

AIAS

Technical description



AIAS is a pre-programmed, easy configurable and operable control system for optimizing the energy consumption in demand oriented building ventilation systems with VAV controllers. Also other ventilation system parameters like system static pressure, noise in the duct, on the control and terminal ventilation elements face remarkable improvement by optimizing functionality of AIAS.

The operation principle of AIAS is calculating controlling the optimal fan power according to the operation values of the VAV controllers. The system covers exactly the highest ventilation air demand interpreted by VAV controllers not exceeding the lowest possible fan power to meet this demand.

The minimal configuration of AIAS system is based on one central control unit called AIAS-Combox. It is a compact DDC-controller with pre-programmed functional blocks for optimizing ventilation system energy consumption. It communicates with VAV and room controllers via bus on Exoline and Modbus protocols and so it can be integrated into superior BMS. Such configuration is able to operate in systems with up to 30 VAV devices individually controlling rooms or zones connected to one air handling unit with variable fan speed control. Each space can be operated by a supply and an extract VAV with app. 10 data-points (measurement and control variables) processed by AIAS.

The configuration can be extended by adding next AIAS Combox units each for additional up to 30 VAV devices connected to the same AHU. So the configuration can be scaled up to virtually unlimited number. The real limitation is the number of rooms aerated by the same AHU. The master AIAS Combox tops the chain of control signals from all slave units. It generates the power control signals for the Supply and extract fan. Any AHU or ventilation fan can be controlled by AIAS if it has continuous output power control modulated by the control signal DC 0-10V.

The system can operate also with VAV devices that cannot communicate by bus protocol. Therefore a remote I/O module - AIAS-RIO with analog inputs for reading the VAV feedback signals is available. This opens possibilities to optimize also older or simpler ventilation VAV systems by AIAS.

AIAS

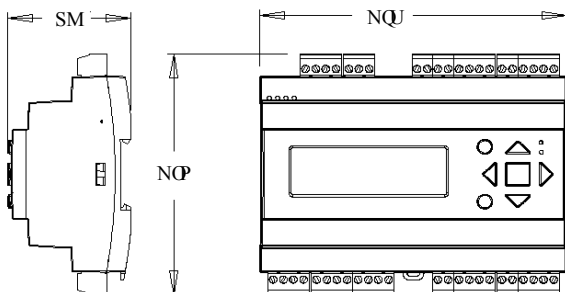
AIAS „combox“



Description

The central piece of the AIAS optimizing system for the demand oriented air handling, flow control and distribution is the AIAS “combox”. It coordinates the operation of air handling unit with all the individual room control elements by a tailored digital control solution without need of additional coding. It covers also the communication functions for direct or remote parametrizing, messaging, management, commissioning, maintenance and BMS integration. The customized set-up, recognition and assignment of the system elements at initial start-up is easy and intuitive using a setup menu.

The capacity of a single AIAS “combox” is sufficient to operate with up to 30 individual room VAV-control loops, where each can contain app. 10 data points (control and measurement variables). The positions of the VAV-controllers are examined separately air supply and for air extract. This enables AIAS “combox” to generate optimized control values individually for the supply and the exhaust fan on the AHU.



Technical data and Dimensions

Supply voltage	24 V AC ±15%, 50...60 Hz or 20...36 V DC
Power requirement	3 VA (without load)
+C output	+ 24 V DC, 0.1 A, short-circuit proof
Communication	EXOline, Modbus or dial-up connection Port 1, isolated, via a built-in RS485 connector.
TCP/IP port	available
Operating system	EXOreal
Battery backup	Memory and real-time clock, at least 5 years
Ambient temperature	0...50°C
Dimensions	148 x 123 x 58 mm (W x H x D). DIN controller width: 8 1/2.
Protection class	IP20
Mounting	DIN-rail mounting or cabinet mounting
EMC emissions & immunity standards:	This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-1 and EN 61000-6-3.
RoHS:	This product conforms to the Directive 2011/65/EU of the European Parliament and of the Council.

INPUTS	
Analogue inputs, AI	0...10 V, 0...200 mV, Pt1000, DIN Ni1000, LGNi1000, 12 bit A/D
Digital inputs, DI	Floating contact, 24 V DC, configurable for pulse input
Universal inputs, UI	UI AI or DI (see above)
OUTPUTS	
Analogue outputs, AO	0...10 V, 5 mA, 8 bit D/A, short-circuit proof
Digital outputs, DO	Mosfet 24 V AC/DC, 2 A. Totally max 8 A.
24 V DC output	0.1 A, short-circuit proof

Connection 10Base-T/100Base-TX auto-negotiation (RJ45).
Cable length max 100 m (min Cat 5)
Protocol EXOline-TCP
Power requirement + 2,5 VA in addition to the basic requirement
Measurements in mm

Mobile Configuration and commissioning display



Description

Directly connected to AIAS "combox" the pocket display module enables access to the system configuration and variables for reading and editing directly at site. Different user authorisation and access levels are adjustable.

Technical data and Dimensions

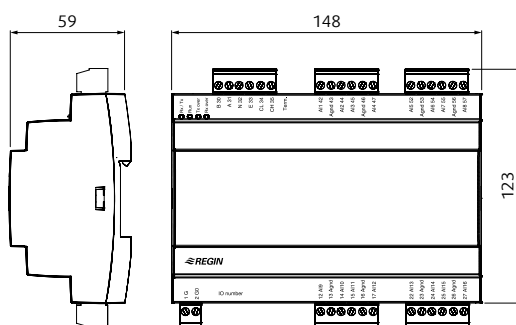
Protection class IP40
Power supply internal via communication cable from AIAS "combox"
Connection cable 3 or 10 m with RJ12 fast connector to AIAS "combox"
Display backlight, LCD, 4 rows with 20 characters
Character height 4.75 mm

AIAS Remote I/O modul 16x AI



Description

The RIO module can be used if additional measurement of analog values is required by the system. The unit communicates the values via ExoLine data bus to the AIAS "Combox" - max. two RIO modules. The 16 analog inputs are configurable for signals of DC0-10V, 4-20mA, resistive load 10kOhm, Pt100, Ni100. This makes possible connecting of different measuring transmitters. The 10kOhm input can be used for connecting the VAV-feedback signals from the VAV controllers without bus connectivity (common in retrofit).



Technical data and Dimensions

Supply voltage	24 V AC/DC ±15 %, 50...60 Hz
Power consumption	Max. 3.5 VA
Communication	EXoLine, CAN-Bus
Operating temperature	0...50°C
Storage temperature	-20...+70°C
Ambient humidity (operation)	Max. 90 % RH
Protection class	IP20
Mounting	DIN-rail or in a standard casing
Dimensions	148 x 123 x 59 mm (WxHxD) incl. terminals
DIN-rail module width	8.5

INPUTS	
Analogue inputs, AI	PT1000, Ni1000 (only CAN-Bus), microsensors, 0...10 kΩ, 0...10 V, 0(4)...20 mA
	Low Voltage Directive (LVD) standards: This product conforms to the requirements of the European Low Voltage Directive (LVD) 2006/95/EC through product standards EN 60730-1 and EN 60730-2-9.
EMC emissions & immunity standards:	This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-3:2001 and EN 61000-6-1:2001.
RoHS:	This product conforms to the Directive 2011/65/EU of the European Parliament and of the Council.

AIAS Room Controller RC-C3DOC



Description

The room controller manages the room air quality by measuring the actual selected value like temperature, CO2 content, humidity etc. Compared with setpoint the control value for connected VAV controller(s) is generated. Override functions like occupancy, window contact, external emergency interlocks, change-over, free cooling are available.

The bus communication with AIAS „combox“ passes via ExoLine.

Technical data and Dimensions

Supply voltage	18...30 V AC, 50...60 Hz
Internal consumption	2.5 VA
Ambient temperature	EXoline, CAN-Bus
Ambient humidity	Max 90 % RH
Storage	-20...+70°C
Terminal blocks	Lift type for cable cross-section 2.1 mm ²
Protection class	IP20
Material casing	Polycarbonate, PC

COLOUR	
Cover	Polar white RAL9010
Bottom plate	Light gray

Weight	110 g
Dimensions	95 x 95 x 28 mm

COMMUNICATION	
Type	RS485 (EXoline)
Communication speed	9600, 19200, 38400 bps (EXoline)
Galvanically isolated port	No
Memory	
Non-volatile (EEPROM)	All settings and configurations are preserved

BUILT-IN TEMPERATURE SENSOR	
Type	NTC, linearised, 15 kOhm
Measuring range	0...50°C
Accuracy	+/-0.5°C at 15...30°C
Display type	LCD with background illumination

LVD, Low Voltage Directive	This product conforms with the requirements of European LVD standard IEC 60 730-1. EMC emission and immunity standard. This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-1 and EN 61000-6-3.
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RoHS	This product conforms to the Directive 2011/65/EU of the European Parliament and of the Council.
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INPUTS	
AI1	PT1000-sensor, 0...50°C, accuracy +/- 0.1°C
UI	AI: PT1000-sensor, 0...100°C, accuracy +/- 0.2°C or AI2: 0...10 V or DI
CI	Window contact
DI	Closing potential-free contact connected to +C in one end
OUTPUTS	
UO	DO:24 V AC, max 2.0 A or AO:0...10 V DC, max 5 mA
+C, power output for DI only	24 V DC, max 10mA, short circuit protected

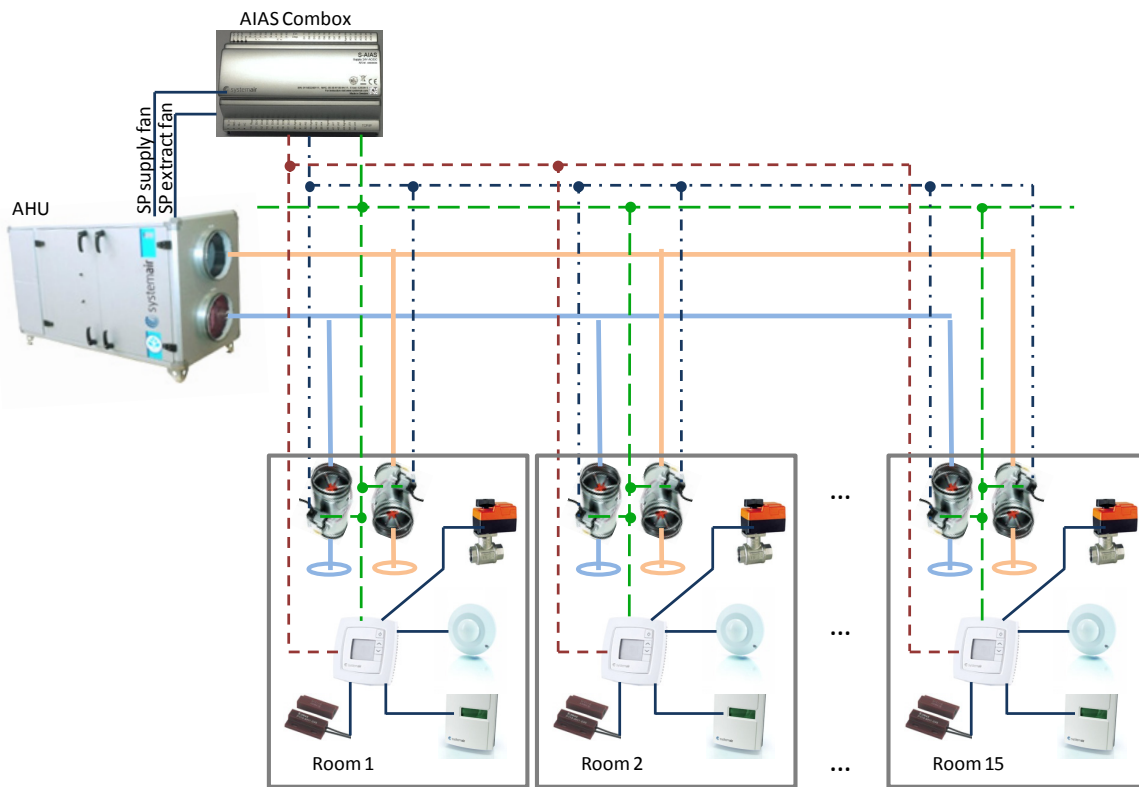
AIAS – typical system topologies

Legend:

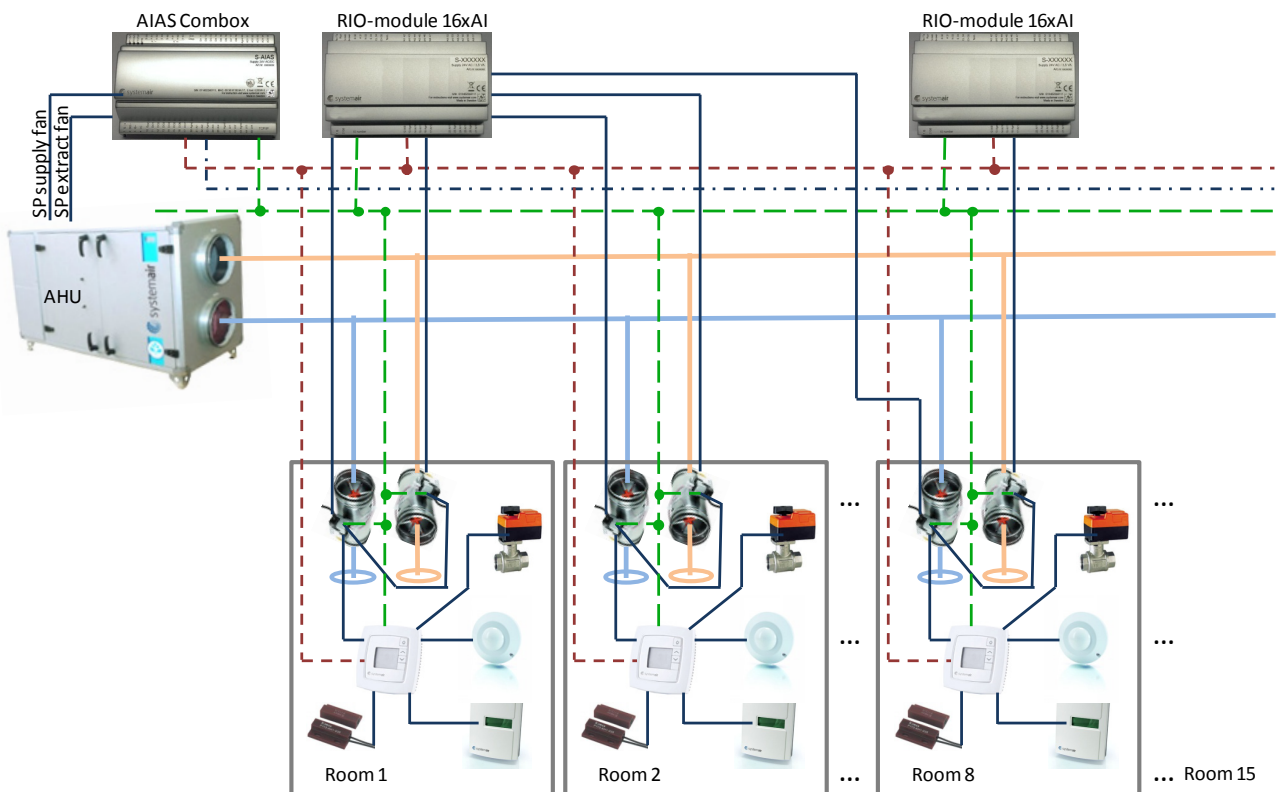
- ModBus RTU (bus)
- ExoLine (bus)
- Analog or binary signal
- AC24V

- Room control unit
- Window contact
- VAV Controller
- Sensor/Transmitter CO2, Humidity, etc.
- Occupation switch
- Heating / Cooling control actuator

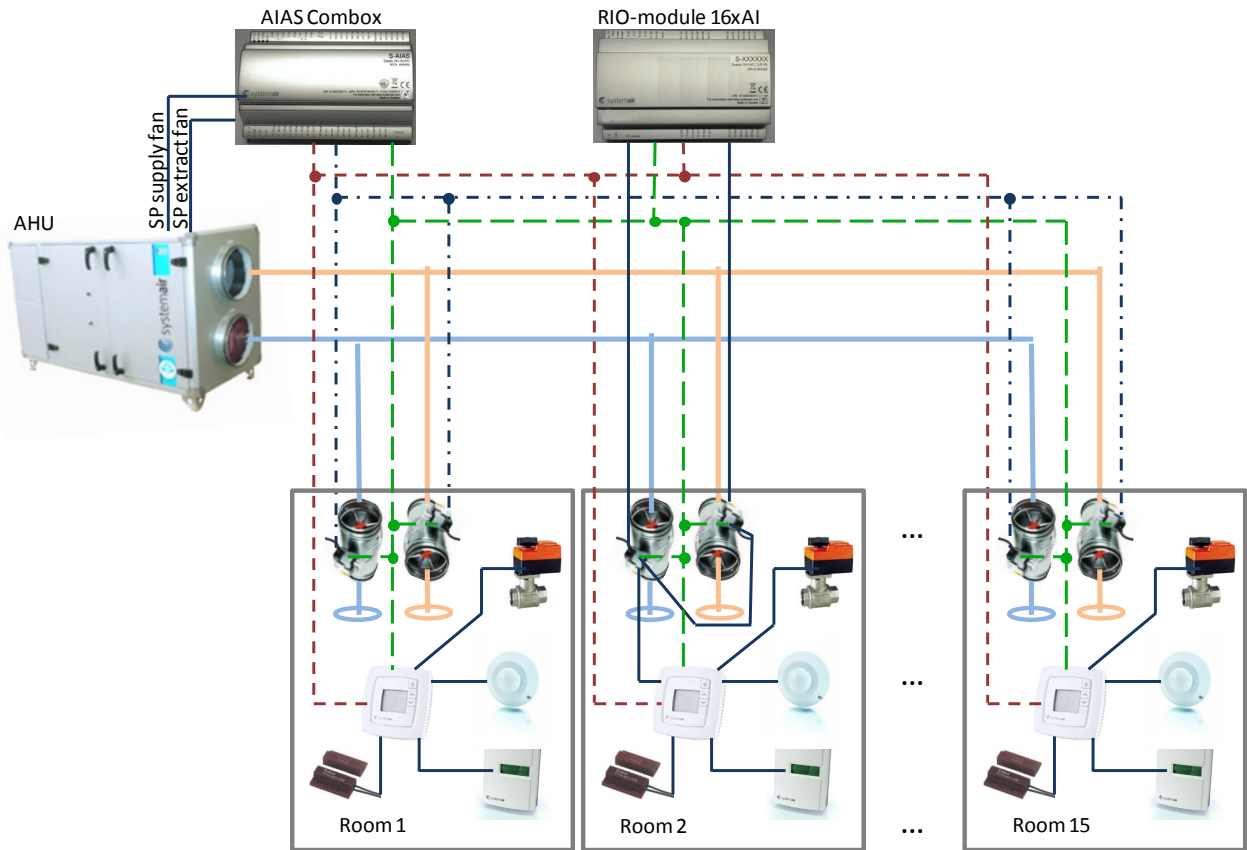
Individual room control (IRC), supply and extract VAV controllers with Modbus communication.
Up to 30 VAVs / Up to 15 rooms



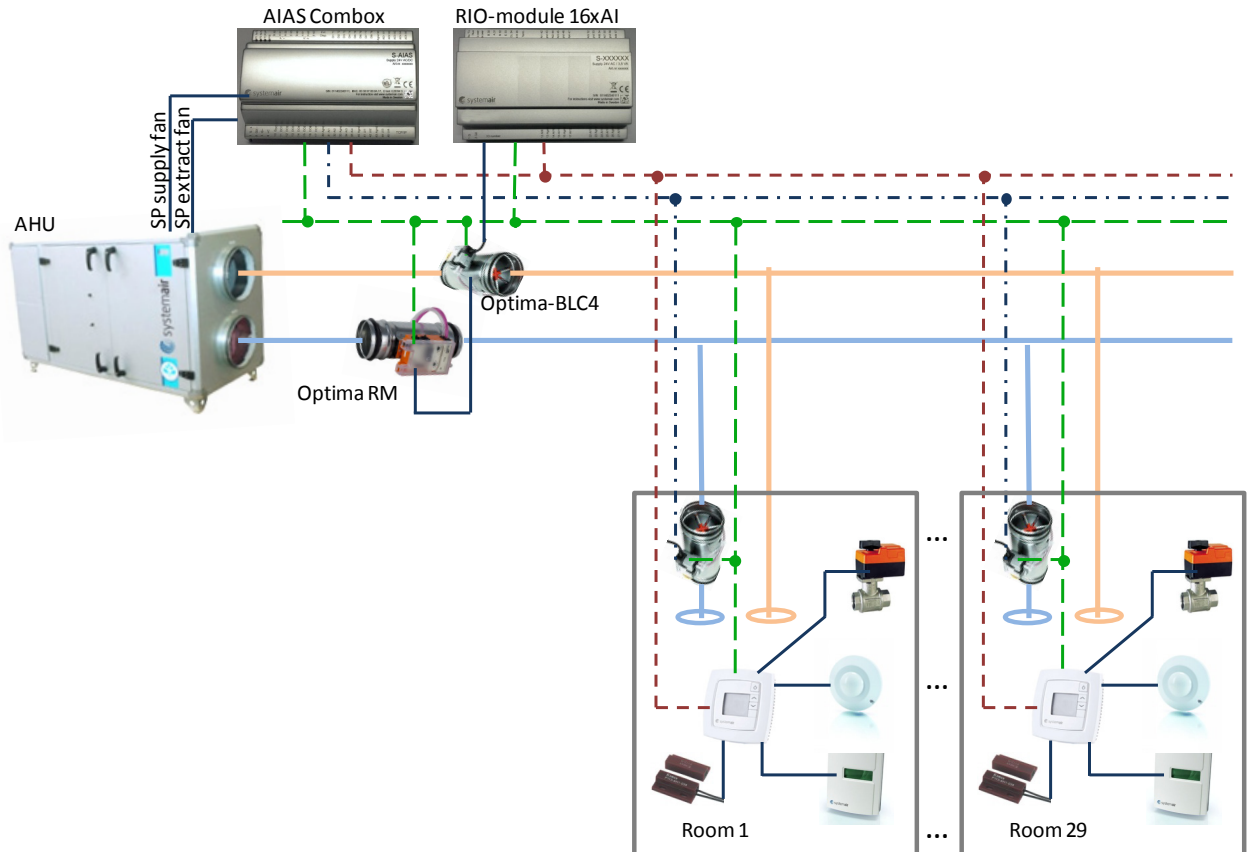
Individual room control (IRC), supply and extract VAV controllers with analog feed-back signal.
Up to 30 VAVs / Up to 15 rooms



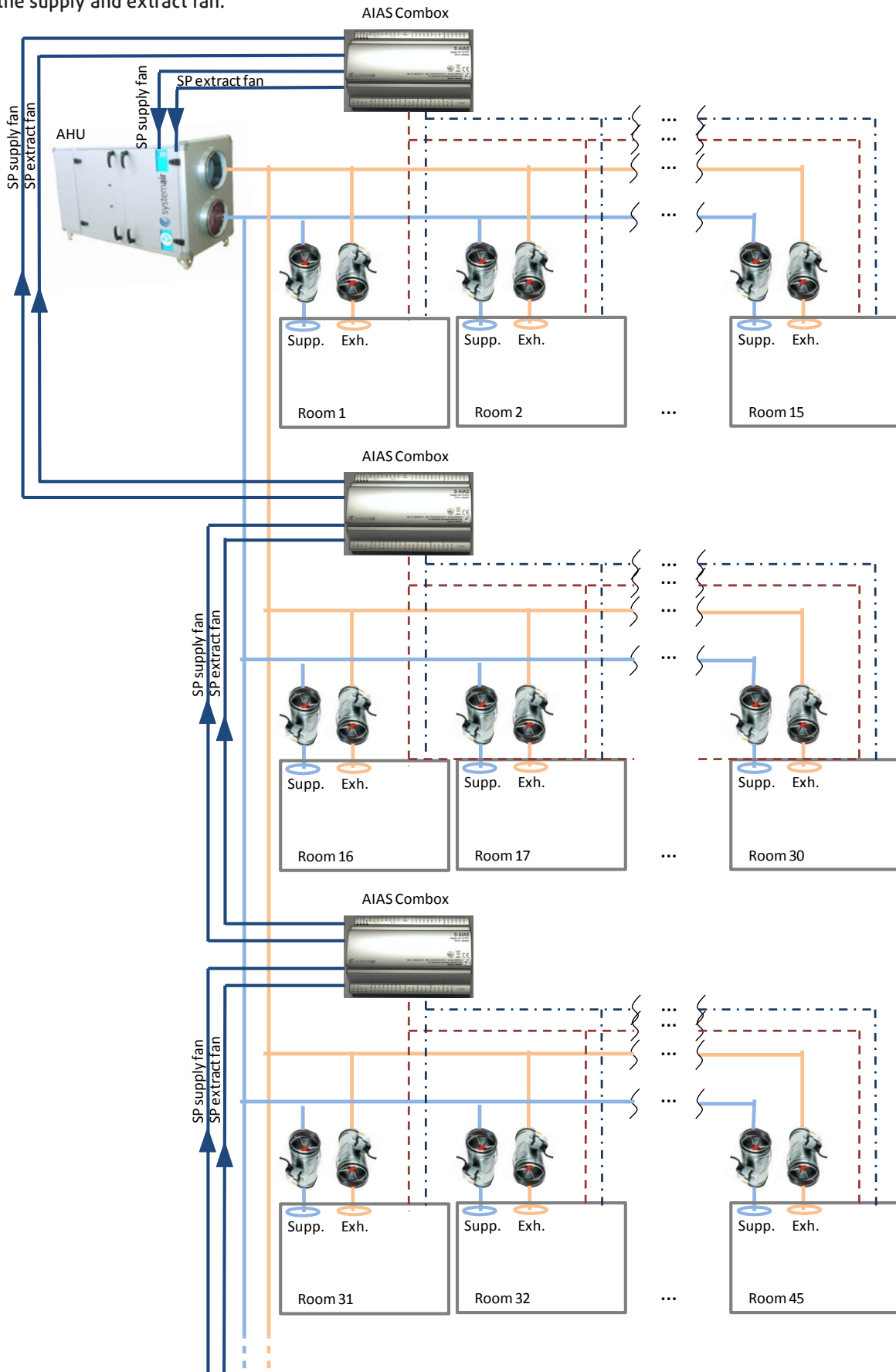
Individual room control (IRC), supply and extract VAV controllers with Modbus communication (1, ...15) and with analog feed-back signal (room 2). Up to 30 VAVs / Up to 15 rooms



Individual room control (IRC) supply VAV controllers with Modbus communication. Zone control extract VAV with analog feed-back signal and supply flow measurement. Up to 29 VAVs in 29 rooms, 1 VAV in zone extract.



Individual room control (IRC), supply and extract VAV controllers, more than 30 VAV devices on one AHU. The AIAS Comboxes are connected to the chain by analog setpoint signals (1 for supply, 1 for extract fan). Each Combox compares own calculated setpoints with SP from Combox lower in the chain. The higher SP from this comparison passes to the Combox higher in the chain. So the Combox highest in the chain sends the highest setpoints of all to the supply and extract fan.





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