INFORMATION ON COMMISSIONING A VAV SYSTEM

It is common to have variable air volume (VAV) installations in the Vmax control setting when commissioning the system. This means that the VAV units must be set to 100 %. By that the VAV will control on its design value. For most projects, there is a required accuracy within 10 % of the design value.

Use a Pitot tube for measurements:

It is important to perform the measurements with a Pitot tube in front or behind the VAV unit. Make sure there are no duct connections between the measuring point and the VAV unit that could affect the volume flow. Air velocities above approximately 2 m/s can be measured with a Pitot tube. The measurement should be carried out at several points in the duct cross-section area and there should not be too much difference between the measured values. That would mean the flow is not uniform.

Accurate measurements:

Part of an accurate measurement is the assessment of the measured velocities in the duct cross-section. When measuring air velocities of 5 m/s in the top of the cross-section and velocities of 1,5 m/s in the bottom part of the cross-section the airflow is not distributed uniform over the cross-section. The average value of the velocity is 'the sum of its velocities, divided by the number of velocities'. If the cross-sectional velocities differ within small limits the average is representative. The average velocity can be multiplied by the cross-sectional area to calculate the volumetric flow.

This measured volumetric flow can be compared with the actual volumetric flow feedback of the Belimo. In many cases, the values measured with Pitot tube are within 5-10 % of the feedback value by Belimo.

Measurements with a measuring tube:

In practice, measurements are sometimes carried out with a measuring tube. Practical experience has taught us that the measured values cannot always be regarded as representative. With a measuring tube, diffusers can be balanced, but the absolute value is often not representative of the measured volumetric flow. Measurements with a Pitot tube usually confirm the correct functioning of the system.

If you want to determine the accuracy of the VAV unit, we always recommend using a Pitot tube. With some regularity, it turns out that the flow in the duct is not uniform. In that case, determining the actual volume flow is a difficult task. It is up to the commissioner to find a suitable point with enough straight inflow length to ensure a good measurement.

The laboratory measuring setup in the factory:

VAV units are calibrated from factory with a control accuracy of approximately 3 %. However, in practice it is not possible to take measurements with such accuracy. In addition, the flow in practice also depends on many other factors.

This is also the reason why it is generally assumed that measurements in practice must be within 10 % accuracy. Rectangular boxes need to be adjusted little more often because the air tend to stick to the top or bottom of the duct.

This so-called coanda effect also occurs with round ducts where despite sufficient straight duct length (e.g. 20xD) there may still be a non-uniform flow which has a negative impact on the regulated volumetric flow.

If the deviation between the measured and controlled value by Belimo is too large, the VAV can be re-calibrated. We can provide a temporary 'release code' to enable adjustment of the dP@Vnom value.

With regard to Belimo feedback to the BMS:

In case of VAV units connected to a BMS system the 0-10V control and feedback is done by wire 3 (white) and wire 5 (orange). The white wire sends a 0-10V signal corresponding to Vmin and Vmax. The orange wire returns a 0-10V signal from the volumetric flow measured by Belimo based on 0 m^3/h till Vnominal m^3/h.

If the VAV is connected via a BUS communication the control and reading is transmitted digitally.

Via the BMS you can view the current volume flow of all VAV units. If there are VAV units that operate on lower volumes than expected, you can have them checked for their operation.