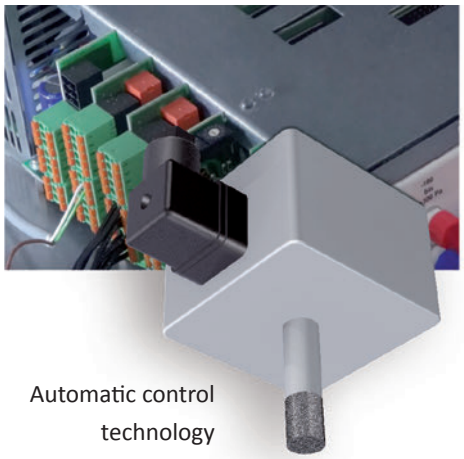
REVEN Speed Control via VAV700

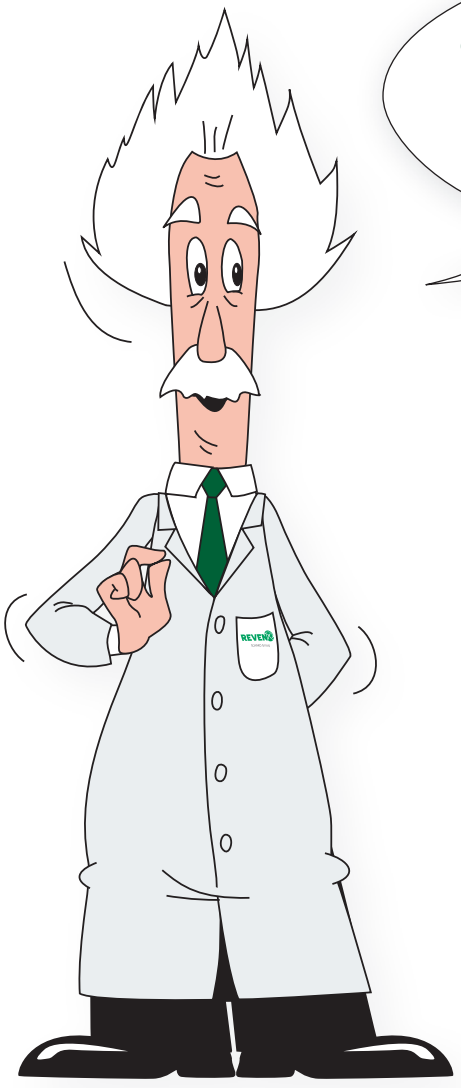
REVEN
SCHAKO Group

Contents

1. General notes 2
2. Documents required for dimensioning 3
3. Notes concerning the design of hoods with RSC ..3
3. Operating modes 5
4. Wiring 6
5. Connection to the Building Management System (BMS) 8
6. Alarm limits 11
7. Commissioning 12



Automatic control technology



Clean indoor air and a healthy working environment – the capture and separation of air pollutants is our core competence!

Professor Smart

1. General notes

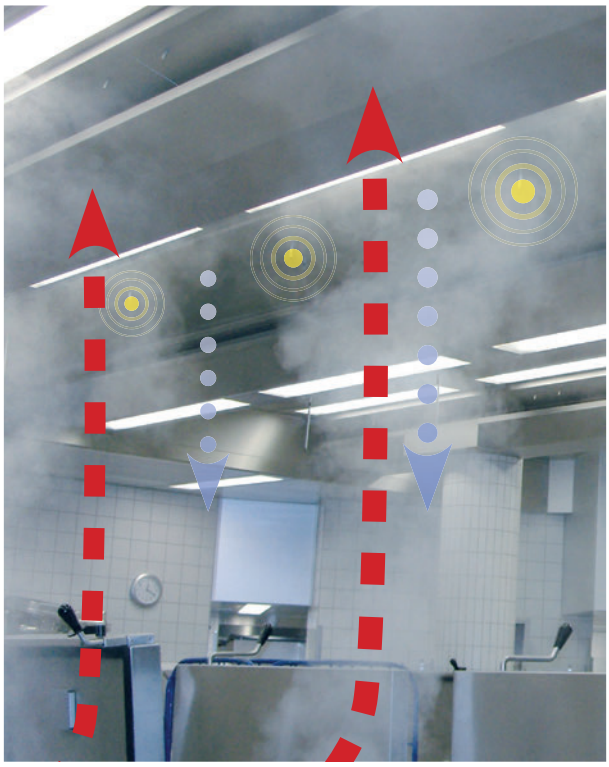
1) The REVEN Speed Control system from Rentschler REVEN cannot control the frequency inverter. For this purpose, an appropriate duct pressure control must be provided by the customer.

2) To ensure the perfect functioning of the system, the control system of the supply air must be equipped with volume flow controllers made by SCHNEIDER Elektronik GmbH.

3) If the volume flow measurement is handled by the separators of the REVEN® hoods, these may only be removed for cleaning purposes if the system is in operating mode "OFF", otherwise the system switches to the alarm state.

2. Documents required for dimensioning

1) Division into zones (REVEN)
2) Air volume calculation for the hoods (REVEN/SCHNEIDER)
3) Floor plans of the rooms to be equipped (ventilation engineer/planner)
4) Preliminary design of the duct network to determine and dimension the volume flow controller for the supply air
5) Data transfer to the BMS
   a. BACnet IP
   b. Modbus IP
   c. analog/digital



Visualized airflows when using RSC
Yellow: sensors in operation
Red: exhaust airflow/cooking fumes
Blue: supply airflow

3. Notes concerning the design of hoods with REVEN Speed Control

1) Flow rates (air volumes)

a. Separator size: 450 x 300 mm
   Vmax = 400 m³/h per separator
   Vmin = 120 m³/h per separator (30 % of Vmax)

b. Separator size: 450 x 400 mm
   Vmax = 500 m³/h per separator
   Vmin = 150 m³/h per separator (30 % of Vmax)

2) Airflow velocities

During operation (extraction and supply of air), the volume flow **Vmax** at the connection sleeve should not exceed a flow velocity of v = 6 m/s in order to keep noise emissions (flow noise) low.

If the specified value is exceeded, the required sound pressure level of less than 62 dB(A) can only be achieved with sophisticated sound attenuation.
The maximum volume flow **Vmax** to be controlled should therefore always remain approximately 40 % below the nominal volume flow **Vnom** of the louvered damper or the volume flow controller.

3) Sound power level in dB(A)

For the design of kitchen extractor hoods with REVEN Speed Control, louvered dampers are required for constructive reasons. However, they may increase the airflow velocity significantly and also cause high noise emission.
Decisive for the reduction of noise emission is the determination of the correct size of the louvered dampers in accordance with the manufacturer's specifications. Of equal importance is the correct testing of the resulting sound pressure level with consideration of the duct inlet pressure, the flow cross-section of the louvered dampers and the required volume flow.

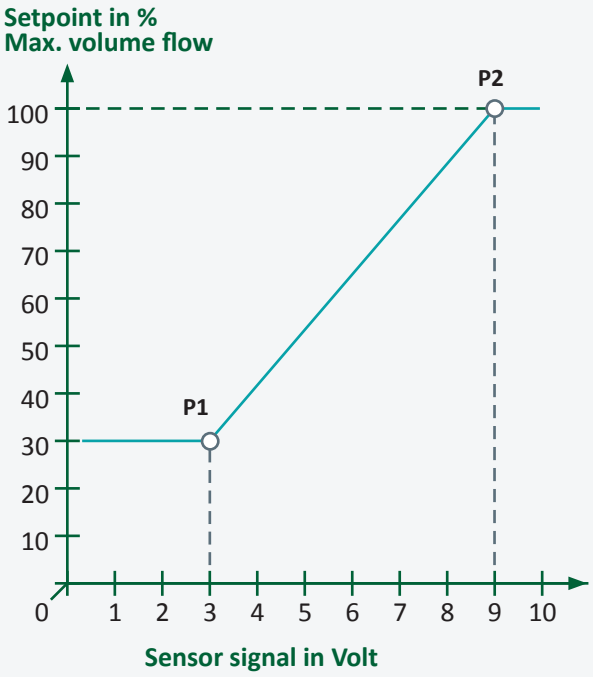
3. Operating modes

a. Automatic mode AUTO

In automatic mode, the setpoint for the volume flow control is driven by the demand and derived from the signal of the combined air temperature and humidity sensor (GHTU-2K-MP, 0 - 10 V).

b. Operating mode OFF

When the operating mode OFF is activated, the louvered dampers of the RSC system shut completely. After this, the separators can be removed for cleaning.



Linear scaling is performed between the points P1 (Vmin) and P2 (Vmax).

Outside this range, the setpoint is limited accordingly.

Via parameters, the points can be moved along the stress axis.

The following values are set at the factory:
P1 (Vmin) at 3 V
P2 (Vmax) at 9 V

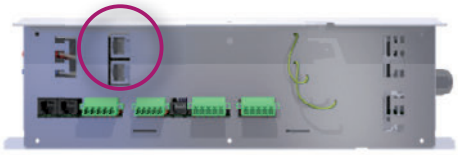
IMPORTANT NOTICE:

Depending on the design of the ventilation system, the flow rate of the ventilation unit must be decreased, as otherwise the duct pressure can rise to "dangerous" levels.
If the frequency converter of the ventilation unit is controlled via the duct pressure, this happens automatically.

4. Wiring

- The RSC and the associated supply air volume flow controllers are networked with each other via CAT6 cables (standard Ethernet) as a standard.
- The balancing of the supply and exhaust air in the kitchen is handled by an integrated supply air volume flow controller on the software side.
- The connection to the Building Management System is made either via a switch (by customer) with CAT6 cable, or room by room via a DDC (by customer) with J-(YST)Y cable. (DDC means "Direct Digital Control" and refers to a substation of the BMS, which is usually fitted in the control cabinet.)
- All the devices (RSC electronic box, VAV700 supply air volume flow controller) require a power supply of 230 V a.c., cable type NYM 3 x 1.5 mm².
- The components are wired with each other using CAT6 cables in a daisy-chain network or star wiring. However, an additional switch is required for this.

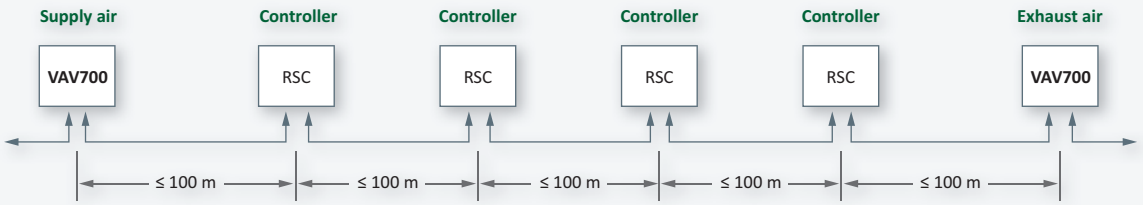
230 V a.c. power supply



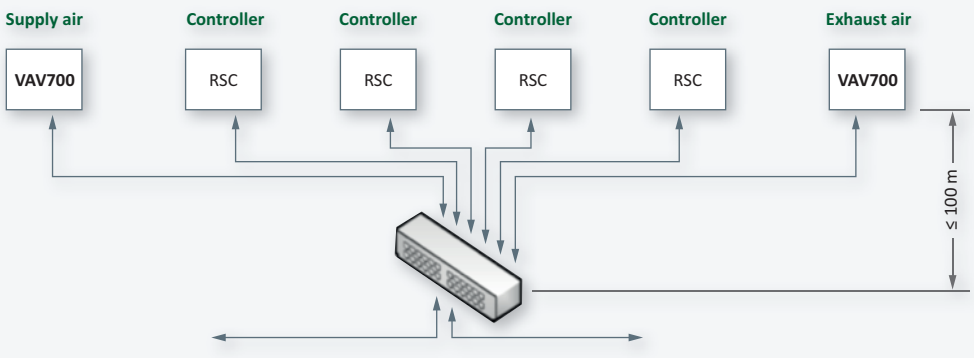
CAT6 connectors for daisy chaining

- For daisy-chain networking, the chains should be limited to one balance group (room) and the maximum number of participants should not exceed 32.
- Peripheral devices are connected using J-Y(St)Y cables - e.g. 2 x 2 x 0.8 mm (2 x 2 cores, cross section 0.8 mm).

Daisy Chain Wiring



Star Wiring



5. Connection to the Building Management System (BMS)

The connection to the Building Management System can be implemented either via BACnet IP or Modbus IP, as well as via analog and digital signals.

1) BACnet IP:
Each hood and each supply air volume flow controller is assigned an IP address generated by the Building Management System.
With regard to the naming of data points, a corresponding agreement between the I&C company in charge and Rentschler REVEN GmbH is required. The corresponding IP addresses are needed before the delivery of the equipment, as they are preset at the factory.

2) Modbus IP:
Each hood and each supply air volume flow controller is assigned an IP address generated by the Building Management System.
In contrast to BACnet IP, Modbus IP assigns fixed protocol addresses to the data points specified below, which must also be coordinated between the I&C company in charge and Rentschler REVEN GmbH. The corresponding IP addresses are needed before the delivery of the equipment, as they are preset at the factory.

Both, the Modbus IP and BACnet IP protocols can map the following data points.

SIGNALS PER HOOD AND/OR ZONE

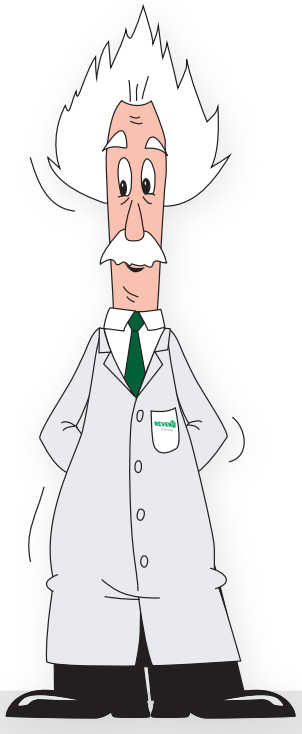
Signal	Type	Input/Output
Preset of operating state Off/Automatic*	Binary	Input
Operating state Off/Automatic	Binary	Output
Fault message (deviation)	Binary	Output
Volume flow setpoint	Real	Output
Volume flow actual value	Real	Output
Control damper position	Real	Output
Demand (kitchen hood/zone)	Real	Output

* Not applicable when controlled via room balance logic.

SIGNALS PER ROOM BALANCE LOGIC UNIT

Signal	Type	Input/Output
Preset of operating state Off/Automatic*	Binary	Input
Collective fault signal	Binary	Output
Total exhaust volume SET	Real	Output
Total exhaust volume ACTUAL	Real	Output
Total supply air volume SET	Real	Output
Total supply air volume ACTUAL	Real	Output
Demand (kitchen hood/zone)	Real	Output

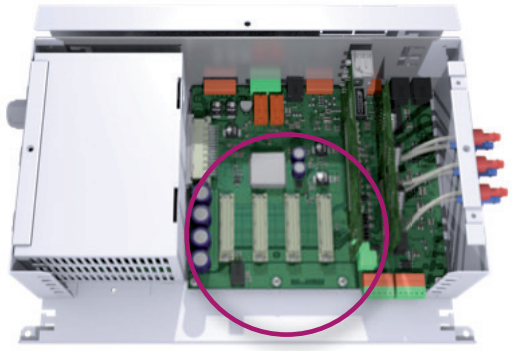
* Not applicable when controlled via room balance logic.



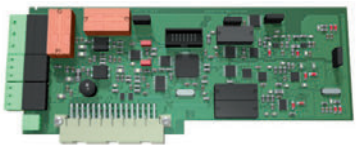
SIGNALS PER SUPPLY AIR VOLUME CONTROLLER VAV700

Signal	Type	Input/Output
Preset of operating state Off/Automatic*	Binary	Input
Operating state Off/Automatic	Binary	Output
Fault message (deviation)	Binary	Output
Volume flow setpoint	Real	Output
Volume flow actual value	Real	Output
Control damper position	Real	Output

* Not applicable when controlled via room balance logic.



Slots for extension modules



EM10 extension module

3) Analog and digital:

With a conventional connection to the Building Management System, only the room data transmitted via the signals listed below are available. For automatic control, two extension modules with corresponding analog outputs 0 - 10 V and relay contacts for fault signals are integrated into the supply air volume flow controller of the respective room and connected via hard wiring to the DDC provided by the customer. The recording of all data which would be possible via a protocol such as BACnet IP or Modbus IP would involve enormous additional effort for wiring and programming and should therefore be avoided for cost reasons.

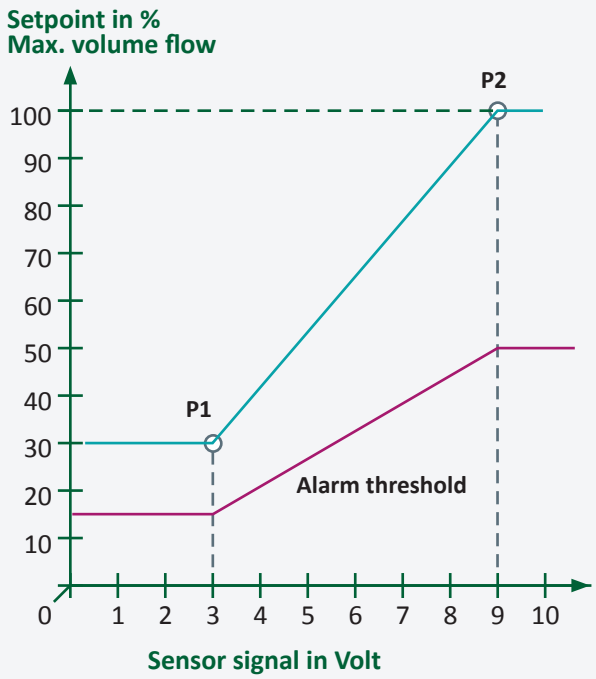
SIGNALS PER ROOM BALANCE LOGIC UNIT VIA ANALOG AND DIGITAL CONTACTS

Signal	Type	Input/Output
Preset of operating state Off/Automatic*	DIN	Input
Collective fault signal	DOUT	Output
Preset of total exhaust air volume SET	AOUT	Output
Total exhaust air volume ACTUAL	AOUT	Output
Preset of total supply air volume SET	AOUT	Output
Total supply air volume ACTUAL	AOUT	Output

* Not applicable when controlled via room balance logic.

6. Alarm limits

A fault message is only put out if an actual value deviates by more than 50 % from the setpoint over a period of more than five minutes.
Example:



Kitchen extractor hood:
P1: Vmin = 300 m³/h (30 % of Vmax)
P2: Vmax = 1,000 m³/h

P1: The sensor detects a slight increase in humidity or temperature, the sensor signal is smaller than 3 V.
The extractor hood is controlled for the setpoint Vmin = 300 m³/h.
The alarm limit is at 50 % of the setpoint, which corresponds to 150 m³/h, for longer than five minutes.

P2: The sensor detects a higher increase in humidity or temperature, the sensor signal is greater than 3 V.
The extraction power of the hood is increased to the setpoint Vmax = 1.000 m³/h.
The alarm limit is at 50 % of the setpoint, which corresponds to 500 m³/h, for longer than five minutes.

7. Commissioning

When the components are delivered, the IP addresses agreed in advance have been preset at the factory. After completion of the construction work, the system is commissioned by our trained specialist staff.
The parameters projected in advance are transferred from a central location to the delivered devices. This is followed by a separate function test in the kitchen and the fine adjustment of the individual kitchen extractor hoods.
Furthermore, all components with the set parameters as well as the measured room-related actual values are fully documented in a separate test report, which is made available to the operator for his revision documents after the completion of work.

Subject to technical changes! Errors excepted! Version 01V.05M.2019Y

REVEN
SCHAKO Group

Rentschler REVEN GmbH
Ludwigstrasse 16 - 18
74372 Sersheim · Germany
Phone: +49 7042 373-0
Fax: +49 7042 373-20
info@reven.de • www.reven.de