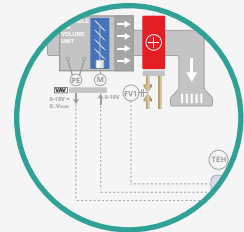




VAV CONTROL SOLUTIONS

GUIDE TO ENERGY SAVINGS AND COMFORT



SENTICON EXCELLENCE ON VAV



Pressure Independent VAV Plant and its associated control systems have been in common use for over 60 years. Initially control systems were designed using pneumatic products. Through time and research VAV controls systems have evolved from analogue products to fully digital electronic controllers and products. Senticon team has been involved in design and manufacturing VAV solutions for decades.

Today Senticon produces some of the more advanced control and measurement solutions for VAV control, offering accurate control, energy saving, customer comfort and full integration to BMS systems. The Senticon controllers integrate seamlessly to the overall Building Management Systems and provide multi-sensing functions with fast payback on installations.

The products use the industry standards and provide compliance to the latest green directives.



WELL BUILDING COMPLIANT



RESET AIR COMPLIANT

WHAT VAV SYSTEMS DO? HOW DO THEY MAKE BUILDINGS BETTER?

When VAV Systems were first introduced into the HVAC Air conditioning sector, the result was to achieve a Comfort Level within each room of the building for all people and machines/apparatus. In those early days and well into 25 years ago, there was not a big push for energy savings nor clean air environmental conditions as we now know.

Modern VAV System should make the buildings better; more comfortable, safe and energy efficient.

VAV installations in buildings should allow for the flexible zoning of the environmental temperature and humidity in each room, to suit different occupants, material and machines. Due to the individual zoning, it must also be possible using new technology to ensure a clean air environment in each room by using CO2/VOC integrated products and associated control loops, together with energy savings to HVAC plant and lighting services.

Many Educational and Commercial buildings are now under pressure to meet carbon emission targets. The new VAV systems are designed to reduce wasted energy usage, carbon emission targets can be achieved quickly with the ability to stop wasting energy on the large main HVAC plants such as chiller units.

With Senticon these goals can be achieved due to the accuracy and controllability of our new AccuFlow Pressure sensor and TVR/QVR range VAV controllers. These offer ability now to reduce the minimum air volume setting of the VAV boxes. Additionally due to ingenious multi-measurement technology, Senticon products also offer large additional savings (energy, electricity consumption) at very small capital outlay, and with easy installation.

Senticon



ENERGY EFFICIENT



USER COMFORT



CLEAN AIR QUALITY



MAINTENANCE FRIENDLY



CAPITAL SAVINGS REDUCED COSTS

SENTICON VAV CONTROL STRATEGY

Basic building block of the VAV Room Control is the VAV Box. The VAV Box controls the airflow to the required level. The key parts of the VAV Box Control are **Flow Measurement** (differential pressure sensing) and **Flow Damper Control** (actuation).

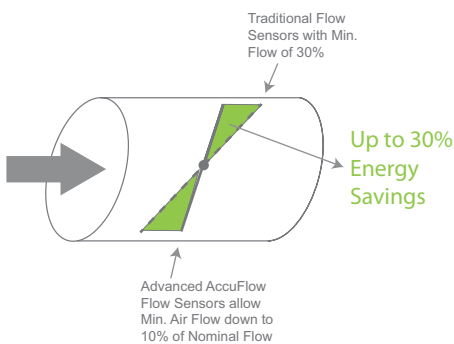
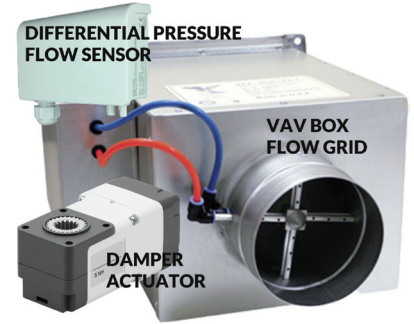
It is common in many VAV systems that a combined actuator/controller/pressure sensor unit is used next to VAV Box together with separate Room Thermostat giving flow control position. Typically these combo products do not provide the most accurate flow measurement and energy efficient actuation.

Senticon VAV control strategy is to **focus** on each component to provide **maximum energy savings** with improved **comfort**.

This is done using Multi-Measurement integrated room controller (thermostat) combined with low energy Brushless DC Motor actuators and AccuFlow accurate flow measurement.

Focusing on these parts maximum energy savings can be achieved for the VAV system.

ELEMENTS OF FLOW CONTROL



ENERGY SAVINGS WITH ACCURATE FLOW MEASUREMENT

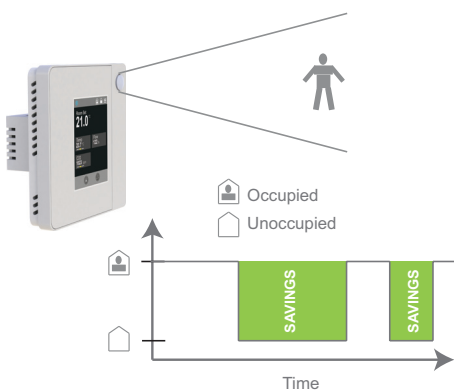
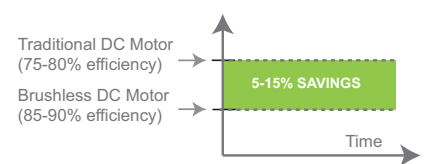
On the Senticon VAV solutions the VAV flow measurement is carried out with AccuFlow accurate flow sensors. This allows the VAV box minimum flow setting to be reduced to 10% instead of typical 30% in older systems.

By reducing the minimum air flow according to multiple studies including ASHRAE on existing buildings up to **30% energy savings** can be achieved compared to standard solutions.

BRUSHLESS DC MOTOR ACTUATION SAVES 10-15%

With Senticon VAV System a separate Brushless DC motor based actuators are used for changing the flow damper position. These brushless DC motors save about **5-15%** energy compared to traditional motors by eliminating brush friction and electrical losses, improving heat dissipation, and providing more precise electronic control.

Additionally Brushless DC Motor actuators incur lower maintenance costs and longer lifespan, further contributing to overall operational savings despite possibly higher initial costs.



OCCUPANCY CONTROL WITH INTEGRATED SENSING

Senticon multi-measurement VAV controllers optimise the building space usage profile offering additional significant savings by switching the system to stand-by when the room is unoccupied using integrated occupancy sensor.

By reducing or increasing setpoint by one degree - in Senticon solutions automatically - for every degree **10% energy savings** can be achieved.



DESIGNED FOR THE USER - MODERN, INTUITIVE AND ATTRACTIVE USER INTERFACES

Senticon VAV controllers have high end glass touchscreen user interface providing ease of use. The display can be customised to project requirements. The Senticon VAV controllers can also be provided with mobile phone user interface through built-in Bluetooth.

Capacitive Touchscreen with High End Glass Surface

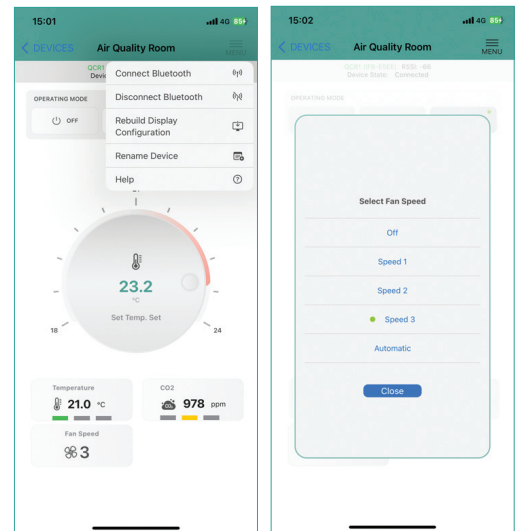
Configured to Requirements:

- Display Measurements and Alarms (green/amber/red colour)
- Display Energy and Consumption Readings from BMS
- Fully Customisable 5 Display Locations (values, descriptions, units)
- User Setpoint Adjustments, Operating Mode and Boost Functions
- On/Off Button Overrides
- Customisable Screen Colours

SmartPhone SmartView User App (iOS)

The Senticon devices can be equipped with built-in Bluetooth providing direct access to the devices from the SmartView mobile phone application.

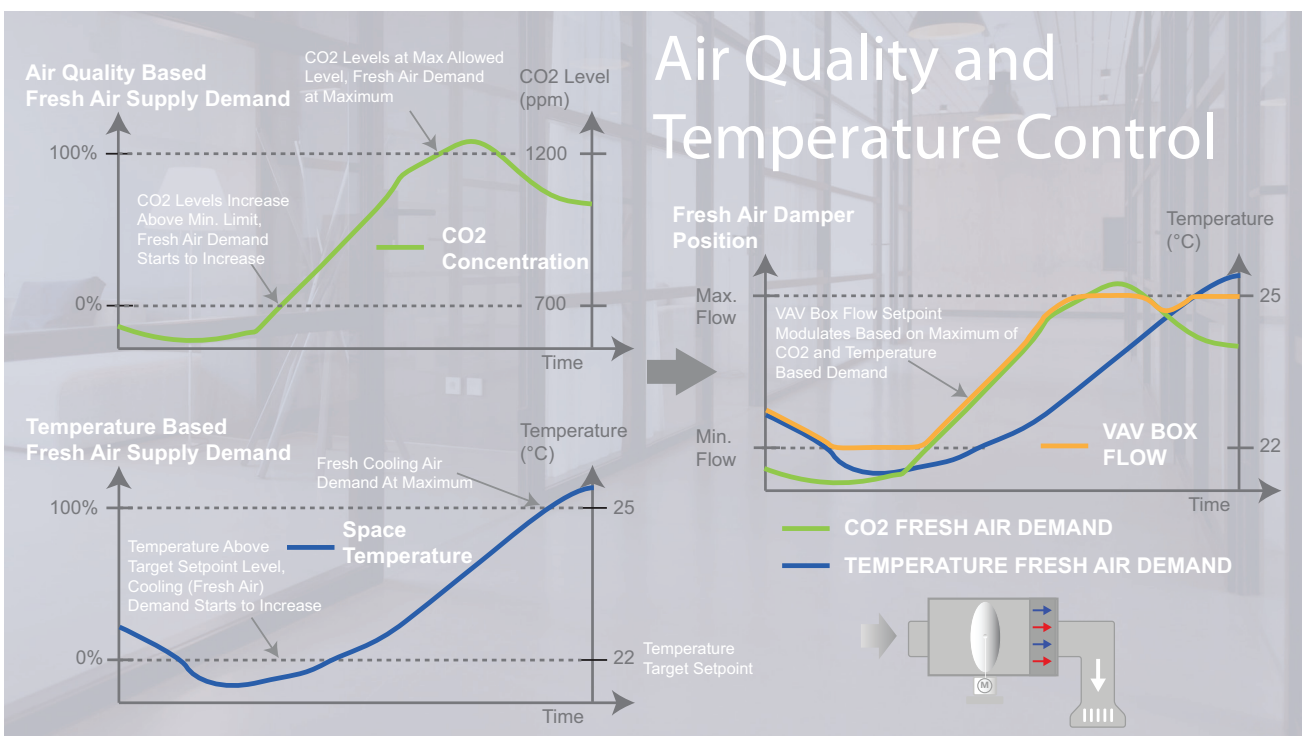
The application offers easy way of interrogating the building settings.



AIR QUALITY - OPTIMISE AND PROVIDE COMFORT



Senticon Multi-Measurement VAV controllers are available with built-in Air Quality measurement (CO2 and Volatile Organic Compounds). The controllers control the indoor air temperature to the customer setpoint and simultaneously modulating the fresh air supply maintain the optimum conditions in the room space. Thus achieving the optimum conditions and energy efficiency.





ENERGY SAVINGS & COST/MATERIAL SAVING ON HVAC PLANT PROJECTS

Senticon products have been designed to be easy to install with robustness and time saving features. The built-in application logic is comprehensive and designed for the real-life HVAC applications. These features guarantee success in projects.



- Multi-Measurement Controller; Temperature, CO2, VOC, Humidity and PIR ; **Compact and Integrated Solution provides Efficiency and Reduces Installation Costs**
- Easy Access to the Controller Programming; Mounted on the Wall; **Save on Maintenance**
- Easy application programming with Intuitive Tools; **Save on Engineering**
- Modbus/BACnet Network Addressing and Baud Setup via software or built-in bit switch; can be addressed without tools; **Save on Project Execution**
- Wireless LoraWan Variants for Retrofits / Minimised Cabling; **Save on Retrofit Projects**
- Multi-device backup & restore on the configuration tools; **Save on Engineering**
- Consistent documentation and programming tools menus; **Save on Engineering**
- 60V Over-voltage Protected RS485 Channel; robust solution for installations; **Save on Fault Finding**
- BACnet MS/TP with COV Functionality; optimise the MS/TP networks; **Save on Programming**

Example Payback Analysis

For a typical hotel suite in the Middle East:

- The average annual energy usage is about 13,500kWh per suite.
- With an average commercial electricity rate of \$0.15/kWh, this equals an annual energy cost of ****\$2,025****.
- **A 30% savings from a new controller would save ****\$607.50 per year****.**
- The \$300 controller would be paid back in ****about 0.49 years (approximately 6 months)****.

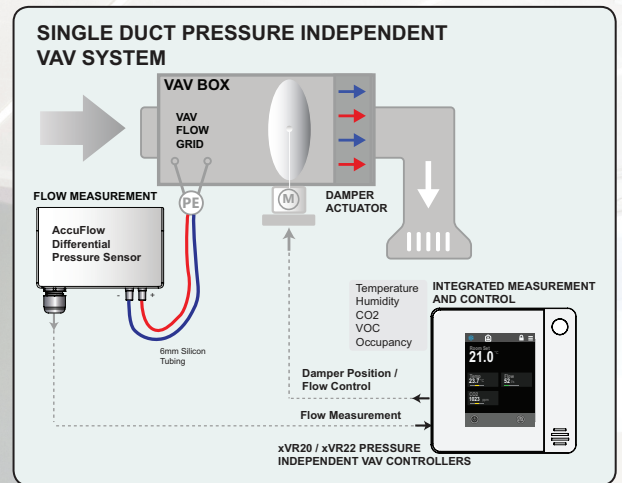
****Summary:**** Hotel suites in the Middle East have roughly double the energy cost of those in cooler regions, so installing a \$300 controller with a 30% efficiency gain is paid back in less than half a year.

\$\$\$ SAVE \$\$\$

DIFFERENT TYPES OF VAV SYSTEMS SUPPORTED BY SENTICON

There are many different types of Variable Air Volume control systems, including much older systems such as Dual Duct Systems, Multi Zone Systems and the low cost constant volume Bypass system, however, for Pressure Independent Systems that are now being used in most world-wide projects, you can be assured that our Senticon range can offer a well-tested design to meet with the following systems:-

1. Single Duct VAV Terminal – the most common system in use throughout the world.
2. Tracking VAV Terminals – Also controls positive and or negative pressure in rooms, such as in hospitals.
3. VAV for Pharmaceutical use – VAV being interlinked with Fume Cupboards and extract fan systems.
4. Fan Powered VAV System (Series type) – The mixing of re-heat from the room temperature at a Constant Fan Speed to maintain room temperature without separate re-heat plant. Special filtration required to stop cross contamination of air supplies.
5. Fan Powered VAV System (Parallel type) - similar to the above plant with the exception that the fan will switch On/Off in order to maintain room temperature.
6. Induction VAV System – this design is like the fan powered plants as far as the design is concerned but the mixing of the air from the room to the plenum is carried out by induction only.



MODERN

FUNCTIONALITY

PERFORMANCE

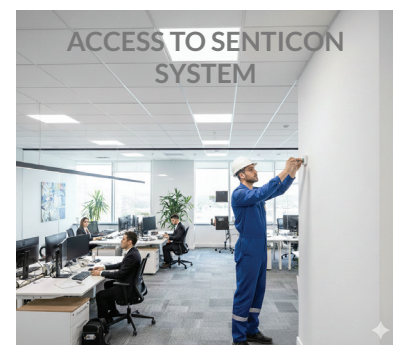
IMPORTANCE OF INSTALLATION LOCATION OF VAV ZONE CONTROL SYSTEMS - MAINTENANCE SIMPLIFIED

Pressure Independent plant is ideally designed to suit public buildings, educational and commercial building and airports/hospitals etc., it is critical for the consultant/building designer/building user to ensure that VAV Boxes are located in areas where they can be in reach for engineers to carry out fault finding and maintenance without the use of mechanical/electrical lifting equipment.

The use of the normal ceiling void location might not be suitable if located at high levels or in clean room areas.

At Senticon we have designed our control system to have all our settings carried out within the room mounted sensor/controller therefore, no need to get access to the VAV Box location unless at standard maintenance periods where arrangements can be made in advance.

Due to the fact that we have kept our AccuFlow Pressure/Flow Sensor separate from a location within the actuator we are offering flexibility for the maintenance engineering staff should e.g. actuator fault arise, as only the actuator would be required to be replaced.



✓ EASY ACCESS

✓ AFFORDABLE SPARES

SENTICON VAV CONTROLS OVERVIEW

Senticon offers wide range of VAV Controllers (TVR/QVR Series) and AccuFlow Flow sensors to provide energy efficient and effective controls to achieve maximum comfort.

The TVR/QVR Series Controllers are suitable for both pressure independent and pressure dependent VAV control with additional control logic for zone heating or cooling. Optional built-in CO2, humidity, VOC and Occupancy (PIR) measurements and control logic can expand the control functionality and energy savings further. The controllers can also connect direct to Senticon's Accuflow DPT50 Flow Pressure Sensors.

The room controllers have an optional sharp colour touchscreen display with glass front that provides intuitive user interface. An optional PIR sensor is available for occupancy mode. The controllers are mounted on the wall surface directly or to standard wall mounting boxes. The controllers have built-in Modbus RTU or BACnet MS/TP communication that allow interaction to the BMS systems. Wireless LoraWan adds unique functionality. Optional Bluetooth wireless interface provides Smart Phone App interface.



Options for Air Quality Measurement:

- CO2 (Carbon Dioxide) - QVR Models
- VOC/TVOC (Total Volatile Organic Compounds)

Options for Energy Optimisation

- High Sensitivity PIR Occupancy Sensor


Options Environmental Control

- 2% Accuracy Relative Humidity Measurement

Flow Measurement

- AccuFlow DPT50 Flow Sensors

Design and Display Options

- Colour Capacitive Touchscreen with Glass Front
- Colour LCD Screen with Push Buttons
- Black, White and Aluminium Color Options 
- Wall Surface and Slimline 13.8mm Enclosure Options

Communication and Integration to BMS

- BACnet MS/TP
- Modbus RS485
- LoraWan Wireless Communication
- Bluetooth SmartPhone Interface



**TVR20/QVR20
TOUCHSCREEN
WALL CONTROLLERS**

STANDARD
TOUCHSCREEN



**TCR22/QVR22
SLIMLINE FLUSH
VAV CONTROLLERS**

SLIMLINE
TOUCHSCREEN



**TVR02 SLIMLINE
LCD BUTTON
VAV CONTROLLERS**

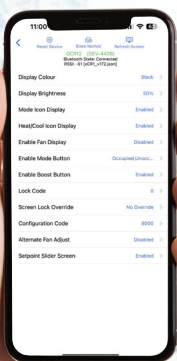
TACTILE BUTTON



RANGE OF EASY-TO-USE CONFIGURATIONS TOOLS FOR VAV

Device Configuration Tool for Windows with Bluetooth Connection / Serial Connection to the Devices
 Device Modbus Device Configuration Tool for Connection over Modbus Network (RS485)
 Smart Configuration Tool App for iOS using Bluetooth Connection

SMARTCONFIG
TOOL

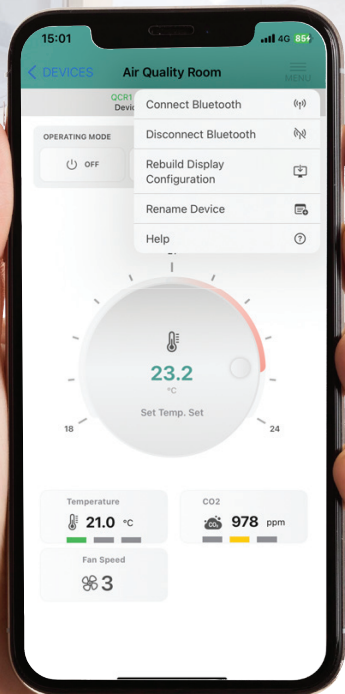


- Clear and Intuitive User Interface (= fast tool adaptation and learning curve)
- Easy access to VAV Control Box Flow Control Settings
- Auto-device detection on connect (= template matched product model automatically)
- Common point structure for Windows, iOS Tools, Modbus and BACnet (= simplified structure, easy to follow regardless of the platform)
- Save, store, upload, download the configuration to devices (= project configuration with multiple identical devices fast)
- Plug & Play Connection with Bluetooth dongle pair to Windows (= remove hassle from Windows Bluetooth configuration, and suitable for laptops without Bluetooth)

Senticon provides advanced building controls and measurement solutions. Our products have been developed with over 100 years of design team experience in Building Management and Measurement Systems. Our controllers and smart sensors products combine aesthetics for modern buildings, accurate and comprehensive measurements, advanced control algorithms for energy savings and excellent comfort control with practicality to the installers.



Understanding the building technology and HVAC applications is the key part of our culture. Our products offer intelligent connectivity to Building Management Systems and IoT systems using industry standard open protocols such as BACnet, Modbus and LoraWan. Merging the application knowledge with in-depth networking technology understanding creates world class products that not only save energy and control well, but also look good.



SmartPhone App offers easy access user interface to Senticon's VAV Controllers



Senticon
SENTIENT CONTROL SOLUTIONS