

VARIABLE AIR VOLUME TERMINAL UNITS

General

Variable Air Volume, also known as VAV terminal units shall be of the pressure independent type.

The VAV controller, actuator and differential pressure sensor shall be integrated in one compact unit. The VAV Controllers that come with an external actuator and a differential pressure sensor will not be accepted.

The VAV Controller shall offer the possibility to communicate either via BACnet MS/TP or Modbus RTU. The installation of the VAV controller to the VAV unit, and the functional tests shall be carried out at the Laboratory of the VAV manufacturer. The test must include airflow and pressure independence simulation in accordance with AHRI Standard 880. OEM Laboratories which do not comply to this standard will not be accepted.

The VAV Controller and VAV terminal units shall be provided by the same manufacturer. The units shall be manufactured, pre-installed, calibrated and tested in the VAV box manufacturer factory. A mandatory factory calibration test report will be issued by the VAV box manufacturer. Separately supplied VAV Controller & VAV terminal units from different parties will not be accepted.

The warranty of the complete unit shall be on the sole-responsibility of the VAV terminal unit manufacturer.

The VAV controller shall have a 5 year worldwide warranty.

VAV Controller

The VAV controller shall communicate with BACnet MS/TP or Modbus RTU, work as a standalone Direct Digital Controller and alternatively also as a BMS-integrated DDC. Each VAV terminal unit shall come in a single VAV compact unit and a separate low voltage transformer. The compact unit shall consist of an actuator, a differential pressure sensor and logics to control airflow, temperature, and CO₂. All external wiring into the VAV terminal unit shall be through a single terminal block connection with labelling.

Regarding the actuator: The motor shall be a brushless DC motor with non-blocking function and power saving mode. The DC motor shall automatically identify end stops or blockages and will automatically reduce the torque. This feature will prevent the motor from overheating and causing premature failure.

There shall be a lockable manual override button to manually move the actuator position when there is no power present. This is necessary when the damper is required to be fully opened during air balancing. Lifetime of the actuator motor shall be minimum 100,000 full cycles or 1,000,000-part cycles loaded with rated torque. The actuator speed shall be 60 s (Boost, manual Override) and 150 s (normal operation) for the full span.

Regarding VAV internal controls: All configuration parameters shall be stored in a non-volatile memory to prevent memory loss after power failure. Each VAV terminal unit shall be capable of handling complete stand-alone pressure independent operation so that the failure of a VAV in the system will not affect the operation of other VAV terminal units.

Each VAV Controller shall be easily configured. Configuration of BACnet MS/TP, Modbus RTU addresses, and related bus settings shall also be configured without power to the controller.

Notebook computer, data cables will not be accepted for configuration of the VAV controller at the site during testing & commissioning. Instead, the VAV controller and the room unit shall be equipped with NFC interface (Wireless Near Field Communication). NFC equipped smartphone shall be used to communicate either directly with the VAV actuator or through the room unit which is connected to the VAV actuator. The maintenance requirement of the VAV terminal unit can be evaluated via a smartphone app so there shall be no need to open the ceiling and reach the VAV unit and connect physically. The App with a free license shall be provided by VAV controller manufacturer and the manufacturer shall make sure that the App software is downloadable from the internet.

The App for the smartphone shall support remote connections through the internet to a central data repository (Data Cloud). This central data repository shall host the project data and provide the latest update to all the users (commissioners and troubleshooters). Therefore, multiple users such as T&C (Test and Commissioning) personnel with NFC equipped smartphones can simultaneously T&C at the project site. The project manager would have the access to the data repository from a web browser and can remotely monitor the T&C progress. Access to the central data repository (Data Cloud) will be provided by the VAV manufacturer.

After the project handover, access to these central data repositories (Data Cloud) can be extended to the Facility Management Team, and they can use it for the maintenance of the VAV terminal units.

The networking of the BAS/BMS architecture shall be through non-proprietary-BACnet or Modbus protocols. With these open protocols, it shall be the responsibility of the BAS / BMS contractor to provide the required interfaces as software and hardware so that the whole VAVs communicate smoothly with the Building Automation / Management System.

Room Unit with or without display

The Room Unit shall be provided either with a physical touch display or a virtual display via a smartphone App. Depending on the selected room unit configuration, the room unit display (touch display or virtual display) shall show actual sensor values and/or allow the room user to see and/or change setpoint values. The background color of the touch display shall be configurable as white or black.

The Room Unit shall also have additional features such as Eco Mode (Energy saving) and Boost Mode (provides faster ventilation).

For precise operation in the long term, the Room Unit temperature sensor shall provide an offset feature. The temperature sensor offset value shall be set up to $\pm 15K$ with the App through NFC communication. Room Units without offset setting capability will not be accepted.