AIAS
Efficient Demand Controlled Ventilation System
AIAS
A revolution in demand controlled ventilation!

Demand Controlled Ventilation adjusts the level of air to the room’s actual needs. This means that a high indoor climate quality can be achieved at the same time as energy consumption is kept to a minimum.

AIAS- optimise your system

The demand controlled ventilation is a powerful instrument to influence many aspects of room climate quality like temperature, humidity, CO2 or particles content and others. For many years our customers and we could experience these quality benefits in public buildings, offices, sport halls, hospitals, schools etc. Traditionally high room air quality was achieved through demand oriented VAV-systems.

Systemair always stands for quality, as well for efficiency. With our new AIAS system, we will boost the efficiency of your demand oriented climate control to a higher level.

Spend only as much energy as it is required to produce high quality air to meet ventilation demands of the rooms at every moment. Spend only as much of financial resources, engineering, installations, automation and maintenance, to meet the demand on high efficient automated controlled ventilation system.

Meet AIAS.

Introduction

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 AIAS system consists of 4 components

1. **AIAS "Combox"**
   - The central piece of the AIAS optimizing system 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. Each AIAS "combox" can manage up to 30 individual room VAV-control loops, each can contain appx. 10 data points.

2. **Mobile configuration & commissioning display**
   - Directly connected to AIAS "combox" is the pocket display module, enabling access to the system configuration and variables for reading and editing directly at site.

3. **AIAS Remote I/O module 16x AI**
   - The RIO module is used for additional measurement of analog values if required by the system. The unit communicates the values via ExoLine data bus to the AIAS "combox".

4. **AIAS Room controller**
   - Directly connected to AIAS "combox" is the pocket display module, enabling access to the system configuration and variables for reading and editing directly at site.
AIAS - Efficient Demand Controlled Ventilation

Easy linkage for optimised ventilation.

System Characteristics

- Operability with any air handling unit or fan system with continuous fan power control by DC 0-10V signal
- Separate fan power optimization for the supply fan and for the exhaust fan by a single AIAS “Combox” central control unit.
- Up to 30 separate rooms or zones with VAV control each with up to 10 operation variables can be connected by bus communication to a single AIAS “Combox” central control unit and participate in optimized operation of the corresponding air handling unit.
- Virtually unlimited number of AIAS “Combox” central control units can be connected in cascade in order to optimize operation of the corresponding air handling unit.
-Reduction of fan power to a minimum, that just can cover the ventilation demand. Thereby saving of electrical energy and air quality processing energies (heating, cooling etc.)
- Minimizing the static air pressure in the duct to a level that just can cover the ventilation demand.
- Minimizing the pressure loss and noise generation on the VAV-dampers by operation in possibly most open position due to minimized duct pressure.
- Easy system build-up.
- Easy system configuration and start-up via display menu.
- Open system architecture for subsequent expansion and integration.
- Integration of both, analog- and bus-communicating VAV controllers, retrofit ability.
- Operation with overrides and interlocks like fire alarms, heat/cold change-over, free cooling etc.
- Calendar/time schedule dependent operation.
- Alarm handling, messaging and acknowledging with priority levels.
- Recording functionality.
- Web interface, remote management.

Both commissioning and in-service monitoring is easy with the unique smart functions and integrated web server. Good room comfort is combined with optimal operating economy. The supply air temperature is adjusted to reduce the need for external heating and cooling air flow.

Functions

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.

Commissioning

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
Examples of room & zone solutions

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

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

3. 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

4. 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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**AIAS**

**Typical system topologies**

**LEGEND**

- --- --- ModBus RTU (bus)
- --- --- Analog or binary signal
- --- --- ExoLine (bus)
- --- --- AC24V
- Room control unit
- Sensor / transmitter
- CO2, humidity, etc.
- Window contact
- Occupation switch
- VAV controller
- Heating / cooling control actuator

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The straight choice for good indoor climate at low energy cost!!

**For property owners**
- System optimisation minimizes operating cost and CO2 footprint
- Single supplier for all your climate systems
- IP connect available
- Can use the buildings existing Ethernet network

**For consultants**
- A cost effective system for low energy costs
- Systemair Air Handling Units provide maximum AIAS functionality
- Uses open communication protocols
- Simple but flexible system layout/selection

**For installation/MONITORING engineers**
- Automatic fault-tracing
- Smart functions facilitate commissioning
- Balancing mode that returns to normal mode automatically
- Batch process function to make changes to multiple parts of the system in one action

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IPSUM from Fläkt Woods