greenBOX Nxt: **Quick Calibration Guide**

Updated: August 3, 2025; 888-ECOGATE; support@ecogate.com

This is a short software setup guide. To fully understand system safety and functionality please read the full user guide of greenBOX Nxt, Power MASTER VFD. Do not use the Ecogate system until you have thoroughly read and understand the safety instructions completely (including the separate safety instructions for dust collector, fan, transport, gates, greenBOX and all other parts of the ventilation system). Failure to comply can result in an accident or personal injury.

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About This Guide

This document provides a quick calibration guide for the greenBOX Nxt ventilation system. It outlines the steps for calibrating air velocities, air volume readings, and overall system performance to achieve optimal ventilation.

Calibration ensures the system delivers the intended air volume at each active workstation, regardless of how many are in use, while maintaining minimum transport air velocity throughout the ductwork.

The guide includes an overview of necessary tools and equipment, detailed instructions for using the Fluke 922 air velocity meter, and step-by-step procedures for calibrating gate air velocity, main duct air velocity and air volume (using three different methods), and adjusting fan speeds. It also emphasizes important considerations like completing ductwork installation and avoiding dust production during calibration.

By following this guide, users can effectively calibrate their greenBOX Nxt system, enjoying benefits like energy savings, quieter operation, longer filter life, and scalability.

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One Minute greenBOX Software Videos are Available at Youtube

To help you quickly understand the greenBOX setup process, we've created a series of short, step-by-step instructional videos on YouTube. For those who want to dive deeper, we've also included links to detailed online documentation for each step in the table below. Happy watching!

#	greenBOX Software Setup Step-by-step	YouTube video	Detailed online document
1	How Air Velocity and Air Volume is Measured by Ecogate system	Ecogate Smart Gates - Gate Pressure…	What Is Not Measured Cannot Be Controlled: H Ecogate greenBOX Measures Air Velocity and Volume
2	How To customize the Dashboard for greenBOX System Calibration	greenBOX Unboxed Customizable D…	greenBOX Unboxed i9: Customizable Dashboa Advanced Dust Collection Management
3	How To Calibrate Air Velocity Readings at Gates	How To Calibrate Air Velocity and Air …	https://www.ecogate.com/post/how-to-calibrate- ocity-and-air-volume-measurements-for-ecogat t-gates

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Content

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Introduction: Achieving Optimal Ventilation Performance Through Calibration

Now that your Ecogate system's workstations, gates, and VFD are installed and the software is set up, it's time to fine-tune your system for peak performance. **Calibration ensures that your system delivers the design (intended) air volume at each active workstation—regardless of whether it's just one is active or the maximum number your system is designed for—all while maintaining the required minimum transport air velocity throughout the ductwork.**

Just like the setup process, we've kept the calibration software simple and user-friendly. The user interface is intuitive, similar to what you're familiar with on your smartphone. And the best part is that the greenBOX software is standardized across all systems, big or small. This means it's been thoroughly tested in a wide range of real-world settings, so you can rely on its effectiveness.

Important Considerations Before Calibration

- **Duct System Must Be Finished, and Connected to all Workstations:** Calibration should only be done after the duct system is fully connected to all workstations. Connecting the ductwork later will significantly change the system's resistance, making prior calibration efforts useless. *This is especially important to note for new shops where dust collection systems might be installed before workstations are in place.*

- **During System Calibration System Must Not Produce Dust:** The pitot tube used for air velocity measurements calibration can become clogged with dust, so calibration must be performed without any material moving through the duct system. *You'll need to schedule a downtime for calibration. The time required will depend on the number of gates in your system and the accessibility of workstations and the main duct.*

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What You Need for Ventilation System Calibration

Calibration Tools and Equipment

To accurately calibrate your ventilation system, you'll need to measure air velocities at each gate (drop) and within the main duct. We recommend using a high-quality air velocity meter like the Fluke 922, paired with appropriately sized pitot tubes (a smaller one for gates and a longer one to reach across the main duct's diameter).

Here's a checklist of what you'll need:

- Fluke 922 Air Velocity meter with fresh AA batteries
- Small pitot tube for measuring air velocity at gates
- Long pitot tube for measuring air velocity in the main duct (for example for 60” main duct you need 60” pitot tube or longer)
- Battery-powered drill with a step bit to create openings for the pitot tube
- Tape or plastic covers to seal the holes in the ducts after measurements
- Stepladder or boom lift (if needed to access hard-to-reach areas) - *Always adhere to local safety regulations*

Leveraging the Fluke 922's Averaging Function

Air velocity isn't uniform across a duct's diameter and slightly fluctuates, so a single reading won't accurately represent the overall airflow. To get precise measurements, you'll need to take multiple readings across the duct's diameter and calculate the average as detailed in ANSI standard and in "Industrial Ventilation, A Manual of Recommended Practice". This can be time-consuming, but the Fluke 922's averaging function streamlines the process, ensuring accurate readings in minimal time.

Air velocity measurements should be taken at a point at least three duct diameters away from workstation hoods, elbows, and branches, both upstream and downstream. Airflow in close proximity to these components is turbulent, which can negatively impact the accuracy of the measurements.

Step-by-Step Guide to Using the Fluke 922 Averaging Function

1. **Power On and Zero:** Turn on the meter using the "**power button**." Press and hold the "**ZERO**" button until you hear a beep.
2. **Connect Pitot Tube:** Attach a pitot tube long enough to span the entire duct diameter.

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3. **Select Velocity Mode:** Press the "**VELOCITY**" button.
4. **Initial Pitot Tube Placement:** Insert the pitot tube into the duct, approximately one-quarter of the way across the diameter. *This is where the majority of airflow occurs due to the larger cross-sectional area, while air velocity decreases near the duct walls.*
5. **Activate Averaging:** Wait for the air velocity reading to stabilize, then press the "**MIN MAX**" button three times until "**MIN MAX**", and finally "**AWG**" appears above the displayed value.
6. **Traverse Duct Diameter:** Smoothly and slowly move the pitot tube across the duct's diameter, reaching one wall, then the opposite wall, and finally returning to the starting point. *Keep the pitot tube parallel to the duct wall throughout the movement.*
7. **Hold Reading:** With the pitot tube back at the starting point, press the "**HOLD**" button. The text "**HOLD**" will appear at the top of the display.
8. **Record and Remove:** Remove the pitot tube from the duct and record the displayed average air velocity. *This method effectively samples air velocity across the duct diameter, with a slight emphasis on the region where airflow has its highest volume percentage.*
9. **Reset for Next Measurement:** Press the "**HOLD**" button to release the hold function. Then, press and hold the "**MIN MAX**" button until "**MIN MAX**" and "**AWG**" disappear from the display. To take another reading, **return to step 4**.

Important Note: It's crucial to activate the Fluke 922's **AWG** function only when the pitot tube is correctly positioned *inside* the duct. Activating the function while the pitot tube is outside the duct or in the wrong position will result in inaccurate readings. This is because the meter will include these incorrect measurements in its average calculation, leading to a skewed result that doesn't reflect the actual air volume within the duct.

Now that you know how to accurately measure air velocities, let's move on to the calibration process. This is where we'll fine-tune your system's performance, ensuring it aligns with the fan curve and delivers the design air velocity and volume required at each workstation. Calibration ensures that your system delivers the design (intended) air volume at each active workstation. This guide will simplify the entire calibration process with easy-to-follow steps. Let's get started!

We recommend beginning by calibrating the air velocity readings at each gate (drop). Although you could technically start by calibrating the main duct's air velocity, it's not possible to properly configure the system for each workstation without knowing the air velocities at their respective gates/drops.

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Step 1: Calibration Air Velocity Measurement at Each Gate

The Ecogate system measures air velocity and air volume at each gate using a strategically located pressure tap (compliant with AMCA standards). This pressure reading is converted into air velocity and air volume measurements through a single calibration point using Ecogate's proprietary software.

Notes to Gate Calibration

1. **Ensure Ductwork is Connected:** Make sure the duct system is fully installed and connected to its corresponding workstation. *If you calibrate without the workstation connected, you'll need to redo the calibration after connection.*
2. **Air Velocity Measurement Works Only if Gate is Open and system (fan) is running :** Air velocity measurements are only possible when the gate is open. Remember, the pressure tap is located on the side of the gate facing the workstation. A zero pressure reading confirms that the gate is closed (in addition to the gate's limit switches).

How to Calibrate Air Velocity Measurements

To ensure accurate air velocity readings, follow these calibration steps:

Step 1: Set Zero Pressure Reading

1. Ensure the system is in the **Stop** mode—this means the ventilation fan is off and not generating pressure.
2. Navigate to **Advanced Gate Configuration** at the gate settings.
3. Press the **SET PRESSURE ZERO OFFSET** button.
4. Once this step is complete, the pressure reading will be zero.

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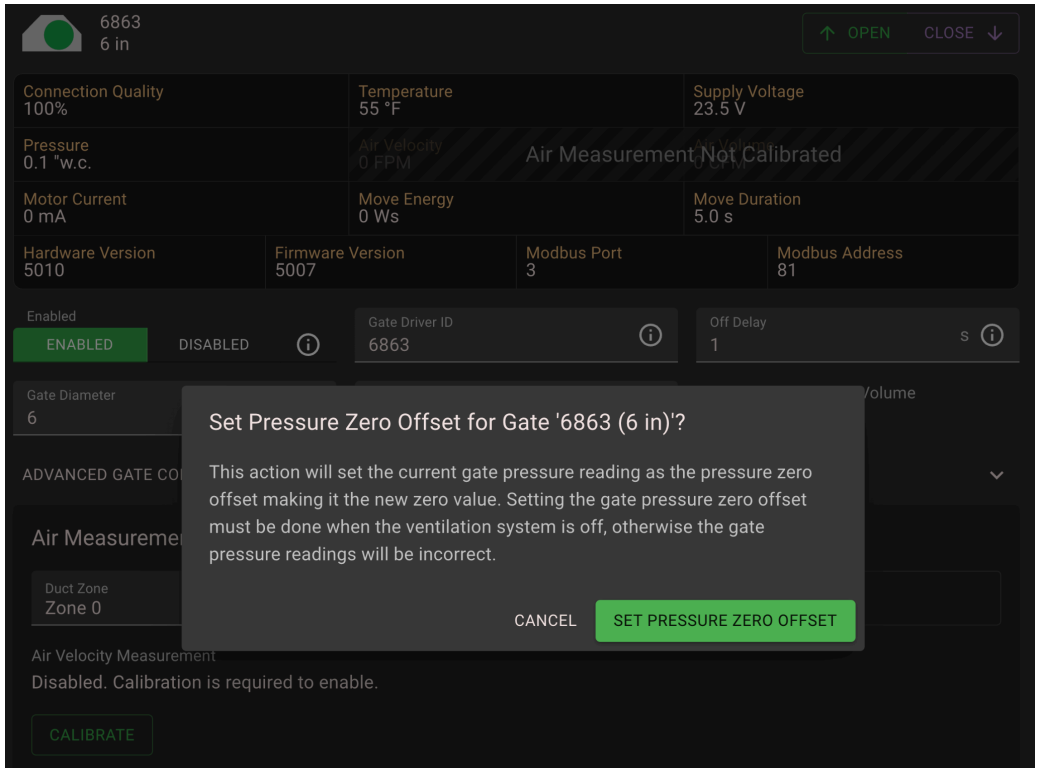

Fig. 1: At Stop mode when the fan is not running use “SET PRESSURE ZERO OFFSET” to reset pressure reading.

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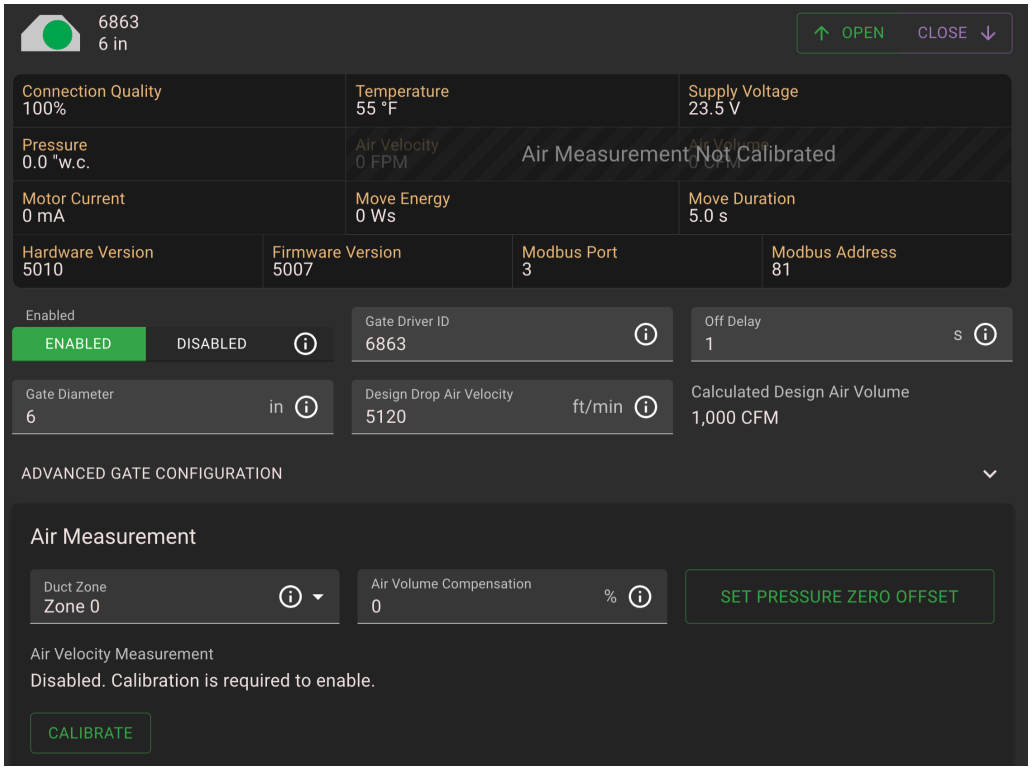

Fig. 2: after pressing “SET PRESSURE ZERO OFFSET” pressure reading is zero.

Step 2: Run the System in Bypass Mode

1. In the **System Settings**, activate **Bypass Mode** to open all gates (except those set to "Open Only By Sensor") and run the fan at constant speed.
2. If any gates are set to "Open Only By Sensor," temporarily disable this setting during calibration.
3. Note: speed of the fan in Bypass mode is set by using **Advanced Fan Settings** → **Bypass Fan Speed**.

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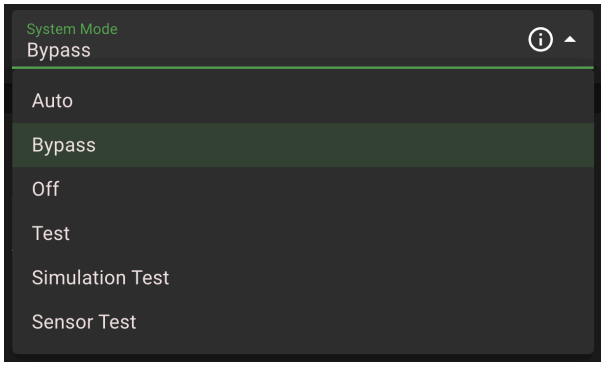

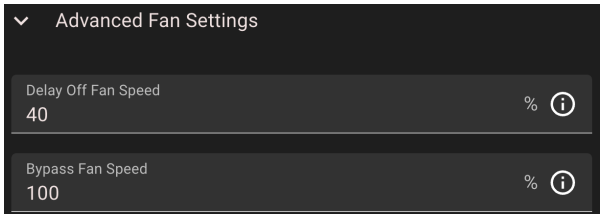

Fig 4: Fan speed at Bypass mode can be set in Advanced Fan Settings → Bypass Fan Speed.

Fig. 3: Set system to Bypass mode to open all gates and run fan at constant speed

Step 3: Measure Air Velocity

1. Use a high-quality air velocity meter with an averaging function. We recommend the **Fluke 922** with a Pitot tube long enough to scan the entire duct diameter.
2. Measure air velocity by scanning the entire diameter of the duct to get an accurate reading by using the averaging function of the Fluke 922 meter - description is in the previous chapter.

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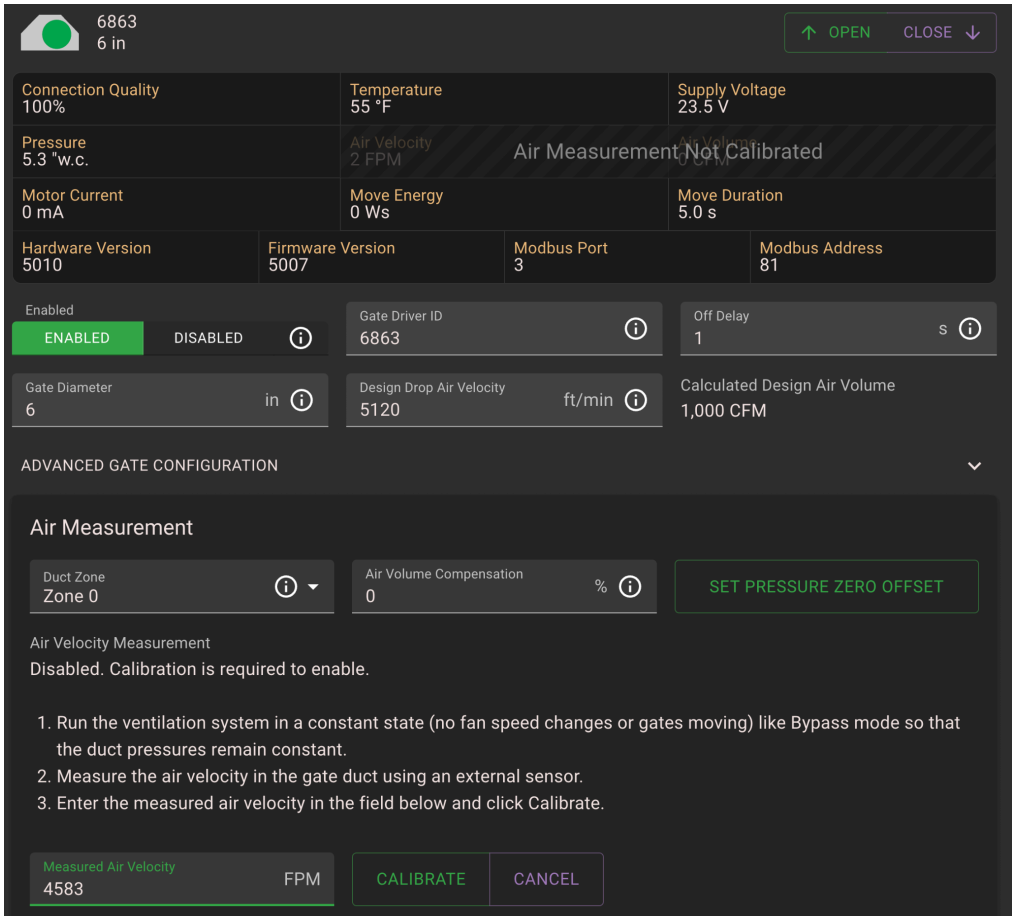

Fig. 5: Enter measured air velocity by Fluke 922 meter, and press CALIBRATE button.

Step 4: Calibrate Air Velocity

1. In **Advanced Gate Configuration**, press the **CALIBRATE** button.
2. Enter the measured air velocity and press **CALIBRATE** again.

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3. The greenBOX will evaluate pressure over a **10-second period**, calculate the average, and adjust the air velocity reading accordingly.
4. Air volume is then automatically calculated based on the measured air velocity and the gate diameter.

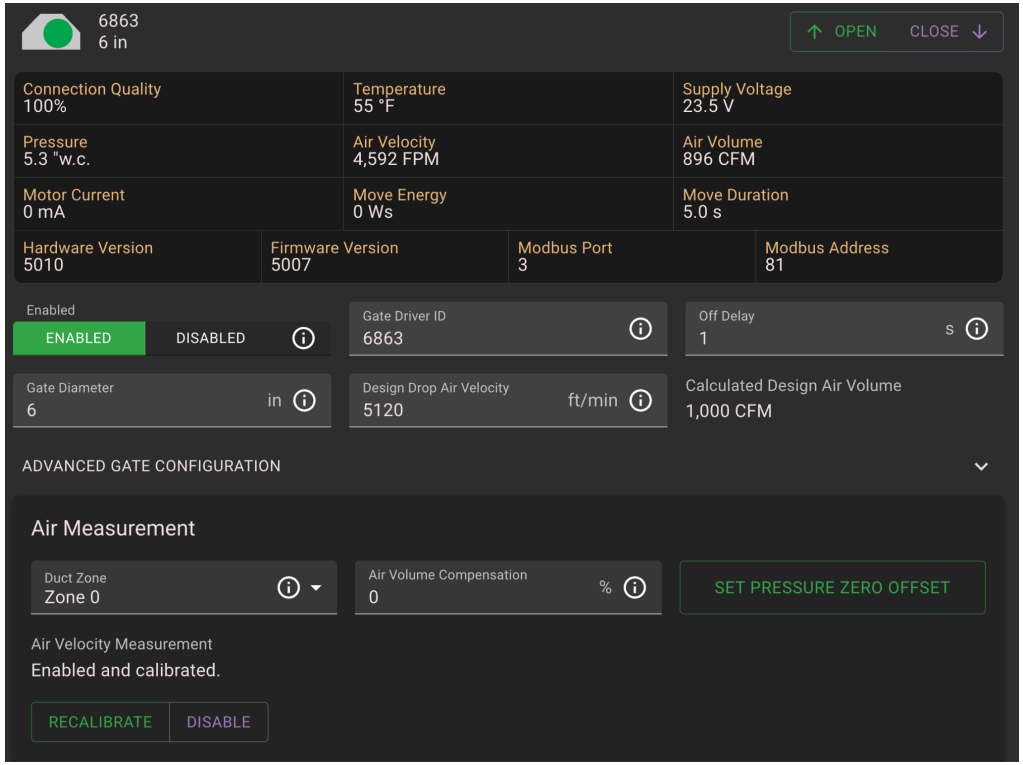

Fig. 6: After calibration gate will show measured Pressure, Air Velocity, and Air Volume

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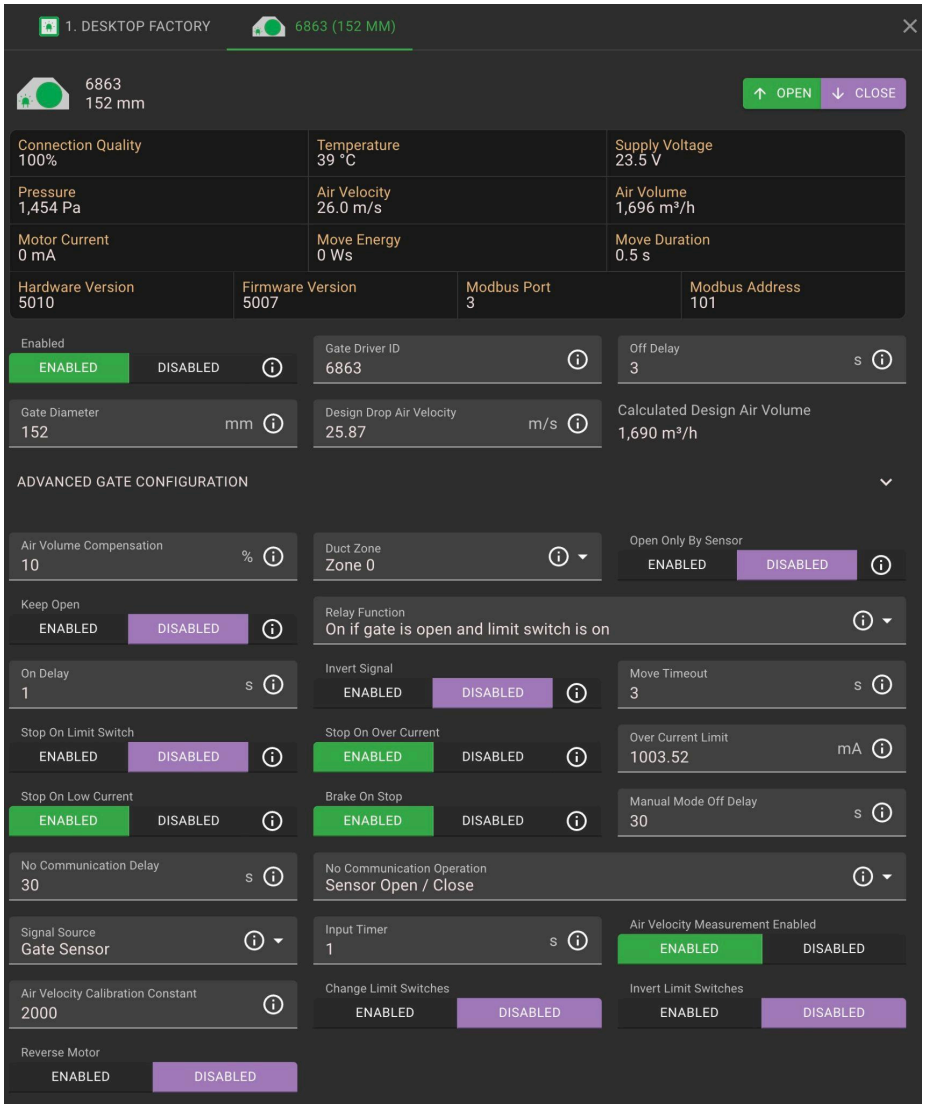

*Fig 7: Enable "**Air Velocity Measurement**" and adjust the "**Air Velocity Calibration Constant**" until the gate's measured value matches the air velocity you measured with the Fluke 922]*

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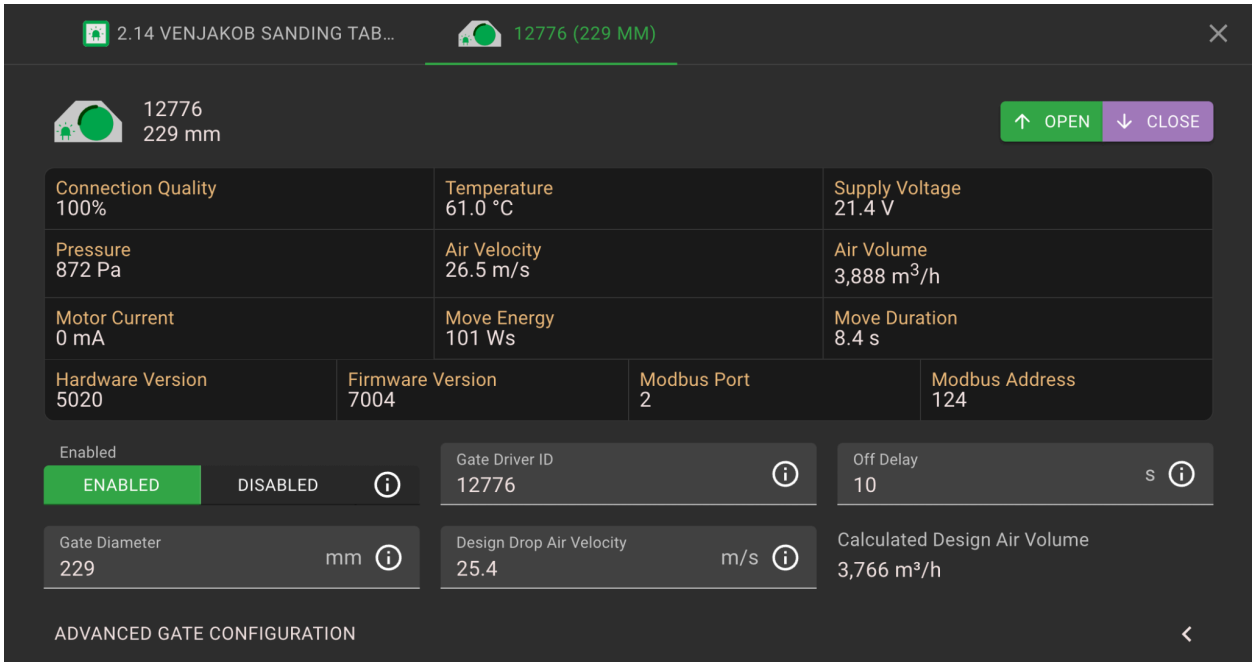

Fig 8: Ecogate greenBOX user interface shows Pressure, Air Velocity, and Air Volume measured at gate, i.e. at drop to the workstation.

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Step 2: Calibration of Air Velocity & Air Volume Reading in the Main Duct

The Ecogate system can use several methods to measure air velocity and air volume because not all options are possible or practical in all types of the systems.

Air Velocity/Air Volume Measurement Methods

Method	Recommended Use	Limitations
Averaging Air Velocity Sensor (External)	Preferred for its precision. Install on the clean side, between the dust collector and the fan.	Not suitable if the fan is on top of smaller dust collectors, as there's no space for installation.
By Fan Power, Fan Total Static Pressure, and Efficiency	Use when an Averaging Air Velocity Sensor cannot be used.	Requires a VFD (for fan power reporting) and a fan total pressure sensor.
By Sum of Air Volume of All Gates	Applicable when all Ecogate gate air velocity readings are calibrated, and there are no open ducts.	Cannot be used if any drops lack Ecogate gates with air velocity readings.

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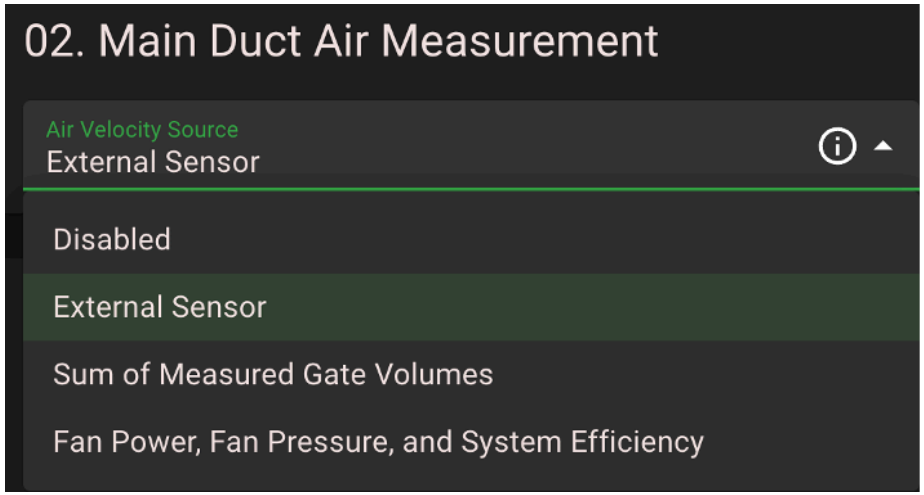

Fig 9: Ecogate system offers three methods how Air Velocity and Air Volume is measured: by External Air Velocity Sensor, by Sum of Gate Air Volumes, and by Fan Power, Fan Pressure, and Fan Efficiency

Method 1: External Air Velocity Sensor

External air velocity sensors provide the most accurate measurements. Ecogate recommends our "Averaging Air Velocity Sensor," which measures air velocity across the entire duct diameter. This sensor, based on the pitot tube principle, measures velocity and static pressures at intervals across the duct diameter, ensuring accuracy since air velocities vary at different points in the duct. This sensor must be installed in a clean air duct—typically between the dust collector filter and fan inlet. While the air volume here matches the main duct's, the air velocity must be recalculated for the main duct before the inlet of the dust collector, which is often slightly smaller than the outlet duct or the duct between the filter system and fan.

Note: Air velocity sensors should be installed at a point at least three to five duct diameters away from elbows, both upstream and downstream. Airflow in close proximity to elbows is turbulent, which can negatively impact the accuracy of the measurements.

This method offers high precision but is unsuitable for smaller systems where the fan is directly installed at the dust collector (filter) outlet or older systems with fans installed in dirty air before the dust collector. For these systems, other two methods can be utilized.

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Averaging Air Velocity Sensor Calibration: A Step-by-Step Guide

1. **Prepare the System:**
    - Set the entire ventilation system to run at a constant speed with all gates fully open.
    - This can be achieved by selecting **MANUAL MODE** on the Power MASTER VFD's front door selector or **BYPASS mode** in the greenBOX user interface. Both methods ensure constant fan speed and open gates.
2. **Measure Air Velocity:**
    - Use the Fluke 922's AWG function to measure air velocity at the sensor location.
    - Ensure measurements are taken at least three duct diameters away from the Averaging Air Velocity Sensor and from any elbows, both upstream and downstream.
3. **Access greenBOX Settings:**
    - Navigate to **Modbus Devices** and then **Averaging Air Velocity Sensor** in the greenBOX interface.
4. **Enter Duct Diameter:**
    - Fill in the "Duct Diameter" field with the diameter of the duct where the sensor is installed.
5. **Important Note on Main Duct Diameter:**
    - While the air volume in the clean duct and the main duct is identical, the main duct diameter is typically smaller.
    - Therefore, air velocity must be recalculated for the main duct.
    - You must enter the "**Main Duct Diameter**" under **System Settings**, in the "**02. Main duct Air Measurement.**" section.
6. **Calibrate the Sensor:**
    - At **Modbus Devices**, under **Analog Input 1**, enter the duct diameter where the sensor is installed (this is usually larger than the main duct diameter).
    - Press the "**CALIBRATE**" button.
    - The greenBOX will then evaluate air velocity over a 10-second period, calculate the average, and adjust the air velocity reading.
    - Air volume will be automatically calculated based on the measured air velocity and the duct diameter.
7. **Select External Sensor for Main Duct Measurement:**
    - Now, in **System Settings**, navigate to "**02. Main duct Air Measurement.**"
    - Select "EXTERNAL SENSOR" for main duct measurement and choose "Ecogate Averaging Air Velocity Sensor" (this is the name you set for the sensor under Modbus devices).

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*Fig 10: **Main Duct Diameter** should be entered at "**02. Main duct Air Measurement.**" Note: the diameter entered at Averaging Air Velocity Sensor (see Fig 02) is the duct diameter where the sensor is installed.*

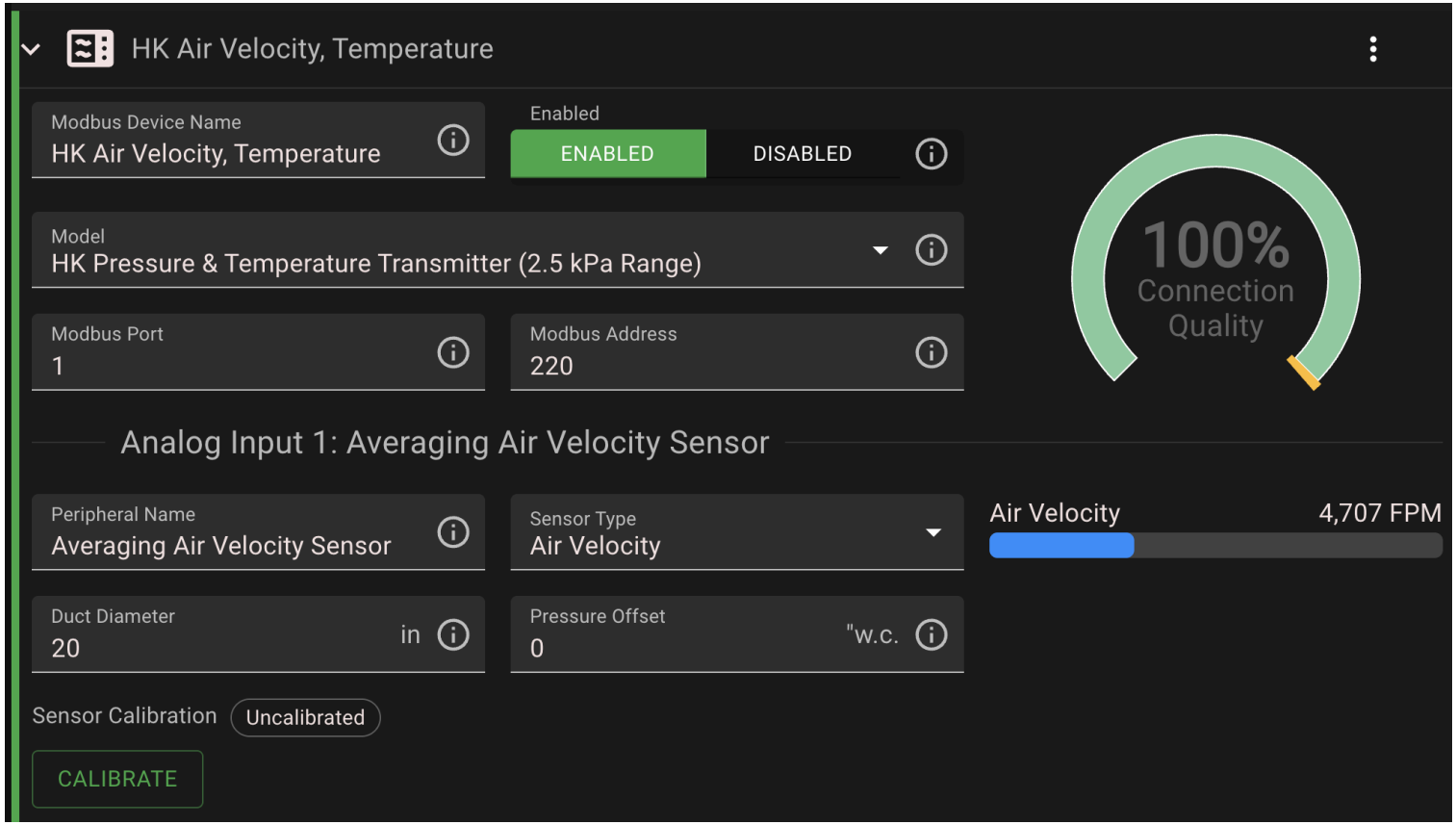

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Fig 11: At Modbus Devices, Analog Input 1, enter the duct diameter where the sensor is installed, and press the "CALIBRATE" button.

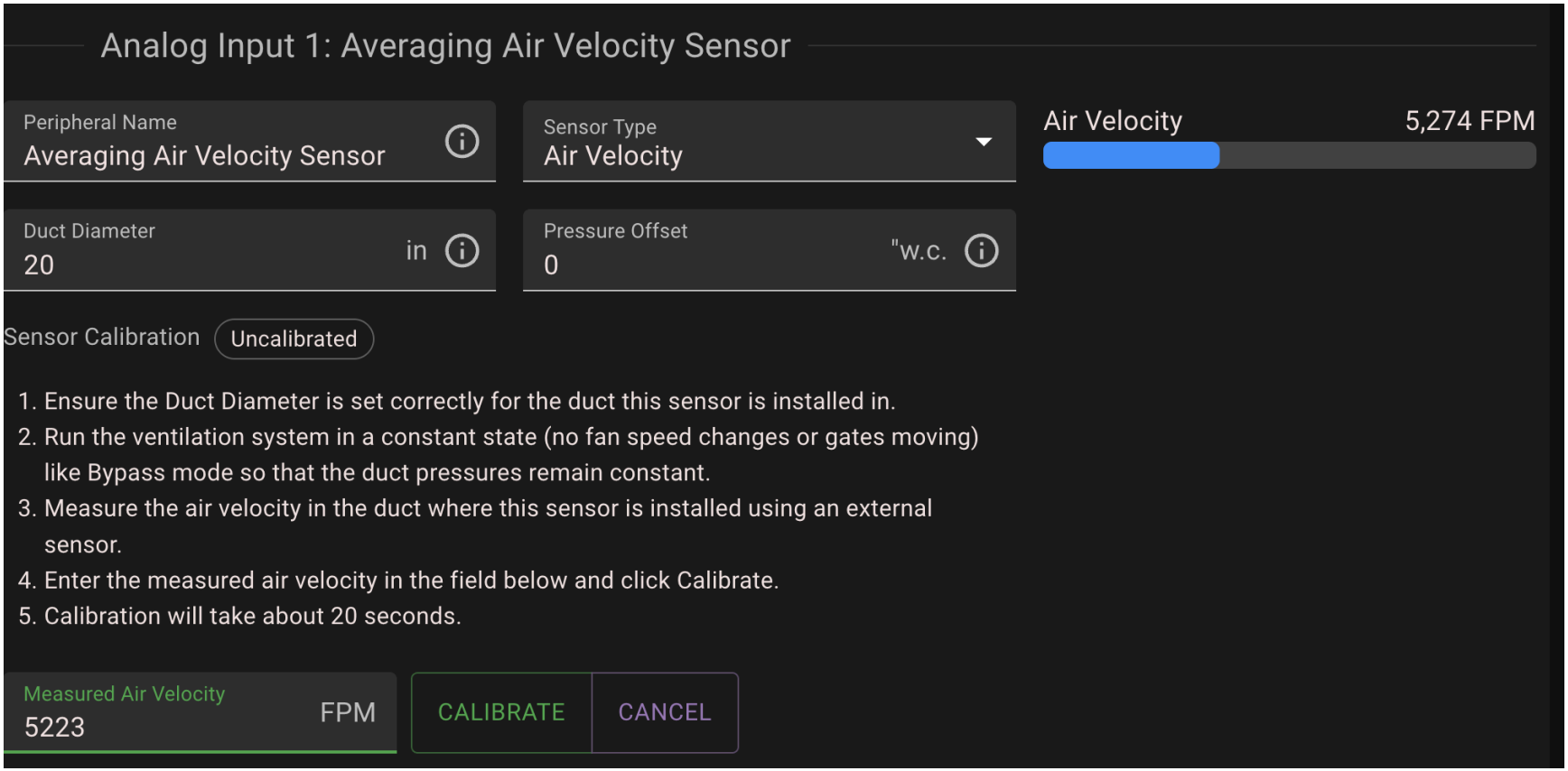

Fig 12: Enter the average air velocity as measured by the Fluke 922 meter, and press CALIBRATE button.

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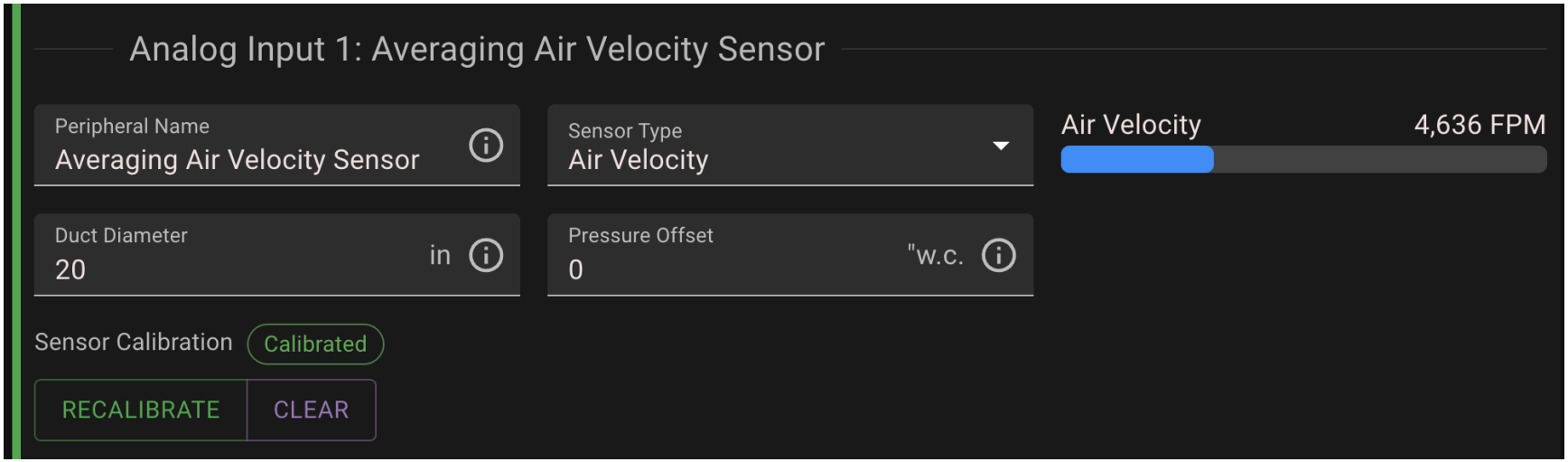
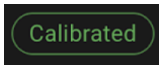


Fig 13: After successful calibration you will see  *status. You can repeat Calibration by using the "RECALIBRATE" button.*

Method 2: Calculating System Air Volume by Summing Gate Air Volumes

Ecogate gates measure air volume and send this data to the greenBOX control unit. This allows the system's total air volume to be calculated by adding together the air volume measurements from all the individual gates. Once the system air volume is known, the main duct air velocity can be easily determined using the main duct's diameter. This method is suitable for systems where all drops have Ecogate gates installed, a common configuration in Ecogate systems and they are no open duct left on the duct system.

Important Note: This method cannot be used if any drops have non-Ecogate gates (e.g., manual or pneumatic gates), if there are duct openings intended for future equipment, or if there are openings designed to maintain minimum transport air velocity (which may be necessary in oversized ducts).

When using this method, no additional calibration is required. Simply input the correct main duct diameter and select from the listbox **"Sum of Measured Gate Volumes".**

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Fig 14: ***Main Duct Diameter*** *should be entered at "****02. Main duct Air Measurement*** *and select from listbox* ***"Sum of Measured Gate Volumes".***

Method 3: Calculating Air Velocity/Volume from Fan Power, Pressure, and Efficiency

This method determines air velocity and volume by reversing the fan power calculation, using fan power (measured by the Power MASTER VFD), fan total static pressure (measured by the fan pressure transmitter), and fan efficiency.

Important Considerations for Accuracy:

- **Fan Efficiency:** Manufacturer-stated fan efficiency (per AMCA standards) is based on ideal test measument conditions. In actual installations, efficiency can be 5% or more lower.
- **Calibration:** To calibrate this method within Ecogate, users must input the air velocity measured across the duct diameter (using the Fluke 922's averaging function) and then press the "CALIBRATION" button.
- **Operating Point:** Fan efficiency varies from the "Best Efficiency Point" on the fan curve, which can affect the precision of this calculation. For optimal accuracy, calibrate near the system's typical operating point.

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Fan (System) Efficiency Calibration: A Step-by-Step Guide

1. **Simulate Typical Operation:**
    - Set infrequently used gates to "Open Only With Sensor." Limit these to a maximum of one-third of the total gates to simulate the usual number of active gates (which typically corresponds to the number of employees using workstations).
    - Activate BYPASS mode in the greenBOX interface to run the system at a constant speed with all remaining gates fully open (not set to "Open Only With Sensor").
2. **Measure Main Duct Air Velocity:**
    - Use the Fluke 922's AWG function to measure air velocity in the main duct.
    - Take measurements at least three duct diameters away from any branches or elbows, both upstream and downstream.
3. **Initiate Calibration in greenBOX:**
    - From the list box, select "Fan Power, Fan Pressure, and Efficiency."
    - Enter the main duct diameter.
    - Press the "CALIBRATE" button.
4. **Enter Measured Air Velocity:**
    - After pressing the first "CALIBRATE" button, enter the air velocity value obtained from the Fluke 922 meter.
    - Press the "CALIBRATE" button again.
    - The greenBOX will then evaluate the air velocity over a 10-second period, calculate the average, and adjust the air velocity reading accordingly.

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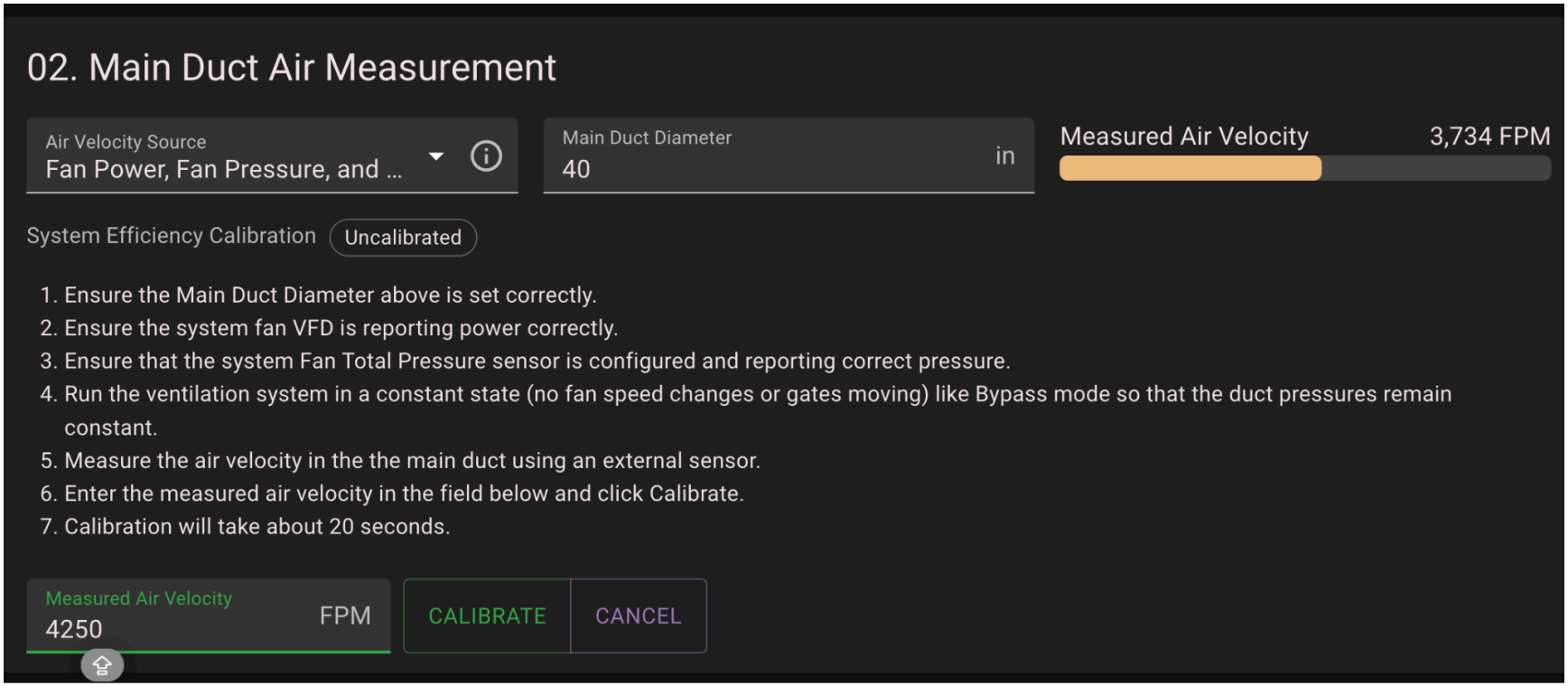

Fig 15: After pressing the CALIBRATE button, enter the air velocity value measured by Fluke 922 meter, and press the "CALIBRATE" button again.

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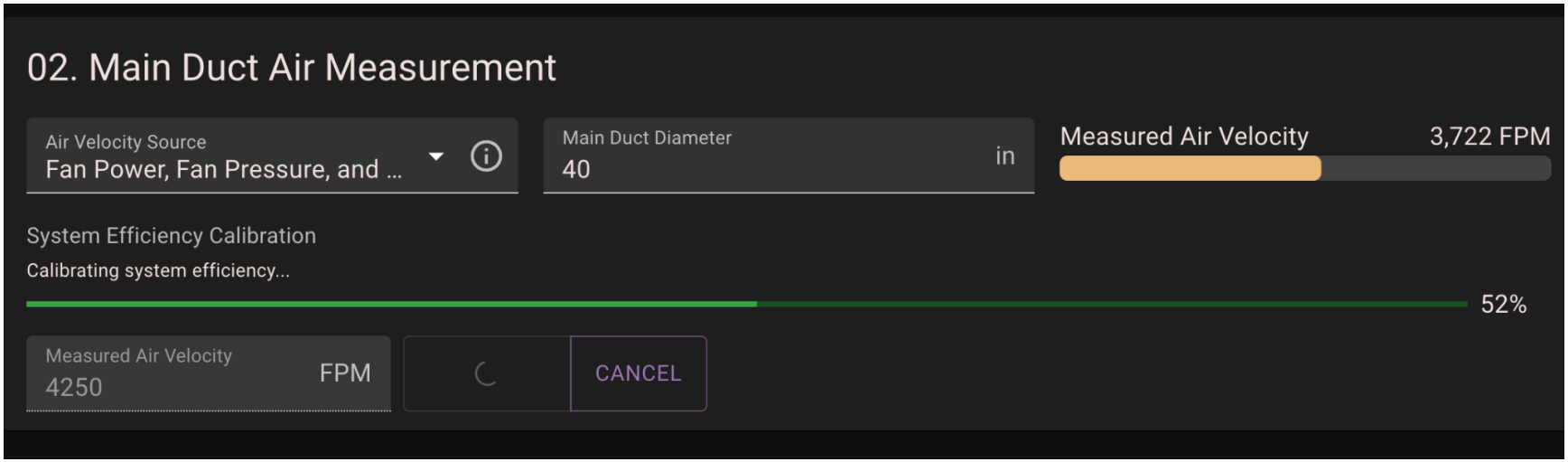


Fig 16: The greenBOX will evaluate air velocity over a 10-second period, calculate the average, and adjust the air velocity reading accordingly.

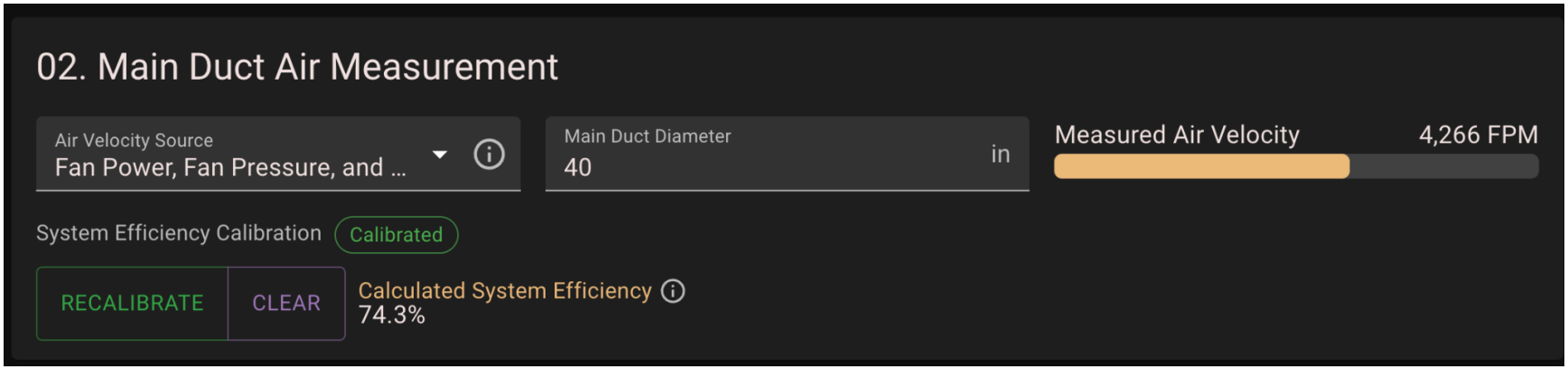
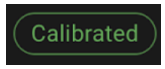


Fig 17: *After successful calibration you will see* 

status. You can repeat Calibration by using the "RECALIBRATE" button. Measured "Fan Efficiency as Installed" - we call it "System Efficiency" to distinguish it from fan efficiency published by the fan manufacturer

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Step 3: Adjusting Fan Minimal and Maximal Speed by Utilizing “Air Volume Surplus"

The primary aim of calibration is to ensure your system delivers the intended (design) air volume at each active workstation, regardless of how many are running, while maintaining the necessary minimum transport air velocity in the ductwork. By calibrating air velocity at the main duct and gates, we gain a clear picture of the system's airflow, simplifying this process.

Calibration involves monitoring the Air Volume Surplus, which is the difference between the Measured Air Volume and the Required (Design) Air Volume. A small positive surplus, regardless of the number or combination of active gates, indicates proper ventilation. Simultaneously, we must ensure the Main Duct Air Velocity never falls below the Minimum Transport Air Velocity.

Ideally, a perfectly balanced duct system wouldn't require monitoring individual gate air velocities, as each would receive the designed air volume and velocity when the system extracts the correct overall air volume. However, achieving a perfectly balanced system is challenging due to several factors:

1. **Lack of Comprehensive Workstation Data:** Design engineers often lack detailed pressure loss and airflow data (workstation curves) for every machine, limiting their ability to precisely calculate requirements. This information is typically available only for larger CNC machines, though ideally, it should be provided for all.
2. **Workflow vs. Dust Collection:** Workstation location in the factory is determined by workflow efficiency, not by optimal dust collection. This can force engineers to connect workstations with varying resistance (e.g., low-resistance small machines with high-resistance wide belt sanders), further complicating system balancing.
3. **Duct Diameter Limitations:** Duct diameters are available in set increments (1-inch up to 10", 2-inch for larger sizes). This can necessitate choosing a slightly larger or smaller duct than the optimal design, impacting airflow precision.
4. **Long Duct Systems:** Extensive duct systems with numerous branches and bends further complicate achieving optimal balance as pressure losses to last workstations in the duct system are higher compared to the workstations close to the fan.

While manual balancing gates can help balance drops, they are only practical in systems with low dust loads because they create obstacle in the duct system. The balancing gates are increasing pressure lossses a turbulence we recomend with on-demand systems set design air volume to drops with lowest air flow and accept higher airflow in other drops. This is acceptable as Ecogate systems inherently have surplus air volume available due to many inactive workstations with zero airflow.

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While it's possible to design systems with perfect airflow for each drop, such systems are often more expensive, consume more energy, and are not economically viable for most applications.

Configuring Dashboard to See Surplus Air Volume and Main Duct Air Velocity

The Dashboard Configuration options are accessible from the top right “three dots” menu. From there configure dashboard by using following options:

1. Select “**Air Volume Surplus”** from third listbox from top
2. Select “**Measured Air Velocity”** from last listbox

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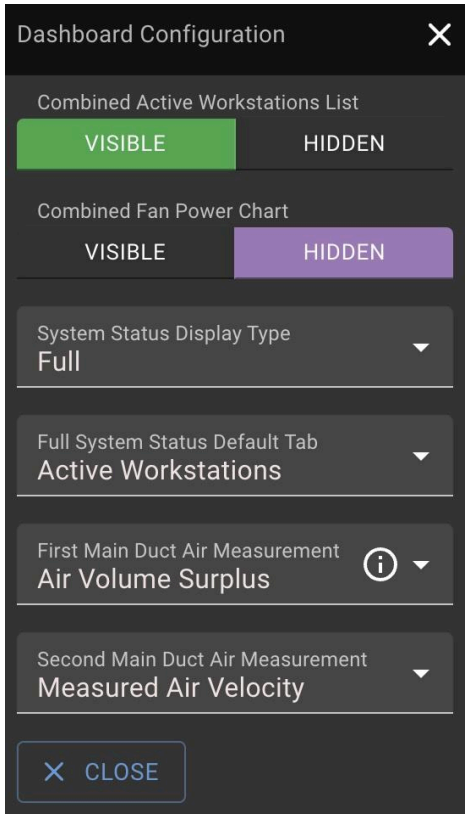

Fig 18: From the top right “three dots” menu configure dashboard: select “Air Volume Surplus” from third listbox from top, and select “Measured Air Velocity” from the last listbox.

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Setting Maximum Fan Speed

The "**Maximum Fan Speed**" setting, located in "**01. Fan Settings**" is a percentage value. It's crucial to understand that the VFD (Variable Frequency Drive) itself has a speed limit, typically defined by its "LIMIT" parameters (e.g., ABB drives use parameter 30.14 "Maximum Frequency"). The VFD will not operate above this limit, even if greenBOX requests it. In North America, this limit is 60 Hz, while in Europe, it's 50 Hz. Operating above 60 Hz is possible in special circumstances, provided there's sufficient reserve in the fan's maximum speed, motor power, motor current, and VFD power. A separate document provides details on how to utilize speeds exceeding 50/60 Hz.

	Fan Maximum Air Volume (%)	Maximum Fan Speed Settings @ greenBOX
1	Is equal to System Design Air Volume	100 %
2	Is above System Design Air Volume	below 100%
3	Is below System Design Air Volume	above 100%

Important Note: The "Maximum Fan Speed" setting in greenBOX can exceed 100%. This is acceptable if the fan's maximum air volume is less than the system's design air volume, as the fan will not operate beyond the limit set in the VFD.

For example, if average workstation utilization is 50% and peak utilization is 75%, it's permissible for the fan to ventilate as maximum, say, 85% of the system's total air volume. In such cases, the greenBOX Maximum settings will display values over 100%. This value represents the theoretical speed needed for the fan to ventilate 100% of all workstations simultaneously, a scenario that will not occur. Instead, **this value acts as a "mapping" value, adjusting the regulating slope to determine the required fan speed for a given air volume**.

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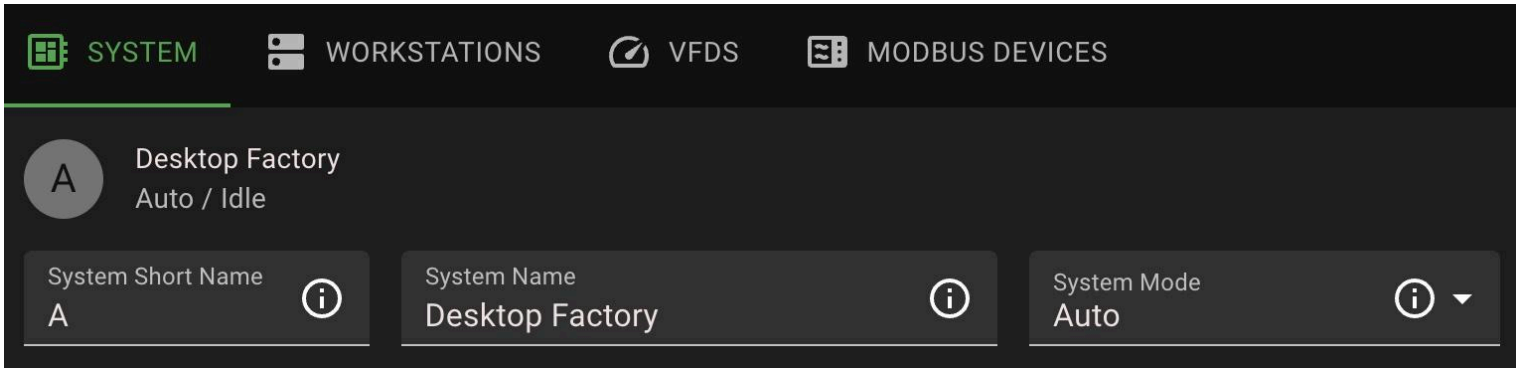

*Fig 19: for Calibration set system to "**Auto**" Mode*

Here's how to set the Maximum Fan Speed:

Step 1: Simulate Full Load
Set "**System Mode**" to Auto. Activate the maximum number of workstations your system is designed to handle at once. You can do this using the "**Invert Signal**" function in the Advanced Gate settings.

Step 2: Adjust Based on Air Volume Surplus
Monitor the "**Air Volume Surplus**" value. If it's negative, gradually increase the "**Maximum Fan Speed**" until the surplus becomes positive. A positive surplus indicates that the system can deliver the required airflow to all active workstations. If you can't achieve a positive surplus, deactivate one workstation and repeat the process.

- If necessary, continue adjusting the "**Maximum Fan Speed**" above 100% until you achieve a positive "**Air Volume Surplus**." Remember, this value is for performance mapping, generally adjusting what fan frequency is set for certain measured air volume (i.e. how steep is air volume/to fan speed function). It is important to note that the fan physical maximal speed is limited in the "Limit Parameters of the VFD, and it is set as default to 60 Hz = 100% of the fan speed. In special cases we can run the fan over 100% speed - but carefully read the Ecogate document to determine if it is safe to do it, and how to do it.
- Reaching 100% fan speed as indicated on the VFD tab indicates the system's air volume limit.

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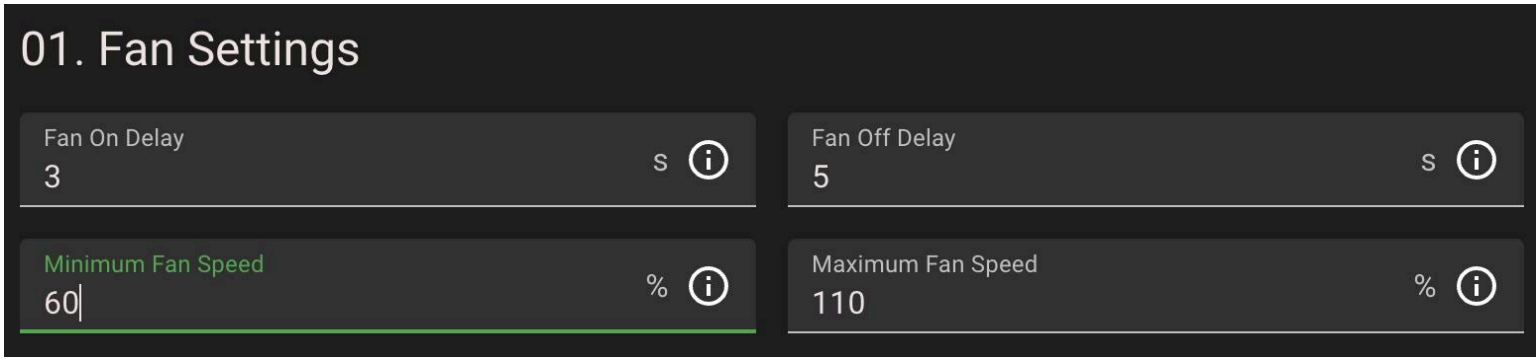

*Fig 20: During the calibration process you will adjust "**Maximum Fan Speed**" and "**Minimum Fan Speed**".*

Setting Minimal Fan Speed

Switch the system to "**Auto Mode**" and activate a single workstation (you can use the "**Invert Signal**" function in the Advanced Gate settings to do this). Since you've already configured the Minimum Airflow setting (as per the greenBOX Nxt Quick Software Guide), the system will automatically open multiple gates. Now, closely monitor the "**Air Volume Surplus**" value. If it's negative, gradually increase the "**Minimum Fan Speed**" until the surplus becomes positive, ensuring adequate airflow for the active workstations.

Simultaneously, keep an eye on the "**Measured Air Velocity**." It should always stay above the **Minimum Transport Air Velocity** specified for your system. If the air velocity dips too low, raise the "**Minimum Fan Speed**." You can also fine-tune the "**Minimum Airflow**" setting, as some fan curves require higher minimum airflow for optimal performance.

Fine Tuning the System

Once you've adjusted the Maximum and Minimum Fan Speeds, thoroughly test the system by activating different combinations of workstations. Continue monitoring the "**Air Volume Surplus**" and make further adjustments as needed to maintain optimal performance.

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Calibrating Air Flow in The Duct Zones

Please note: To maintain the brevity and focus of this quick calibration guide, the process of calibrating airflow within individual duct zones is not covered here. However, a separate YouTube video and online document is available that provides detailed instructions on this specific procedure.

insert YouTube multiple zone video link, ans respective article link

Some Additional Recommended Settings

1. Set **Warning and Error Levels for the Fan and Filter pressure**
2. Set **Gate Off Delay** for all workstations (typicaly 60 seconds for small workstations, several minutes for large workstations).
3. Set the **Fan On and Off Delay**
4. Set if **gates should be Open (recommended) or Closed at the system stop**
5. Set **how many not communicating gates will cause Warning and Error**

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Step 4: Enjoying Your Fully Automated Ecogate System

Once calibrated, your Ecogate system is fully automated and ready to go! Simply use your workstations as you normally would. The system's activity sensors will detect when a workstation is in use, automatically starting the fan and dust collector. It will also close unused gates while intelligently managing airflow to meet minimum requirements.

Benefits of Ecogate:

- **Energy Savings:** The fan operates at lower speeds, significantly reducing electricity consumption.
- **Quieter Operation:** Lower fan speeds mean a quieter working environment.
- **Longer Filter Life:** Optimized airflow reduces wear and tear on filter bags, extending their lifespan.
- **Scalability & Adjustability:** The system's adjustability and increased dynamic capacity allow you to easily add more workstations in the future while maintaining proper ventilation.

Welcome to the world of Ecogate—where efficiency, savings, and a cleaner, quieter workspace come together!