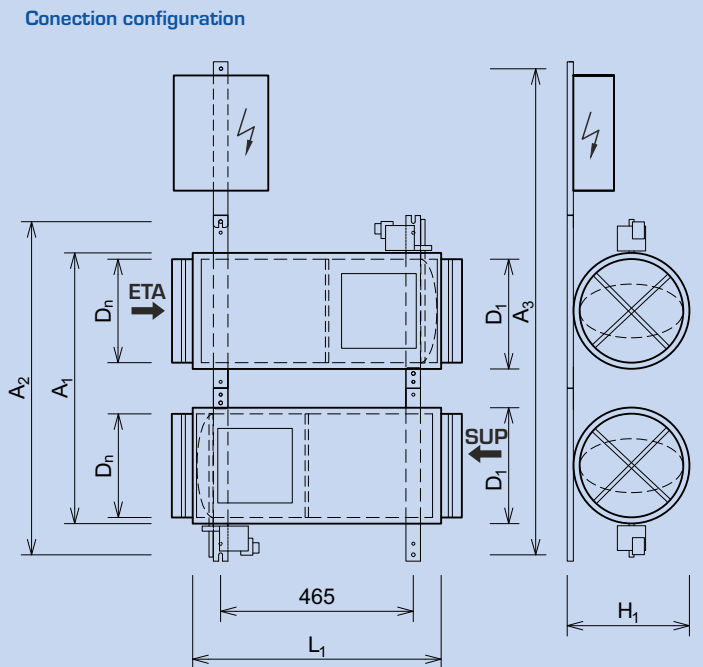
SMART box	$\varnothing D_n$ (mm)	$\varnothing D_1$ (mm)	L_1 (mm)	H_1 (mm)	A_1 (mm)	A_2 (mm)	A_3 (mm)
125/125	125	155	600	170	355	429	80
160/160	160	190	600	205	425	499	870

DIMENSION DIAGRAMS AND DESIGN OF THE SMART BOX - DIAMETERS 200, 250 AND 400

Devided configuration



Conection configuration



SMART box	$\varnothing D_n$ (mm)	$\varnothing D_1$ (mm)	L_1 (mm)	H_1 (mm)	A_1 (mm)	A_2 (mm)	A_3 (mm)
200/200	200	230	600	245	534	534	1057
250/250	250	280	700	295	642	642	1174
315/315	315	345	700	360	765	929	1300
400/400	400	430	700	445	905	1099	1470

DESIGN AND INSTALLATION

ACOUSTIC PARAMETERS

SMART box	Working point		Acoustic performance L_{WA} (dB)								L_{WA} (dB)
	Pressure loss (Pa)	Air volume flow (m^3/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

Note: Acoustic performances for other work points can be found in the ATREA selection software.

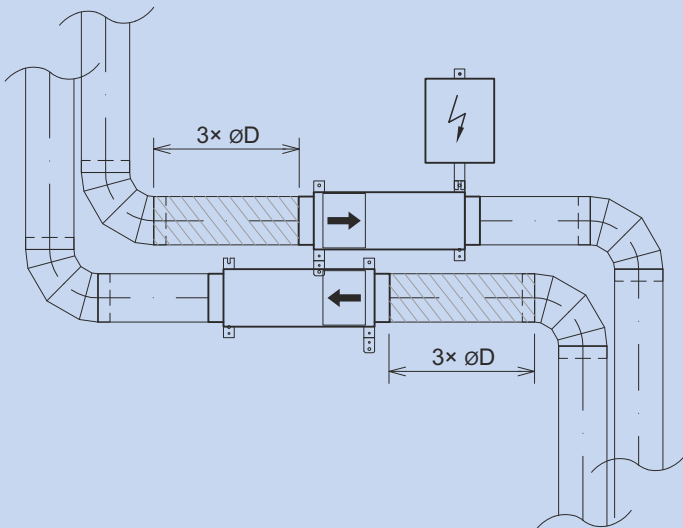
STRAIGHT SECTION - UNIFORM FOR ALL DIMENSIONS

Straight section

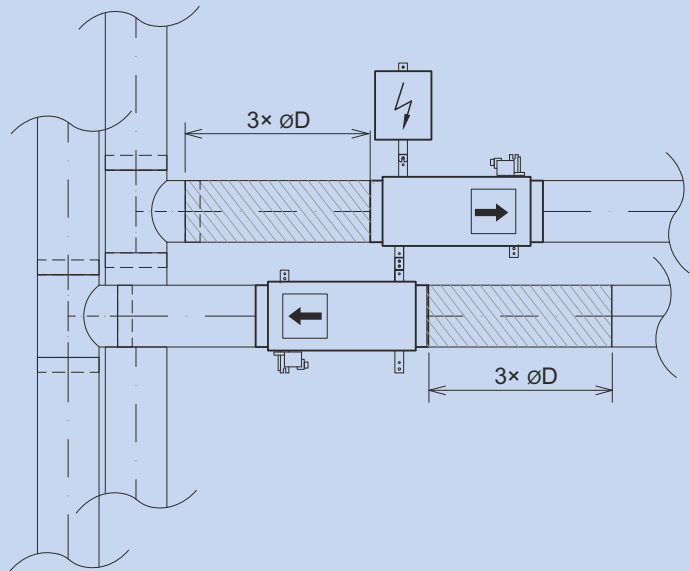
During installation, it is necessary to observe the flow direction which is defined by an arrow on the surface of the tube. It does not matter whether it is the supply or exhaust tubes (defined as a parameter when commissioning the VAV regulator (box)).

To achieve adequate precision of the flow control it is necessary to keep straight section min. $3 \times \varnothing$ connection SMART box port. In case these distances are not observed, the manufacturer is not responsible for incorrect flow measurement.

Diameters 125 and 160



Diameters 200, 250, 315 and 400

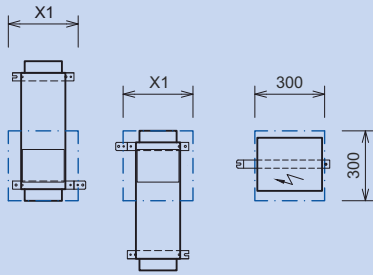


INSPECTION OPENING

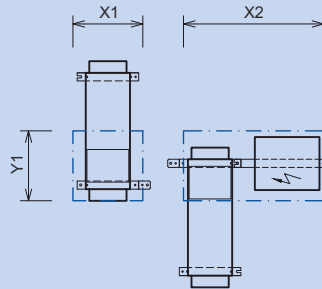
SMART BOX DIAMETERS 125, 160

Devided configuration

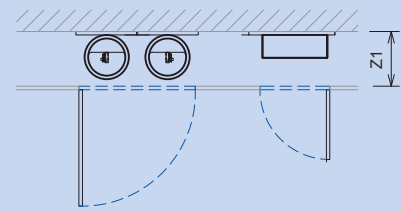
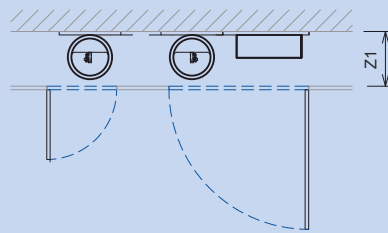
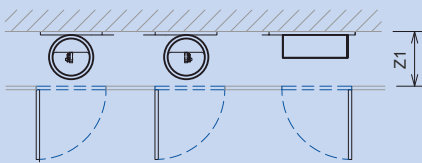
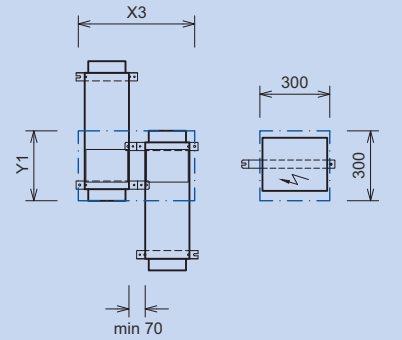
Separate tubes ("stand alone")
with separate terminal



Separate tubes with terminal
connected to one of the tubes

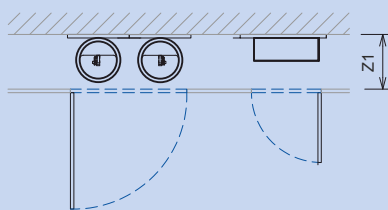
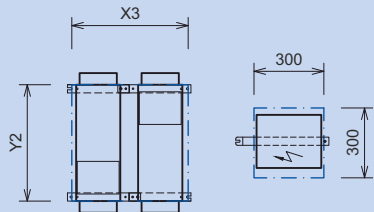


Separate tubes over one inspection opening
with separate terminal

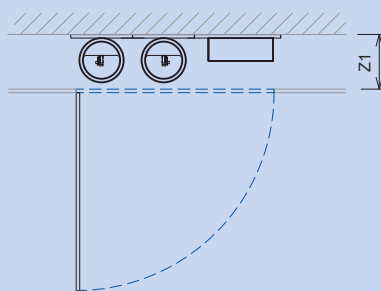
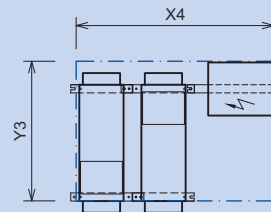


Connected construction

Connected tubes with separate terminal



Combined tubes with connected terminal



MINIMUM DIMENSIONS FOR SERVICE ACCESS

DIAMETERS	X1 (mm)	X2 (mm)	X3 (mm)	X4 (mm)	Y1 (mm)	Y2 (mm)	Y3 (mm)	Z1 (mm)
125/125	200	550	400	800	200	500	500	190
160/160	300	600	500	850	300	500	600	235

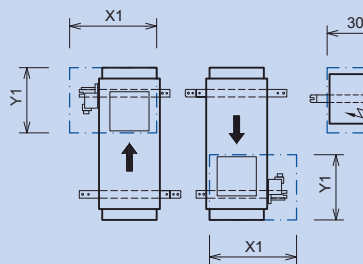
TECHNICAL DATA

INSPECTION OPENING

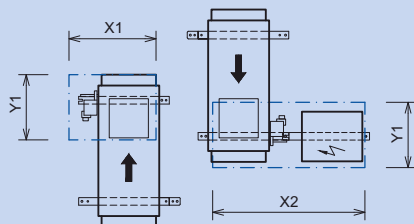
SMART BOX DIAMETERS 200, 250, 315 AND 400

Divided configuration

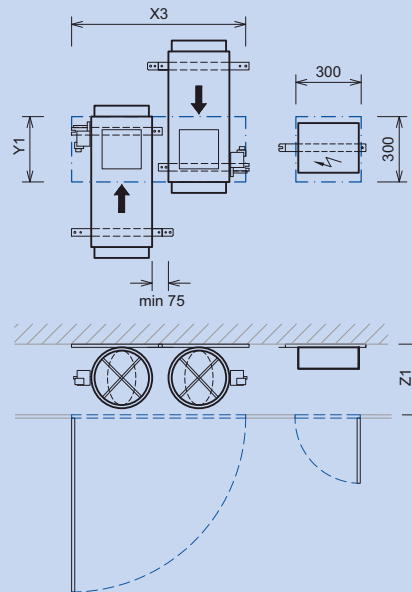
Separate tubes ("stand alone")
with separate terminals



Separate tubes with terminal
connected to one of the tubes

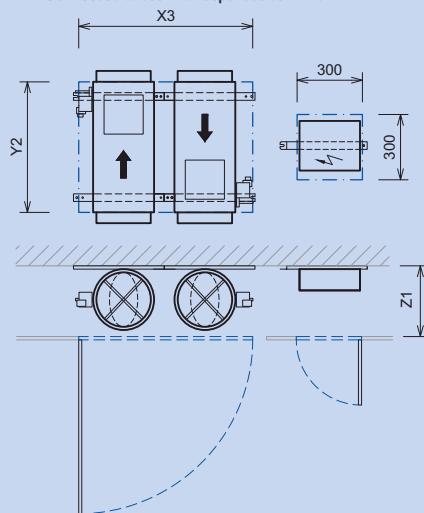


Separate tubes over one inspection opening
with separate terminal

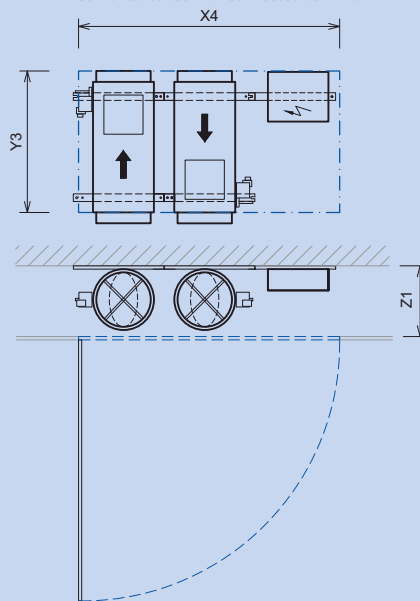


Connected construction

Connected tubes with separate terminal



Combined tubes with connected terminal

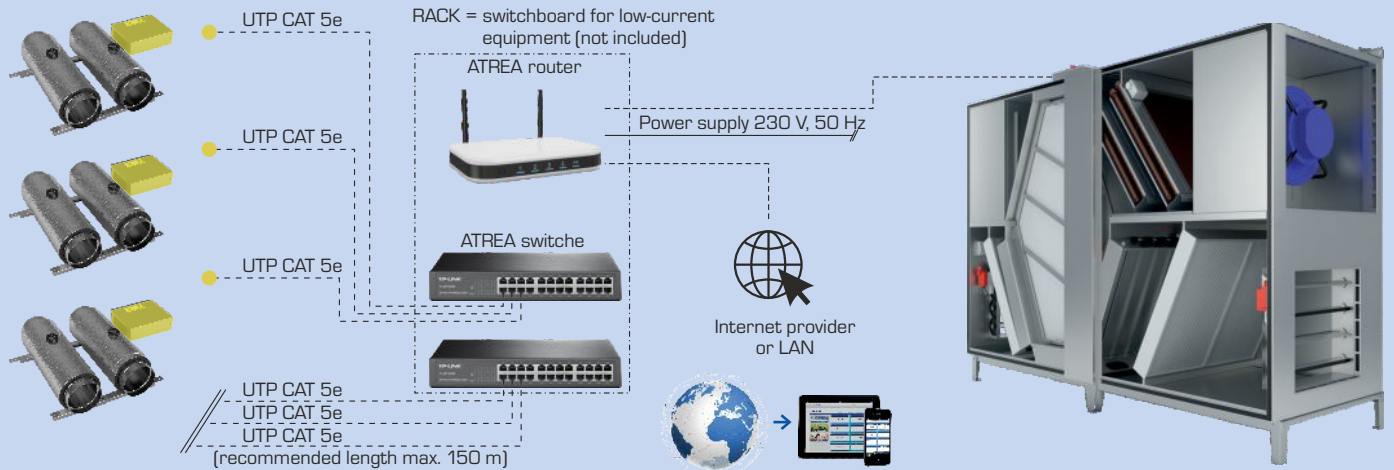


MINIMUM DIMENSIONS FOR SERVICE ACCESS

DIAMETERS	X1 (mm)	X2 (mm)	X3 (mm)	X4 (mm)	Y1 (mm)	Y2 (mm)	Y3 (mm)	Z1 (mm)
200/200	300	700	800	1100	300	500	600	275
250/250	400	700	800	1200	300	600	650	330
315/315	400	750	1000	1400	300	600	650	400
400/400	450	750	1200	1500	300(450)*	600	650	500

*In the case of connecting a substation to a tube over a single inspection opening, due to the different position of the inspection opening on the tube itself it is necessary to make a longer side Y1 (value in brackets)

TOPOLOGY COMMUNICATION NETWORK SYSTEM



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 system can be controlled on demand by the higher-level control by connecting to the ethernet network. Using the router, the complete system is connected to the Internet and gets remote access to the ATREA connect server. This service provides a web interface that allows wireless control of individual SMART boxes by the user or remote control of the entire system by facility management.

SMART BOX - INTERNAL WIRING

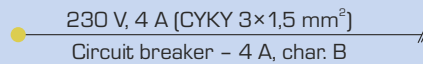
Each SMART box allows connecting to a wide variety of optional components – both at the inputs and outputs. The functionality of the entire system can thus be customized to the specific application, e.g. for the ventilation of apartments in the residential buildings or classrooms at school. Each SMART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

Power supply SMART boxu

Power supply

Required connection

Optional connection

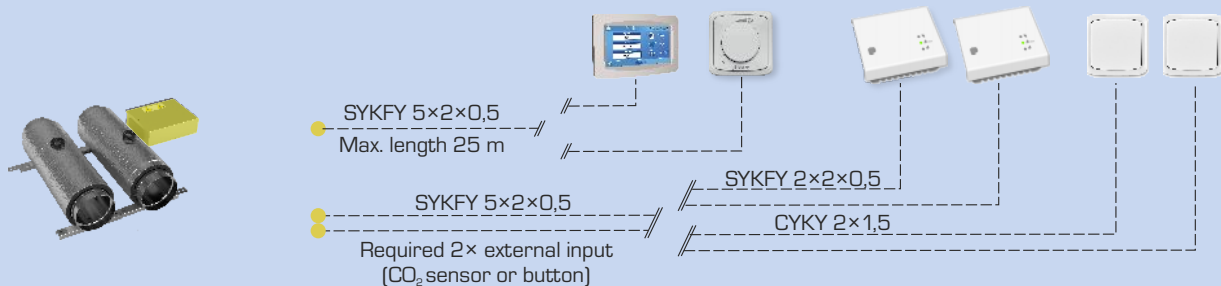


CONTROL OPTIONS

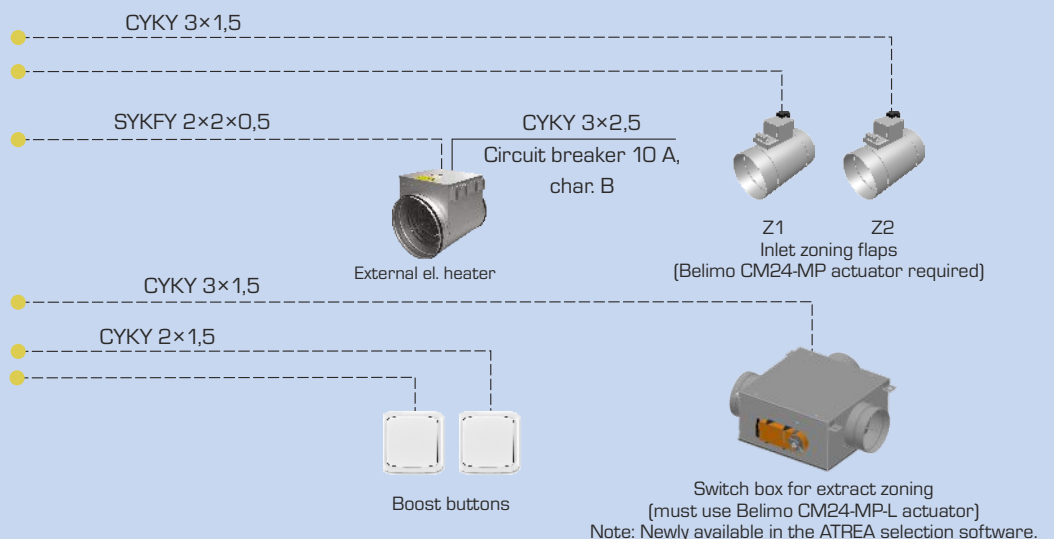
Remote via web interface ATREA connect server (cloud)



Wire input to the terminal



OPTIONAL ACCESSORIES



CONTROL

Mechanical controllers

CP 10 RA – an analogue wall mounted controller allowing to set ventilation power via rotary switch with the possibility of switching off the SMART box (recommended for residential buildings).

CP 10 RT – analogue wall mounted controller allowing to set ventilation power via one rotary switch and supply air temperature with the second one; it also has the possibility to switch off the SMART box.

Digital controllers

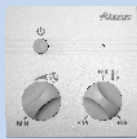
CP Touch – comfortable controller for setting all modes with detailed status display, including failure indication. Allows user access to common functions, weekly schedule setting and adjustment of the entire system. The controller also allows setting a temporary party / holiday mode. Normally includes 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

If the complete system with SMART boxes is connected to the Internet, a smartphone, computer or tablet can then be used to control individual SMART boxes. Simply open the web app on the device and set all parameters, modes and weekly schedule.

Remoter 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.



CP 10 RT controller



CP 10 RA controller



CP Touch controller



Control via phone



Control via PC

ORDER NUMBER

	SMART box UNI 125 (VAV regulator tubus ø 125)	Order. No. A701012
	SMART box UNI 160 (VAV regulator tubus ø 160)	Order. No. A701016
	SMART box UNI 200 (VAV regulator tubus ø 200)	Order. No. A701020
	SMART box UNI 250 (VAV regulator tubus ø 250)	Order. No. A701025
	SMART box UNI 315 (VAV regulator tubus ø 315)	Order. No. A701031
	SMART box UNI 400 (VAV regulator tubus ø 400)	Order. No. A701040
	SMART box C 125 (metal plate cover for SMART box UNI 125 – silver)	Order. No. A701112
	SMART box C 160 (metal plate cover for SMART box UNI 160 – silver)	Order. No. A701116
	SMART box C 200 (metal plate cover for SMART box UNI 200 – silver)	Order. No. A701120
	SMART box C 250 (metal plate cover for SMART box UNI 250 – silver)	Order. No. A701125
	SMART box C 315 (metal plate cover for SMART box UNI 315 – silver)	Order. No. A701131
	SMART box C 400 (metal plate cover for SMART box UNI 400 – silver)	Order. No. A701140
	SMART box RD5 (measuring and control part, universal)	Order. No. A701000

	Controller CP Touch – touch-screen – 4 color versions (white, ivory, grey, anthracite)	Order. No. A170130 Order. No. A170131 Order. No. A170132 Order. No. A170133
	Controller CP 10 RT – white color, two temperature range	Order. No. A170140
	Controller CP 10 RA – white color	Order. No. A170286
	EI. heater EPO-V	according to size
	EI. heater EPO-PTC	according to size
	Router	Order. No. A700901
	Switch 8-port	Order. No. A700905
	Switch 24-port	Order. No. A700906
	TKR SLIM 125 RL-MP – ø 125 (male), Belimo CM24-MPLL	Order. No. R150123
	TKR SLIM 125 T-MP – ø 125 (male), Belimo CM24-MPLL	Order. No. R150124
	TKR SLIM 160 RL-MP – ø 160 (male), Belimo CM24-MPLL	Order. No. R150163
	TKR SLIM 160 T-MP – ø 160 (male), Belimo CM24-MPLL	Order. No. R150164
	TKR SLIM 200 RL-MP – ø 200 (male), Belimo CM24-MPLL	Order. No. R150203
	TKR SLIM 200 T-MP – ø 200 (male), Belimo CM24-MPLL	Order. No. R150204