

SKP · SKC · SVA

CONSTANT AND VARIABLE AIRFLOW REGULATORS



MADEL®

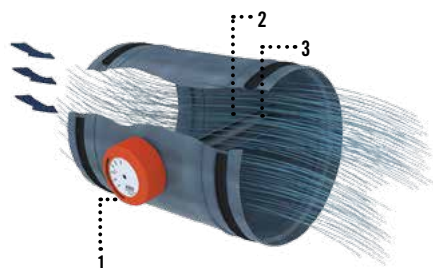
we shape the air

PRECISE REGULATION

With the aim of guaranteeing thermal comfort, indoor air quality and high energy efficiency in air conditioning and ventilation installations, MADEL has designed the Constant Flow (VAC) and Variable Flow (VAV) regulators.

The use of this type of regulator in airflow installations allows us to balance and adjust the air flow in each of the different branches of the installation.

The VAC and VAV regulators have the ability to control the air flow *independently* from the pressure in the duct.



① Airflow selector

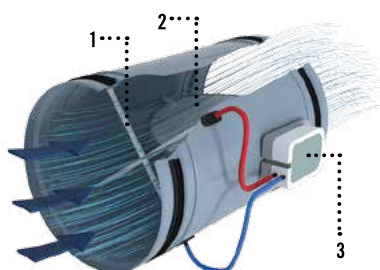
② Regulating damper

③ Regulating fellows

VAC Constant flow regulators

Using a mechanism composed of a spring and a membrane, the regulator balances the aerodynamic forces due to the air flow, resulting in a constant air flow at the regulator outlet, independently from the pressure in the duct.

This type of mechanical regulators operate *without external power supply*, and are an economical easy-to-install solution as they do not require any additional wiring.



① Airflow sensor

② Airtight damper

③ Compact controller

VAV Variable flow regulators

A variable air flow regulator is the integration in a single device of a flow measuring probe, an airtight control damper and a proportional actuator, achieving precise control of the air flow passing through the regulator, independently from the pressure in the duct.

To guarantee the precise energy supply in each of the zones, the VAV regulators use a double regulation loop between the controlled variable (T, CO₂,...) and the measured air flow, to meet the required demand conditions.

CHARACTERISTICS OF THE SKC / SKP SERIES



SKP: Low-pressure VAC regulators for terminal units.

- » Airflows from 15 to 700 m³/h.
- » Pressure range from 50 to 250 Pa.
- » Dimensions from 80 to 250 mm.
- » Flow adjustment before installation.



SKC-C: Medium/high-pressure VAC regulators for circular duct.

- » Airflows from 60 to 3400 m³/h.
- » Pressure range from 50 to 1000 Pa.
- » Dimensions from 80 to 400 mm.
- » Flow adjustment *in-situ* using manual control.
- » Conventional or insulated version



SKC-R: Medium/high-pressure VAC regulators for rectangular duct.

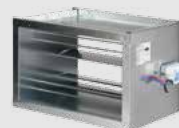
- » Airflows from 200 to 9000 m³/h.
- » Pressure range from 50 to 1000 Pa.
- » Dimensions from 200x100 to 600x600 mm.
- » Flow adjustment *in-situ* using manual control.
- » Conventional or insulated version.

CHARACTERISTICS OF THE SVA SERIES



SVA-C: VAV regulators for circular duct.

- » Airflows from 70 to 3200 m³/h.
- » Pressure range from 50 to 1000 Pa.
- » Dimensions from 100 to 400 mm.
- » Conventional or insulated version.



SVA-R: VAV regulators for rectangular duct.

- » Airflows from 180 to 13000 m³/h.
- » Pressure range from 50 to 1000 Pa.
- » Dimensions from 200x100 to 800x600 mm.
- » Conventional or insulated version.

DIAGRAM OF A VAV-TYPE INSTALLATION

The control of a VAV installation has two highly differentiated parts. **Control of temperature and/or CO₂ in the zones and control of the pressure in the duct.**

The T and/or CO₂ of the zone is controlled by varying the necessary flow in each of the zones, can be controlled only in the supply or in the supply and return, parallel connection or Master Slave connection.

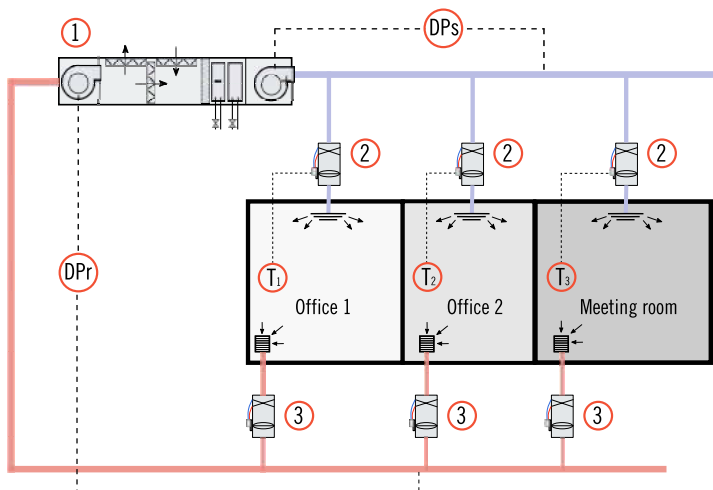
The criteria for selecting the working airflow range in each of the zones are as follows:

» **Minimum flow** complies with minimum air changes rate set by local regulations.

» **Maximum flow** complies with thermal criteria to be able to handle the maximum thermal load. The SVA dampers allow the imperative commands to force the total opening or closing of the gates according to occupation, timings...

The duct pressure control is controlled by the modification of the working point of the fans using a variable-frequency drive and a differential pressure sensor.

VAV installations with the **SVA** dampers are fully integrable with the building's management systems (Modbus, LonWorks, Bacnet, KNX).

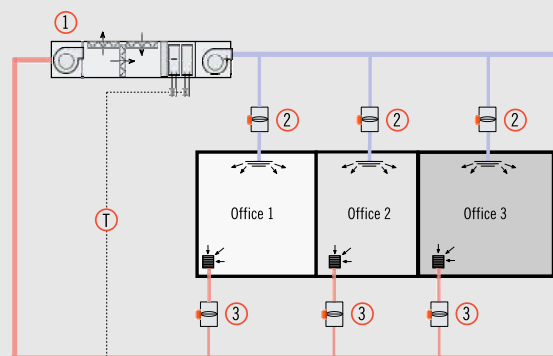


- ① Air Handling Unit
- ② SVA supply damper
- ③ SVA return damper
- Ⓣ Temperature regulator
- Ⓛ DPS Supply pressure probe
- Ⓛ DPr Return pressure probe

VAC INSTALLATIONS

» Constant airflow control in each of the zones, independently from pressure changes in the ducts (dirty filters, closing of dampers...). In this case the temperature or air quality set-point is controlled by acting on the Air Handling Unit coil or on the fresh air intake dampers, not on the VAC regulators.

» For installations with fans with fixed or variable speed, where the second ones are much more energy efficient because the fan is designed only to overcome the minimum load loss required by the VAC regulators and clean filters.

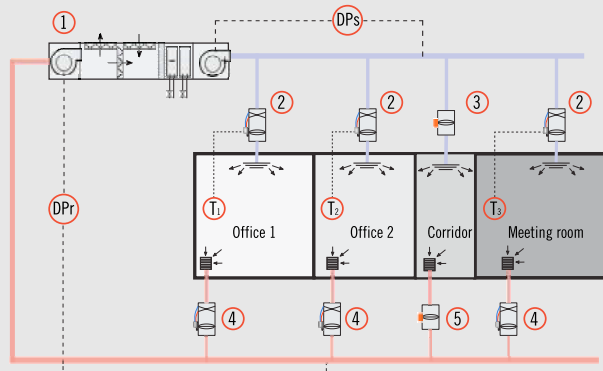


- ① Air handling Unit
- ② SKC supply damper
- ③ SKC return damper
- Ⓣ Temperature regulator

COMBINED VAC-VAV INSTALLATIONS

» Installations that combine VAV and VAC regulators in the same room. For example, having a Air Handling Unit for climate control and Fresh air energy recovery for air quality control, in this case the temperature can be regulated using a variable-flow system and the air quality with a constant flow system.

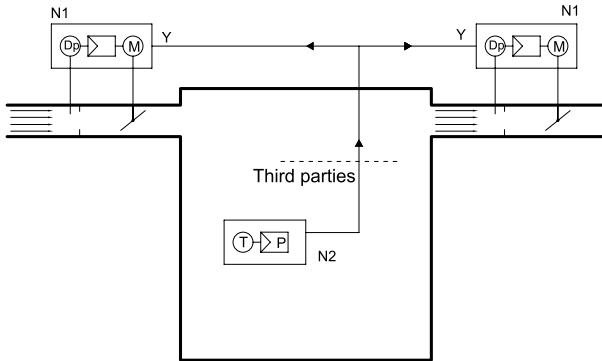
» VAV type installations, with variable airflow regulators by zone and VAC constant flow regulators in communal areas (corridors, halls...). In this case the constant flow regulators are fixed to the maximum flow and act as limiters, avoiding problems of air currents, noise... that could be generated when closing the remaining VAV regulators.



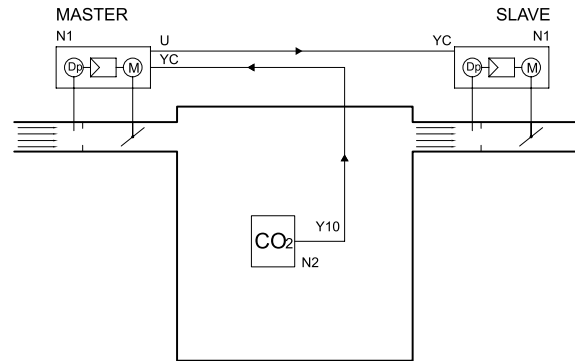
- ① Air Handling Unit
- ② SVA supply damper
- ③ SKC supply damper
- ④ SVA return damper
- ⑤ SKC return damper
- Ⓣ Temperature regulator
- Ⓛ DPS Supply pressure probe
- Ⓛ DPr Return pressure probe

REGULATION AND CONTROL DIAGRAMS

ZONE TEMPERATURE OR AIR QUALITY CONTROL

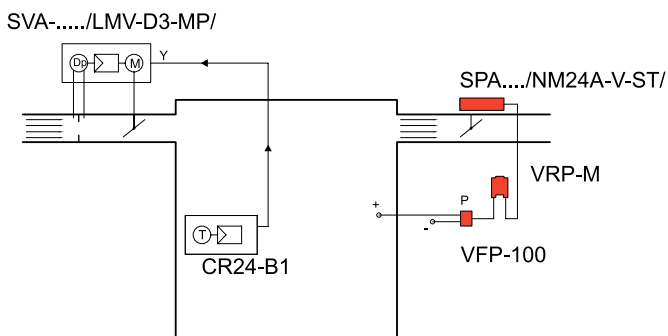


» Room temperature control
Parallel supply/ return connection

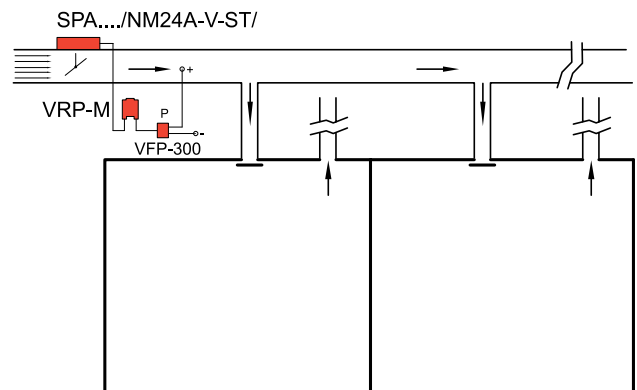


» Room CO₂ control
Master/Slave impulsion/return connection

ROOM OR DUCT PRESSURE CONTROL



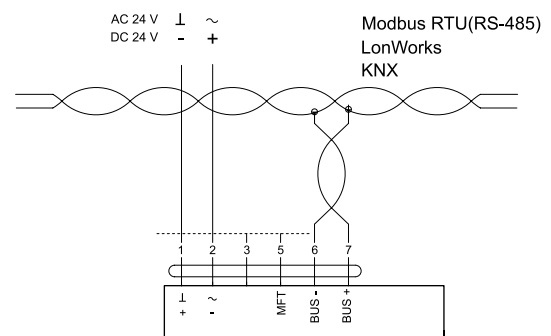
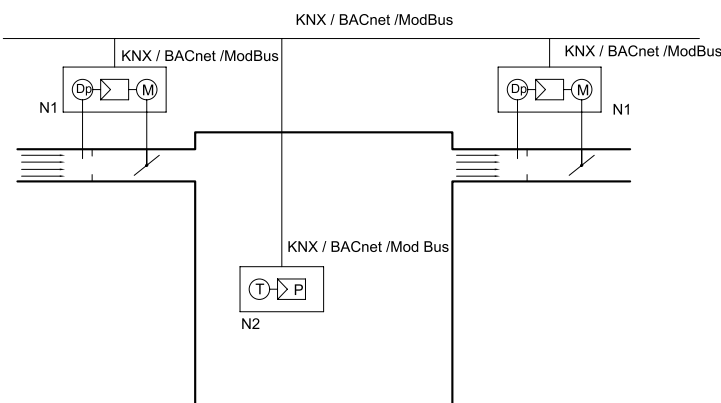
» Duct pressure control



» Room pressure control

SIEMENS BELIMO

COMMUNICATION AND INTEGRATION



Modbus KNX BACnet

APPLICATIONS AND REFERENCES

In all types of installations where comfort, air quality, rational use of energy and low acoustic levels are a requirement.

Zone control in offices, air quality control in educational premises, consumption optimisation in shops and commercial installations with a high variability in occupation. Also in hotels and hospitals where the air conditioning and ventilation requirements are always linked to variable loads and low noise levels. In all of them, the VAC and VAV systems are an optimal solution for air conditioning and ventilation installations.



OFFICES

Endress Hauser
CPD La Caixa
Edificio Enagas Madrid
ONU Génève
Unidad Playas Guardia Urbana BCN



EDUCATIONAL PREMISES

ICTA Universitat Autònoma de Barcelona
Aulas UPV Valencia



SHOPS

Sketchers Centro Comercial Xanadú
Centro Comercial Espacio
Mediterráneo Cartagena



HOTELS

Hotel Ohla Eixample



HOSPITALS

Hospital Granada
Clínica CIMA
Hospital Antofagasta (Chile)

COMFORT AND ENERGY SAVING



Why climatise all areas in the same way?

VAV systems allow you to divide into **zones** the different rooms of an all-air installation with a single air-conditioning unit, achieving precise temperature and air quality control in each zone.

High acoustic comfort, since at nominal rate the VAV system works at medium and low flows, leaving the high airflows and, therefore, the high acoustic levels only for times of maximum load.

By dividing the rooms into zones you can calculate the air conditioner for its maximum simultaneous thermal load (considering occupation, orientation of façades ...), not for its maximum total thermal load, obtaining savings in the initial investment and energy in the nominal power consumed by the air conditioner.

The advantage of multi-zone VAV systems compared with single-zone systems at constant airflow is obvious, why always supply the maximum airflow in every zone? Why, at partial loads, supply the maximum air flow at neutral temperature? VAV systems supply the precise air at all times and reduce fan airflow according to demand. The figure of 20% savings between a multizone VAV system and a single-zone VAC system is commonly quoted in specialised literature.

The new **fan optimisation** systems manage the VAV regulators and the fan in the air conditioning unit, aiming to find the minimum consumption position (VAV regulators with maximum opening and fan with minimum revolutions) that allows you to reduce the load. This system achieves savings of up to 50% compared to VAV systems with standard pressure controls. ⁽¹⁾

(1) VAV/CAV system solution for energy-optimised fan regulation for room ventilation. Belimo.



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