rheia® Comfort By Design

Airflow Commissioning Manual

Fall 2025

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About this manual

This manual is a comprehensive reference for HVAC technicians tasked with commissioning Rheia air distribution systems.

- Check the Rheia website to make sure you are referencing the most current version of this manual which can be found at: https://rheiacomfort.com/contractor-resources/
- Review the Table of Contents to familiarize yourself with the layout of the manual.
- Before diving into the instructions, understand any symbols or naming conventions used in the manual.
- Follow the step-by-step procedures.
- Use the diagrams and illustrations as visual aids to understand the airflow commissioning process.
- QR codes are used throughout the document. Scan these codes with your smartphone camera to access more detailed information on a topic.

Technical support

If you experience any issues with the use or functionality of the Rheia Verify air balancing app, support is readily available. You can access step-by-step guides, videos, and helpful resources anytime on our website at rheiacomfort.com.

Your local Rheia representative is available to provide hands-on assistance and answer any questions you may have about the Rheia airflow commissioning process, and about using the app in the field. We're here to ensure your experience with Rheia Verify is smooth, efficient, and fully supported.

Rheia Resources

Introduction

Rheia is an innovative system designed to be easy to install. This Installation guide is published for HVAC technicians and installers, building officials, and construction professionals interested in the Rheia Air Distribution System. This document describes general installation recommendations of the Rheia components, duct, and accessories. Always follow local code requirements.

Rheia has made all reasonable efforts to ensure this manual contains the most up-to-date, accurate information. Enhancements to the Rheia system may result in modification of features and or specifications without notice.

To ensure you are referring to the latest version of this manual, please visit rheiacomfort.com/resources.

Rheia is not liable for commissioning practices that deviate from this manual or are not acceptable practices within the industry.

Prior to commissioning the Rheia system, Rheia recommends all technicians review the Rheia Installation Checkpoints document provided on rheiacomfort.com.

Commissioning of a Rheia system installation should only be conducted by a trained HVAC technician.

The Rheia system comprises:

- UL 181-listed, 3' and 4' diameter duct
- UL 181C / UL 2043 listed Connector Components (Ferrule, Coupler, and Elbow)
- Distribution Components (take-offs, wall, ceiling and floor boots)
- UV stabilized ceiling and wall diffusers
- Metal accessories and floor diffusers

When storing and handling

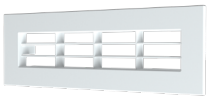
- Do not store Rheia components and duct outdoors
- Do not weld, glue, or apply tapes or adhesives, unless UL 181-listed
- Do not store below -40 deg. F or above 160 deg. F ambient temperature
- Do not install underground

Before starting an installation, review Rheia's library of training resources, carefully read these guidelines, and assemble all the required tools

For more information on the Rheia system visit:
www.rheiacomfort.com

Access Rheia's Library of free installation training videos

Finish installation components

Part No.	Name/ Specification	Description	Image
10-04-230	Ceiling Diffuser Assembly ABS UV stabilized UL94 HB	Diffuser assembly distributes air 360 degrees. Throw is approximately 12 feet @ 40 CFM. Compatible with 5/8" or 1/2" drywall.	
10-04-260	Ceiling Diffuser Small Assembly ABS UV stabilized UL94 HB	Diffuser assembly distributes air 360 degrees. Air throw pattern is designed specifically for heating dominated markets. Compatible with 5/8" or 1/2" drywall.	
10-04-091	Slotted Diffuser ABS UV stabilized UL94 HB	One-piece diffuser. Distributes air omni-directionally. Throw is approximately 17 feet @ 40 CFM. Compatible with 5/8" or 1/2" drywall. Use with High Sidewall Boot Assembly #10-01-200, or Pass Through Boot Assembly #10-01-210.	
00-04-300	Metal Floor Diffuser White: 04: RAL 9016	Painted steel diffuser for use only with Floor Boot 4x10 Assembly #10-01-280. Do not substitute with diffusers incorporating a built-in adjustable damper.	
00-05-300	Metal Floor Diffuser Beige: 05: PANTONE 7531C	Painted steel diffuser for use only with Floor Boot 4x10 Assembly #10-01-280. Do not substitute with diffusers incorporating a built-in adjustable damper.	
00-06-300	Metal Floor Diffuser Grey: 06:PANTONE COOL GREY 6C	Painted steel diffuser for use only with Floor Boot 4x10 Assembly #10-01-280. Do not substitute with diffusers incorporating a built-in adjustable damper.	

Recommended balancing tools

Name	Description	Image
Smart Phone, Tablet, or Computer	Used to connect to Rheia Manage & Rheia Verify from an Internet connection. The Rheia Manage and Verify apps are very low band-width so only minimal signal strength is needed.	
Static Pressure Meter (Manometer) and Probe(s)	Used to take equipment static pressure. We recommend high quality, calibrated meters for accurate results.	
Airflow Capture Hood (Balometer)	Used to capture airflow volume in CFM from Rheia boots. We recommend high quality, calibrated capture flow hoods for accurate results.	
Cordless Drill, Driver Bits and Drill Bits	Used to remove and replace HVAC equipment panels and drill holes for static pressure probes.	
Step Ladder	For safe access to equipment and ductwork.	

Required Documentation

Make sure you have the following documentation prior to starting the balancing process:

- The equipment blower data chart.
- HVAC design drawings and associated data.
- Access to the Rheia Verify App on the job site.

Overview

What is airflow balancing and why is it important?

Rheia's innovative air distribution system simplifies the balancing process, making it an integral part of setting up and maintaining a well-functioning HVAC system.

The current method to balance a home is often neglected because it is time-consuming and inaccurate. Rheia has made the process easier, rewarding the technician with time savings and the HVAC company with fewer call-backs.

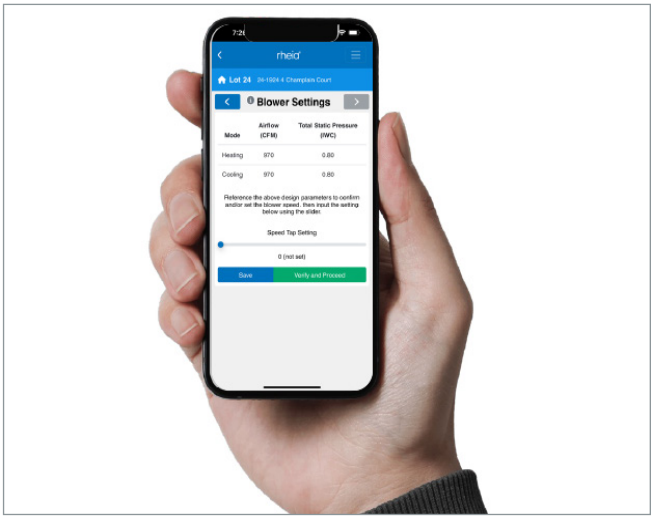
Balancing an HVAC air distribution system helps to ensure they operate as designed, delivering improved comfort, energy efficiency, and operational cost savings. Rheia emphasizes the importance of this process to ensure optimal performance, improved comfort, and efficiency in homes. Rheia requires new homes to have been verified using the Rheia Verify app to be valid for our product warranty.

What is Rheia VERIFY™?

Rheia Verify is an app-based tool which walks a service technician through the verification process of a Rheia HVAC system. Rheia has developed an approach to balance a home's airflow that is quick, easy to understand, and effective.

Current methods to balance an HVAC system require many adjustments that are time-consuming and innacurate, and despite being strongly recommended by HVAC industry bodies and experts, balancing is rarely done; resulting in comfort callbacks and dissatisfied homeowners.

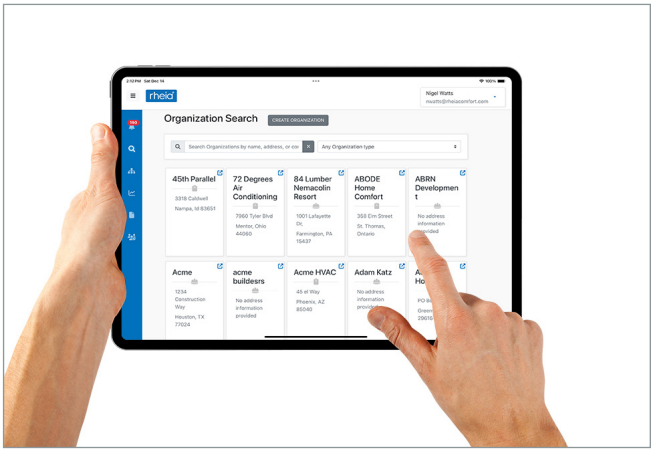
Access Rheia VERIFY™: **verify.rheiacomfort.com**



What is Rheia MANAGE™?

Rheia Manage accompanies Rheia Verify as the central database that manages Rheia's balancing data. All user/ company accounts, community/ lot information, and commissioning results and reports are held within the Rheia Manage environment. Access to Rheia Manage is controlled by your company's administrator, who is given access by Rheia.

Access Rheia MANAGE™: **manage.rheiacomfort.com**



ⓘ Rheia does not collect personal information of users or homeowners in the Rheia VERIFY or MANAGE apps.

Rheia airflow commissioning process

HVAC Technicians use the Rheia VERIFY™ app to balance Rheia air distribution system installations.

Rheia's airflow commissioning process is easy and effective, enabling technicians to quickly balance room airflows using the Rheia Verify app. With preloaded lot information and a guided step-by-step interface, the process reduces guesswork and ensures each register delivers the right amount of air. The result is a faster, easier airflow balancing process that helps create a consistently comfortable home.

1. **Register for access to Rheia VERIFY™**

   At **verify.rheiacomfort.com**, sign up with your work email, and follow the instructions in your email notification. **Work with your administrator to get access to your communities and lots.**

2. **Validate the lot**

   Before starting the balancing process, confirm the address and the lot's orientation. Add the lot orientation if needed. Confirm the HVAC design is uploaded and is correct for the home being balanced. **Make sure you have all the necessary tools and documentation.**

3. **Inspect the installation**

   Check that all boots are accounted for per the design. Confirm the boots have been caulked or sealed to the drywall. **Make sure all dampers are set to the open position.**

4. **Check the installed equipment**

   Check the specifications of the installed equipment and confirm the blower speed is set correctly per the design. Check the model number of the installed equipment to the information in the Verify App. **Use the Blower Data Chart to set the correct fan speed per the Verify App**

5. **Take a static pressure measurement**

   Enter the static pressure measurements into the Verify app. Remove the filter and set the operating mode of the equipment. Set the operating mode in the Verify app. Take Supply and Return static pressure measurements, and enter them into the Verify app.

6. **Measure the airflows**

   Ensure the equipment is operating in a steady-state mode. Record the measured airflows in the Verify app. Reference the HVAC design documentation to identify each diffuser being measured.

7. **Set the final damper positions**

   Run the balancing process in the Verify app. **Follow the app reccommendations and set dampers to their final positions.**

8. **Final static pressure check**

   Take a final static pressure measurement to make sure it is within limits. **The commissioning process is now complete.**

9. **Report review**

   Review the Verify Report to ensure the system is operating within design total static pressure and supply ducts are meeting the specified Manual J airflow requirements.

10. **Corrective action**

    After reviewing the Verify report, **take any corrective action as needed.**

Getting set up

How to get set up as a company

Your company is set up in Rheia Manage by Rheia. Once set up, Rheia assigns someone in your company as the administrator for your account.

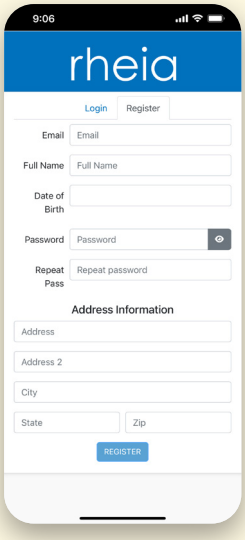
Rheia will notify your administrator via email when their access to Rheia Manage is available.

Company administrator role

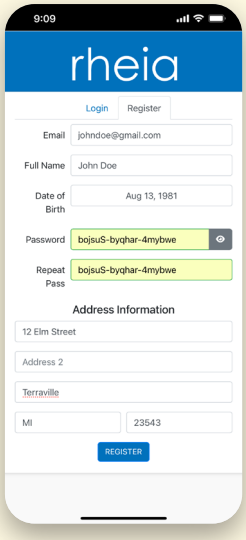
Your company administrator has the ability to set up individual user access and manage roles for any user including access to builder accounts, communities, and lots.

How to register for a Rheia VERIFY™ account

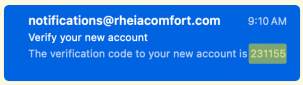
As a technician, you will need access to the Rheia Verify balancing app. Follow these simple steps to register.



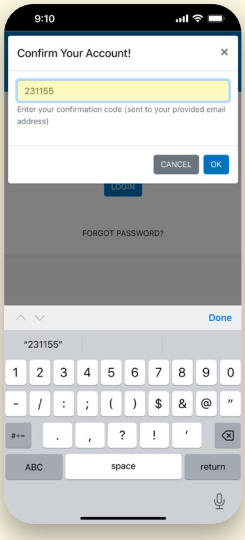
1: Navigate to **manage.rheiacomfort.com** and click the Register tab.



2: Enter the information requested, create a new password, and select "Register". Use a work email address if you have one.



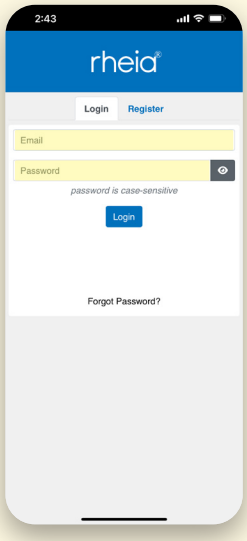
3: Find the verification code sent to your email inbox. Be sure to check your spam/ junk folder.



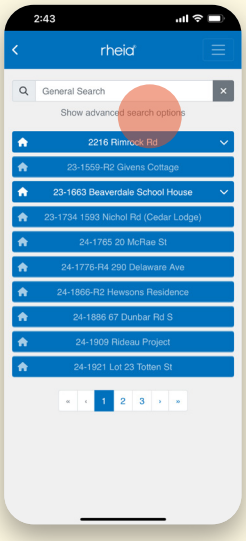
4: Confirm your account by entering the verification code and select OK. Return to the app and login with your new credentials.

This completes your registration. You are now a registered user on the Rheia platform. Once you have registered, an administrator will connect you to the organizations you are working with. Once you have been assigned to the correct accounts, you will be able to see all of your organization's data.

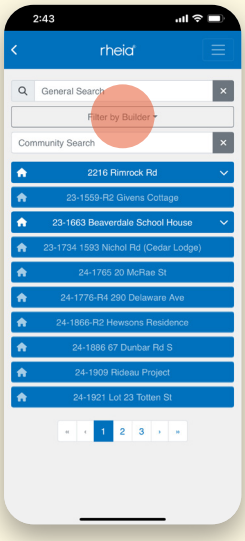
How to find a builder account



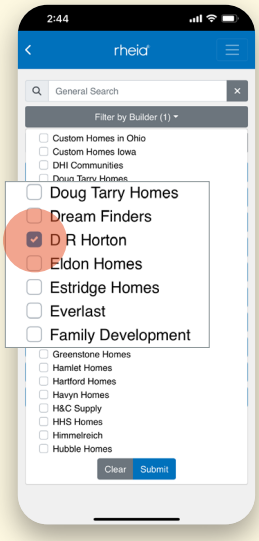
1: At verify.rheiacomfort.com, enter the credentials provided by your administrator and click "Login".



2: Tap the "Show advanced search options" link under the search tool.

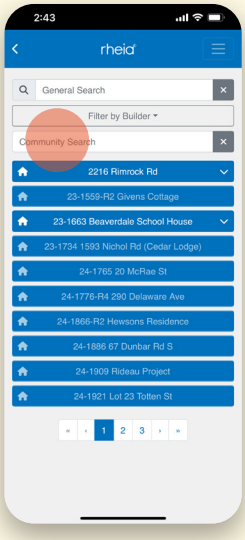


3: To view a list of builders, tap on the "Filter by Builder" button.

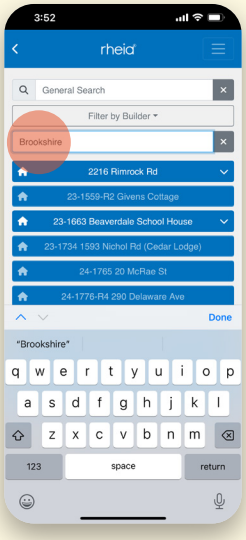


4: Select the builder by tapping the checkbox next to the builder's name. Tap the "Submit' button at the bottom of the screen.

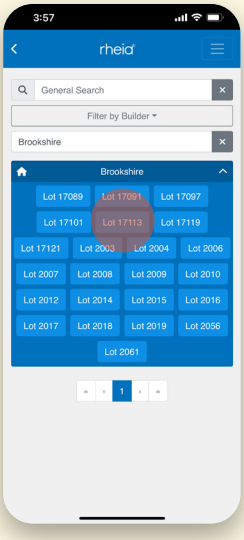
How to locate a community and lot



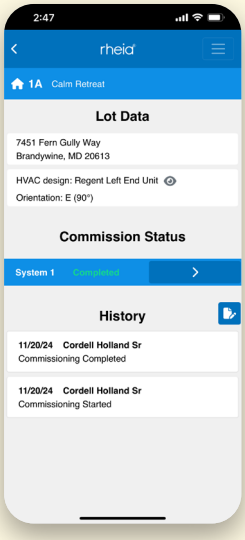
1: Tap the "Community Search" field.



2: Enter a community name and tap return. Select the community from the list displayed.



3: The list of active lots for the selected community is dispalyed. Tap on a lot number to display the lot information.



4: The Lot Data, Commission Status, and History are displayed.

Pre-balancing preparation

Before a technician begins the Rheia airflow commissioning process, confirm that all preparations have been completed as outlined in the Rheia Manage user guide. Attempting to balance the system without these prerequisites can result in inaccurate readings and unnecessary callbacks.

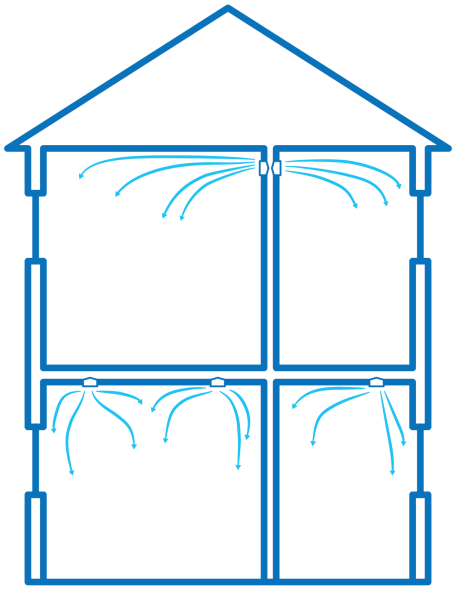
What is needed to balance a home.

Key items that must be ready, include:

- Power to the air handling unit (AHU) and outdoor unit.
- A ladder for access to wall and ceiling diffusers.
- Access to the blower performance data chart.
- The correct HVAC design documentation in either printed or digital form in on hand.
- A power drill with a ½" bit and appropriate tips for static pressure probe insertion.
- A manometer equipped with pitot tubes for static pressure testing.
- A balometer to measure airflow accurately.
- An internet-connected tablet or smartphone to enable access to the Rheia Verfiy app.

When all of the items above are available and functional the technician can proceed with the balancing process.

Balancing a home

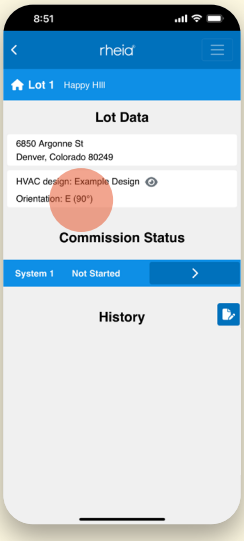


Validate the lot to be balanced

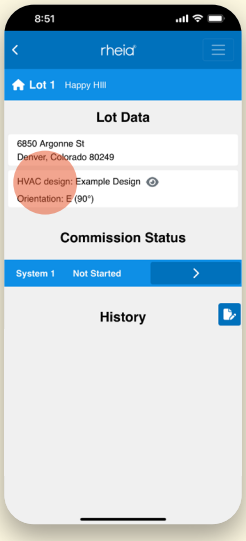
The selected lot's parameters, systems and history are displayed on the first screen. Each system of the home is commissioned separately and accessed via the system list.

If the lot has been previously commissioned and has results on the Rheia Manage database, the app will display "Completed". Each system on the selected lot are listed in the "Commission Status" section. Proceed to each system by first clicking on the arrow to the right of the system name.

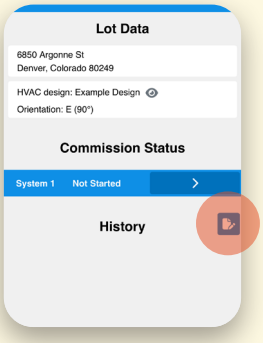
Validate the information about the lot:



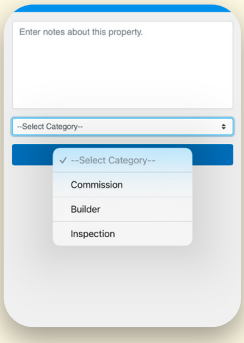
1: Confirm the lot orientation is correct.



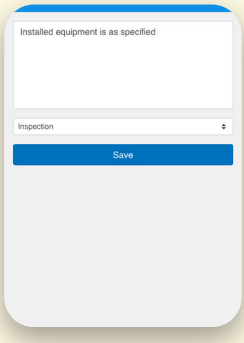
2: Confirm the HVAC design is correct.



3: Tap the "Notes" icon to add any notes as needed.



4:Select a category for the notes.



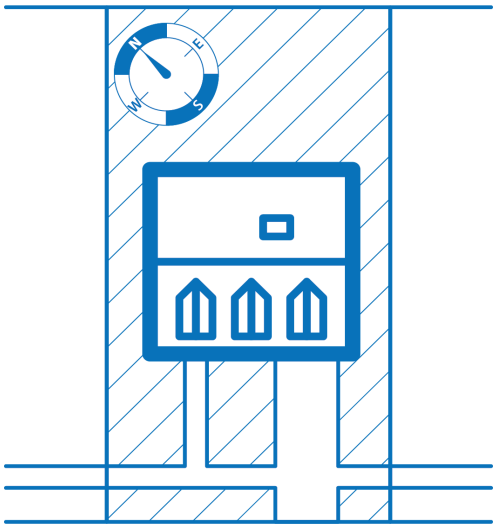
5: Enter the information and tap "Save".

Set the orientaton of a lot

If it hasn't yet been defined, you will need to identify the orientation of the lot and input it into Rheia Verify.

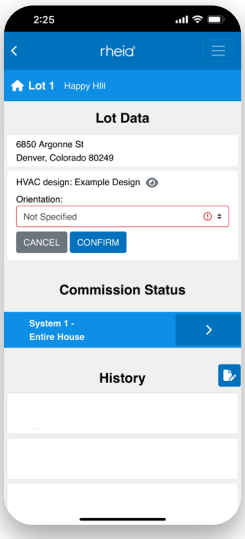
The lot orienation is an important parameter for balancing a Rheia system; the correct orientation is used when setting the balancing dampers to match the airflow targets.

Orientation of the home is defined during the HVAC design process. There are eight possible orientations, and the orientation of the home is based on the direction the main entry door is facing.



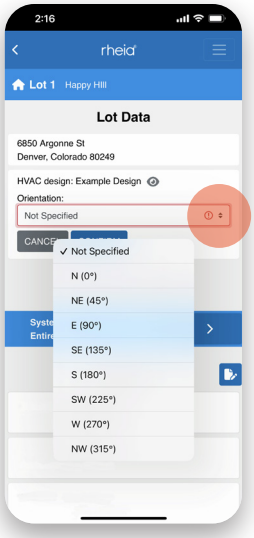
How to enter the lot orientation into Rheia VERIFY™

Rheia Verify allows the technician to set this value in the field, if the orientation was not known when the lot was created in the Rheia system.



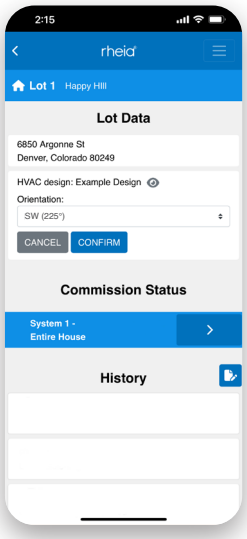
1: If previously set in Rheia MANAGE™, the lot orientation information will be displayed in the "**Orientation"** field in Rheia Verfiy.

Review the setting in the Orientation field and confirm the value is correct relative to the system design.

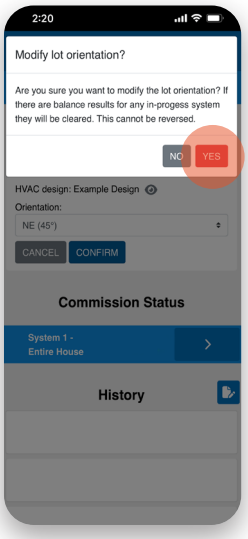


2: If the lot's orientation is incorrect or "Not Specified", select the correct orientation from the drop down list by clicking in the up/ down arrows. There are eight lot orientation options to choose from:

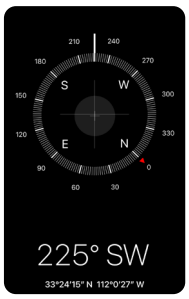
North (0°)
North East (45°)
East (90°)
South East (135°)
South (180°)
South West (225°)
West (270°),
North West (315°)



3: Once an orientation has been selected from the drop down list, click the "CONFIRM" button under the Orientation field.



4: A final confirmation to modify the selected orientation will be requested.Click "YES" to finalize the selection.

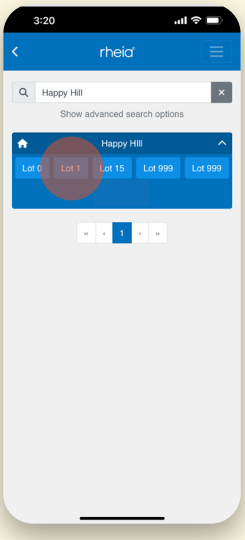


PRO TIP: To accurately determine the orientation of the home, use the built-in compass on your smartphone. Stand inside the home with the top of your phone facing the front door. The direction that is closest to the thick white line is your house orientation. In this screenshot example, the front of the house faces Southwest.

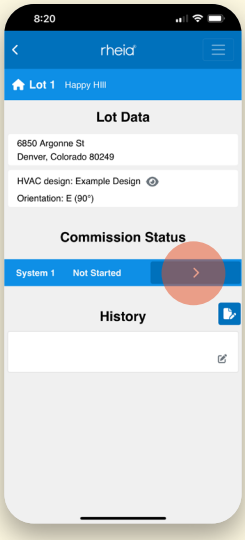
Confirm the equipment specifications

The equipment model numbers are listed in Rheia Verify and must be checked against the installed equipment. When there is a mismatch, the designer must be consulted before proceeding to ensure the installed equipment is compatible with the duct design. Rheia Verify shows the selected equipment from the Manual S design. This includes the coil and Air Handler Unit (AHU).

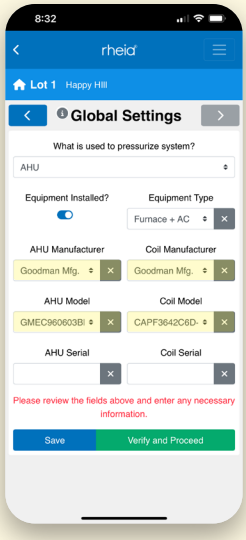
Confirm the equipment specifications:



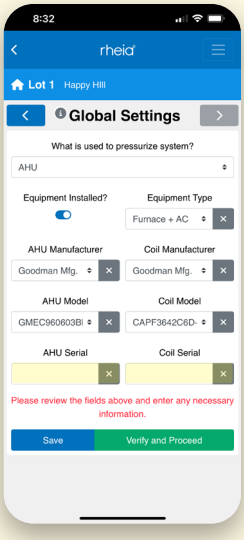
1: Select the lot to be balanced and navigate to the "Lot Data" screen.



2: Tap the next arrow to start the commissioning process.



3: On the "global Settings" screen, confirm the equipment installed matches the listed specifications. Select "Verify and Proceed".



4: Enter the serial numbers for the indoor and outdoor equipment. Select "Verify and Proceed".

⚠ **ALERT:** Do not proceed if the installed equipment does not match what is listed in the design. If they do not match, consult the design engineer about the installed equipment's suitability to this duct system before proceeding.

⚠ **ALERT:** Confirm that all of the installed equipment specifications match the equipment listed displayed on the Verify app.

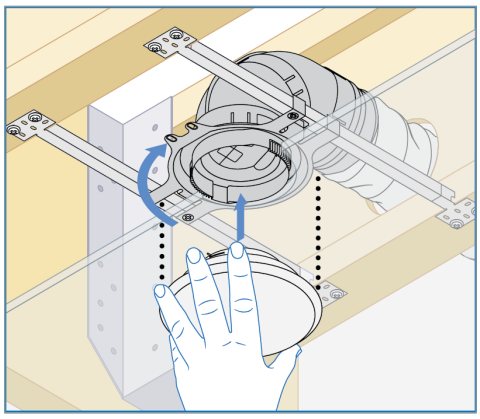
Diffuser installation and removal

To install a ceiling difffuser:

1. Align the protruding legs of the diffuser with the slots in the ceiling boot.
2. Insert the diffuser into the ceiling boot and twist the diffuser clockwise until it is touching the drywall.

To remove a ceiling difffuser:

3. Twist anti-clockwise the diffuser anti-clockwise until the diffuser. You will hear a racheting sound.
4. Keep twisting, and gently pull the diffuser away from the ceiling until it is free from the ceiling boot.

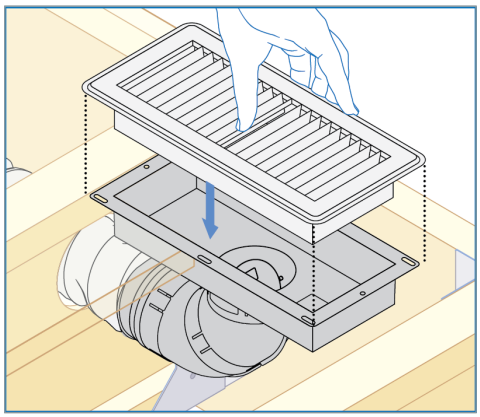


To install a Floor Diffuser:

1. Align the floor diffuser with the perimeter of the floor boot.
2. Lower the diffuser to the floor surface and check that the diffuser flange is in contact all around the boot.

To remove a Floor Diffuser:

3. Lift up the outside edge of the diffuser (use a blunt blade or tool if needed).
4. Lift the diffuser up and out of the floor boot.

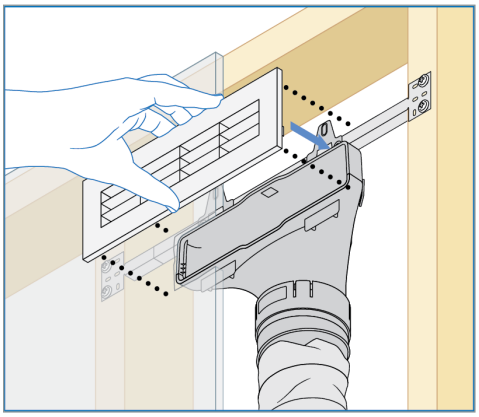


To install a Wall Diffuser:

1. Insert one side of the diffuser into the boot until it is touching the drywall.
2. Push the other side of the diffuser into position (listen for the clicks as the spring tab engages with the wall boot).
3. Firmly push the diffuser until it is flush with the wall.
4. Check that the diffuser is level with the ceiling and adjust if needed.

To remove a Wall Difffuser:

5. Push one side of the diffuser to the left or right.
6. Pull the diffuser out from the opposite edge.
7. Pull the diffuser away from the wall boot.



ALERT: Use only Rheia-approved floor diffusers. Floor diffusers with a built-in adjustable damper will not fully open and will compromise the performance of the HVAC system.

PRO TIP: There are two types of Ceiling Diffusers available. The Small Ceiling Diffuser is for regions of the country that are heating-dominated; The Large Ceiling Diffuser is for regions that are cooling-dominated. Confirm with your HVAC design engineer which Diffuser is right for your applications.

Check the dampers and diffusers

Walk around the installation with the duct layout drawing and note:

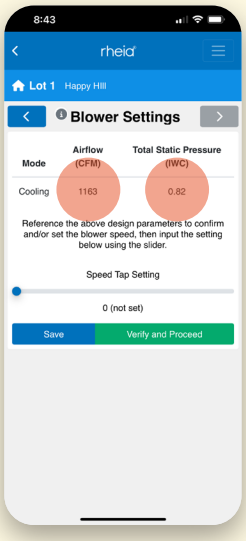
1. Supply boots are in the correct location per the design.
2. Supply boots are visible and not covered by drywalll.
3. Dampers are set to the fully open #1 position.
4. Supply boots are caulked to the drywall.
5. All diffusers are installed (or all diffusers are not installed).
6. Enter the information into the Rheia Verify app.

Confirm the correct blower speed

Using ACCA Manual S and data from the design, the Rheia design process specifies the blower fan airflow and total static pressure targets for heating and cooling mode. Rheia Verify displays the total CFM airflow for heating and cooling mode.

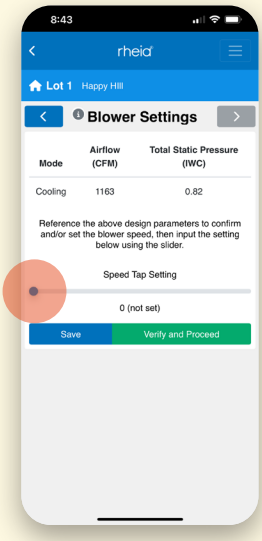
Reference the blower data table in the HVAC equipment manual to determine the appropriate blower speed.

Blower speed lookup process:

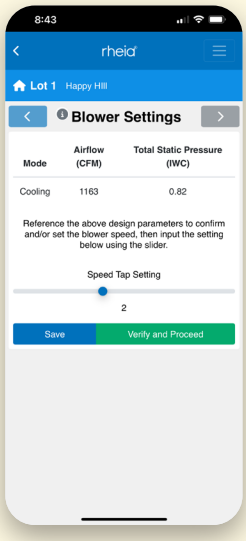


1: On the "Blower Settings" screen, review the static pressure and airflow data for heating and cooling modes. Select "Verify and Proceed".

2: Locate the blower table in the equipment manufacturer's installation manual.



3: Use this information to set or confirm the speed of the equipment. Adjust the "Speed Tap Setting" with the slider. Select "Verify and Proceed".



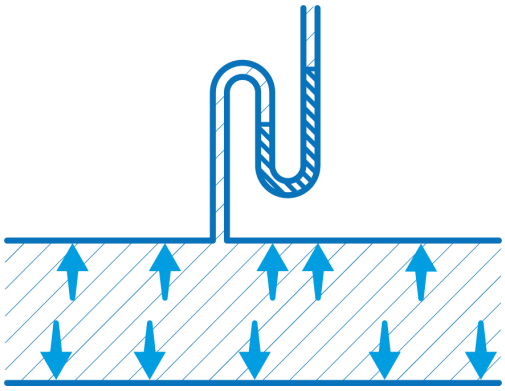
4: Select "Verify and Proceed" to continue the process.

PRO TIP: It is a good idea to double check the assumptions made using this data against direct airflow measurements.

ALERT: If there is a mis-match, notify the designer to check compatability versus what was installed.

Static pressure essentials

What is static pressure in HVAC?



Static pressure is defined as: *The resistance to airflow in a heating, ventilation, and air conditioning (HVAC) system, measured as the* ***force exerted by air at rest*** *within the ductwork.* So, if air wants to travel through a duct it will encounter resistance.

In an HVAC system, how much resistance air faces as it moves through the ducts is measured using a static pressure probe or pitot tube. The reading from the probe depends on airflow—if airflow changes, so does static pressure. That is why it is important to **place the probe in the correct locations** in the ductwork.

An HVAC blower (fan) moves air through the air distribution system. It encounters additional resistance due to:

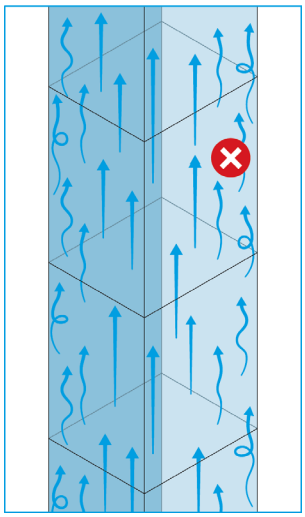
- Ductwork restrictions from internal resistance or blocked ducts.
- Dirty or overly restrictive filters.
- Evaporator or heat exchanger coil buildup from dirt or debris accumulation.
- Improper damper positions that are closed or incorrectly adjusted.
- Supply and return vent obstructions from closed registers or dirt build up.

Beyond the natural resistance of the duct and components, the blower must generate additional force to push air past these obstacles. The amount of force needed is measured as total static pressure.

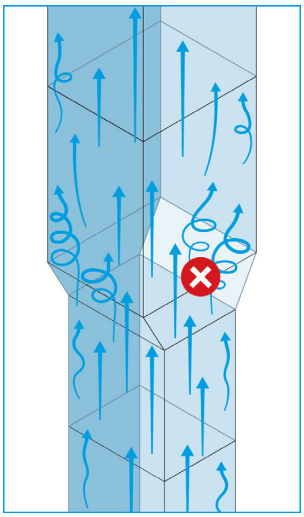
Where to place the static pressure probe

There are many configurations of furnaces and fancoils, but Rheia requires just two measurements to be taken and enetered into the Rheia Verify app.

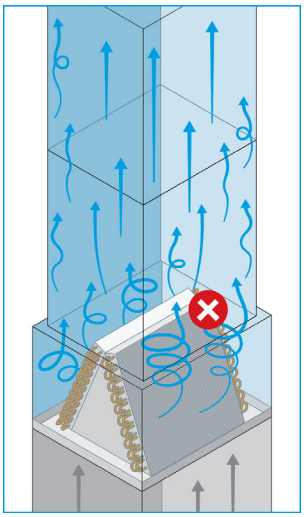
Avoid these locations when testing static pressure:



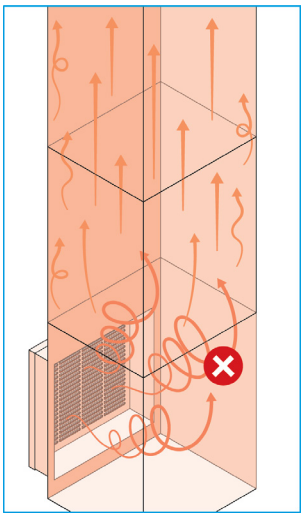
Too close to the sides of the duct



Too close to a transition

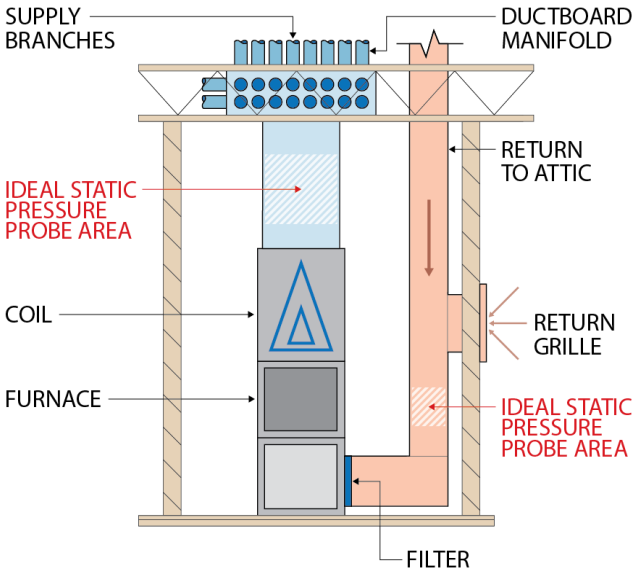


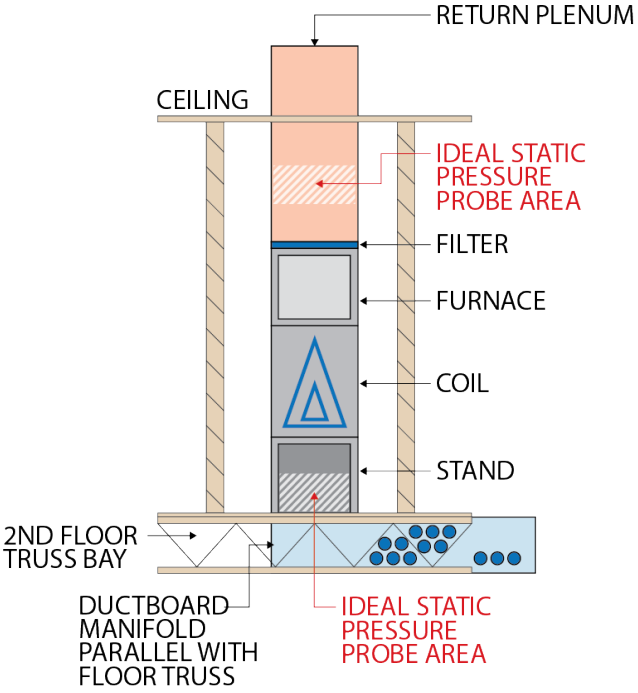
Too close to a coil

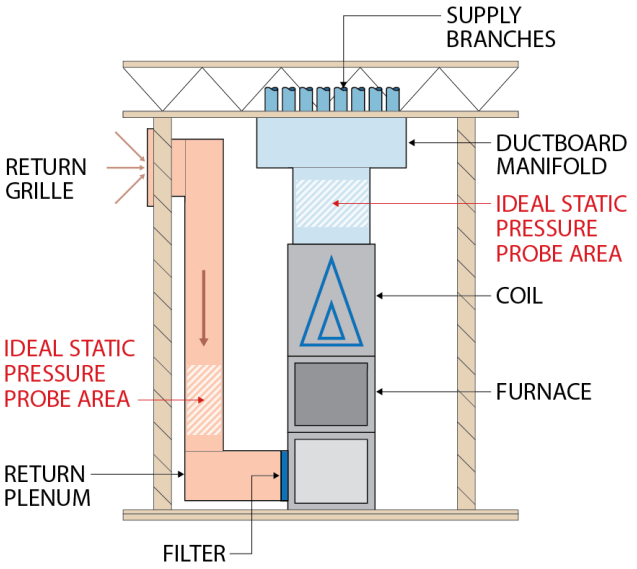


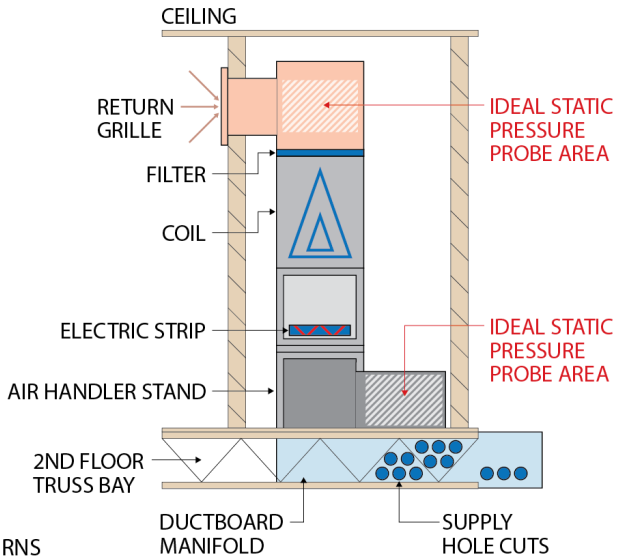
Too close to a grille

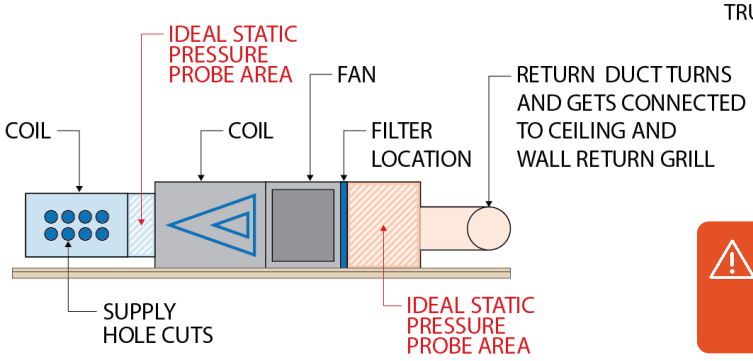
Ideal static pressure test probe location examples









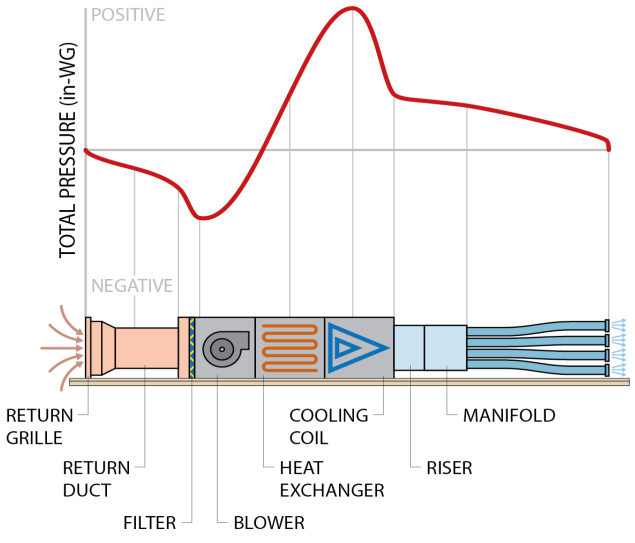


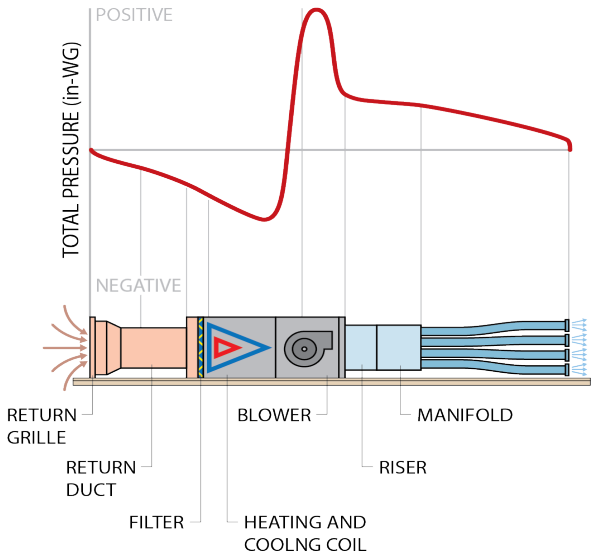
ALERT: Placing the static pressure probe in locations where there is minimal disturbance in the airflow is critical for accurate measurements.

About Rheia ductwork static pressure

- **Static pressure measurements** are used in the Rheia Verify app to **determine how much pressure is available** to balance the installed system for ideal performance.
- When set correctly, the installed equipment will deliver the intended amount of supply air at a specific external static pressure. **This pressure is the sum of the filter, supply and return ductwork**, (and coil if it is a furnace).
- With the Rheia dampers **set to fully open**, this baseline total pressure should be **below the target final balanced system pressure**.
- If this **baseline pressure is already at or above the target** established at design, the **dampers will be unable to be closed** without compromising total static; potentially creating issues with system performance.
- The **difference between the design target and measured static pressure** with the dampers fully open is the **available pressure to balance the system**. This value is typically between 0.05 IWG and 0.1 IWG.
- The Rheia **Verify app calculates the damper positions** that will result in the intended total static pressure (and airflow), while **proportioning the air to each room** according their individual loads.
- After adjusting the dampers, the **final static pressure measurements help ensure that the adjustments don't add excessive resistance.** However, this is rarely an issue since the pressure increase from damper adjustments is calculated conservatively.

Total External Static Pressure (TESP) can be visualized in the form of a curve showing the increase and decrease in static pressure through the Air Handling Unit (AHU). AHUs can be configured in different ways depending on fuel type, blower location, and heating and cooling method. Static pressure is always positive leaving the blower(fan), and negative returning to the blower (fan).





ALERT: For accurate measurements, use a probe specifically designed for HVAC static pressure measurements.

PRO TIP: Some equipment manufacturers include the pressure drop for the OEM Filter. If a 3rd party filter is included, the desginer adjusts the filter pressure drop in the Rheia design by deducting 0.1 IWC from the 3rd party filter pressure drop rating.

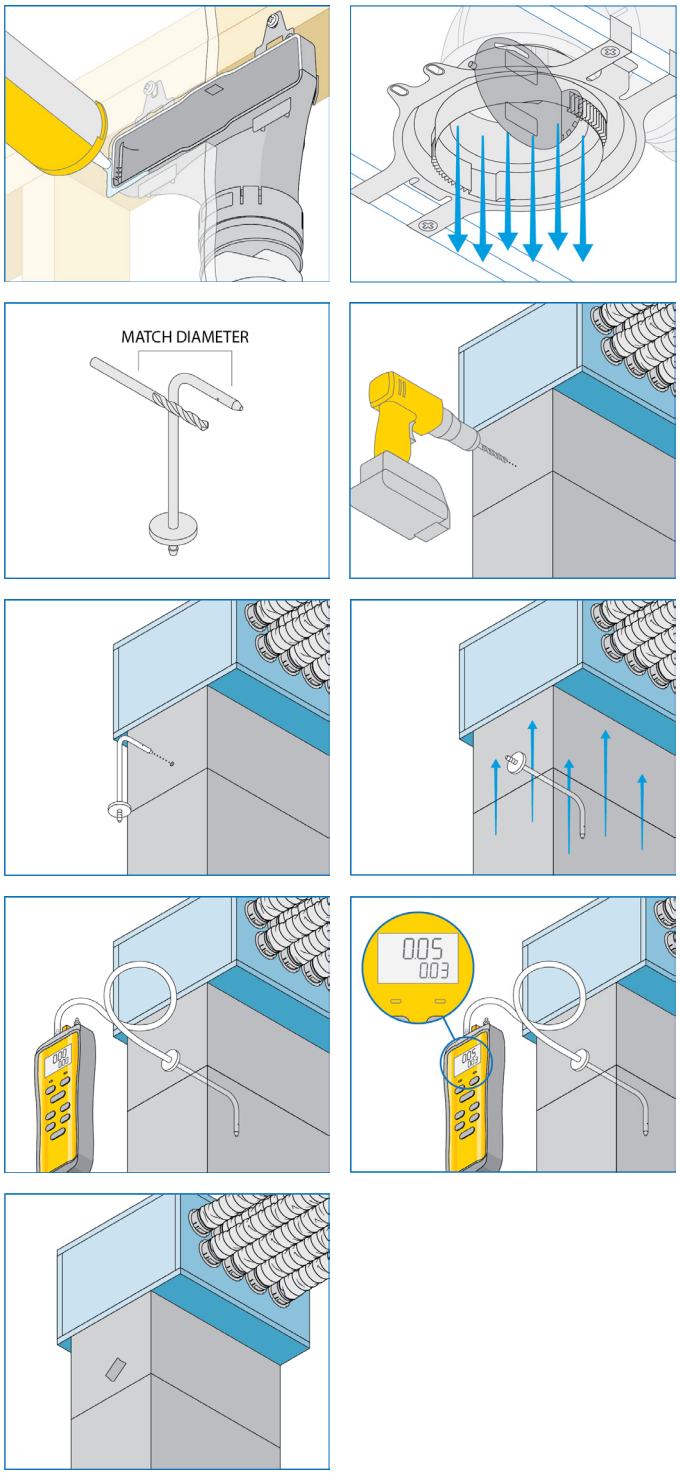
Take a static pressure measurement

Before starting the static pressure measurement process:

1. Confirm the fan speed and total airflow are correct.
2. Confirm that the air filter is not installed unless it is specifically required to be in place. Check the AHU manufacturer's requirements for static pressure testing.

To take the static pressure measurements:

1. Confirm that all of the boots have been sealed to the drywall to prevent air leakage at the boot.
2. Confirm that all of the dampers in the wall, ceiling, and floor boots are set to position #1 (fully open positions).
3. Use a drill bit that matches the diameter of the static pressure probe to create an opening for the probe.
4. Find suitable locations to drill holes in the ductwork. Drill a hole away from any turns, and 18" to 24" after the heat exchanger or coil on the supply side (or after any immediate turns from the AHU).
5. Zero out the manometer before taking the reading. Insert the static pressure probe into the drilled holes, and center it in the middle of the airstream if possible.
6. Make sure the tip of the probe is pointing into the direction of the airflow being measured. The base of the probe will have an arrow indicating the direction of the probe.
7. Connect the static pressure probe to the manometer using the appropriate tubing.
8. Note the number in each reading on the manometer. Enter the data into the Rheia Verify app using a positive number for the supply and a negative number for the return.
9. After completing the balancing process, seal the holes drilled in the ductwork to prevent air leaks using UL-181 listed tape or other approved method.

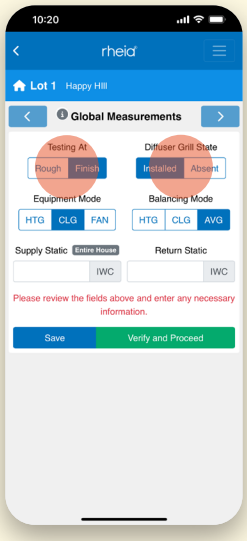


PRO TIP: ONLY use a probe specifically designed for HVAC static pressure measurements.

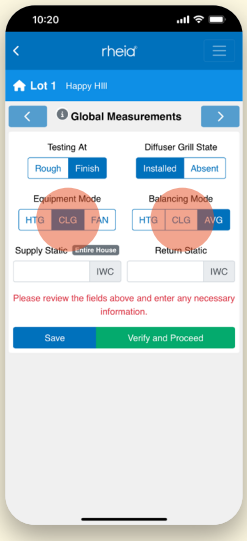
Enter measurements into Rheia Verify

Enter the static pressure measurements into the Rheia Verify fields to input measured static pressures. These inputs are used to drive the balancing algorithm.

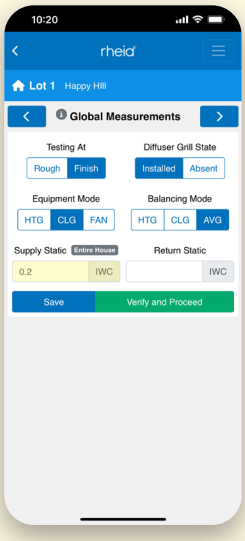
Enter the static pressure measurements:



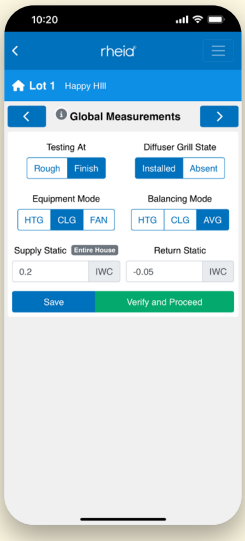
1: On the "Global Measurements" screen, Indicate whether testing is done at the rough or finish construction phase. Indicate whether the diffusers are installed. Select "Verify and Proceed".



2: Indicate the equipment mode: heating (HTG), cooling (CLG) or FAN only. Indicate the balancing mode: heating (HTG), cooling (CLG) or average (AVG). Select "Verify and Proceed".



3: Take a static pressure reading of the supply ductwork after the cooling coil and input into the "Supply Static". There will be one for each zone in the system. Select "Verify and Proceed".



4: Take a static pressure reading of the return ductwork, with the filter removed, and input into the "Return Static" field. Make sure you enter a **NEGATIVE** value. Select "Verify and Proceed".

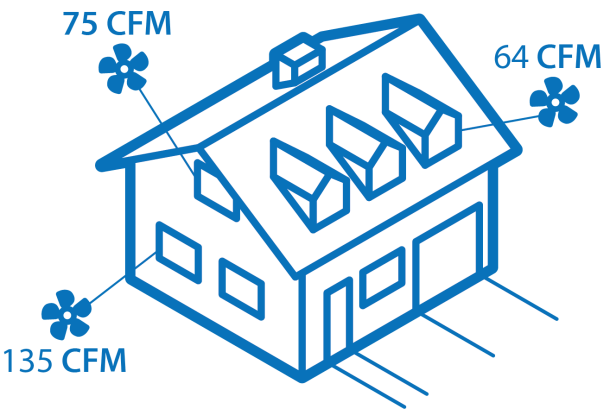
ALERT: High static pressures will result in fully open dampers after balancing the system and potentially long-term equipment reliability risks.

PRO TIP: Static pressure and airflow measurements can be taken either at the rough-in phase or on at the finish stage of construction.

Measuring airflow

Why measure room airflows?

Measuring airflows in a residential HVAC system will improve comfort, efficiency, and system performance. Balanced airflow improves air distribution, preventing hot or cold spots. It optimizes efficiency by ensuring the system operates as designed, reducing strain on equipment, and lowering utility costs. Additionally, verifying airflow contributes to indoor air quality, since poor airflow leads to ventilation and humidity issues. Airflow measurement at rough-in can diagnose problems when they can be easily addressed.



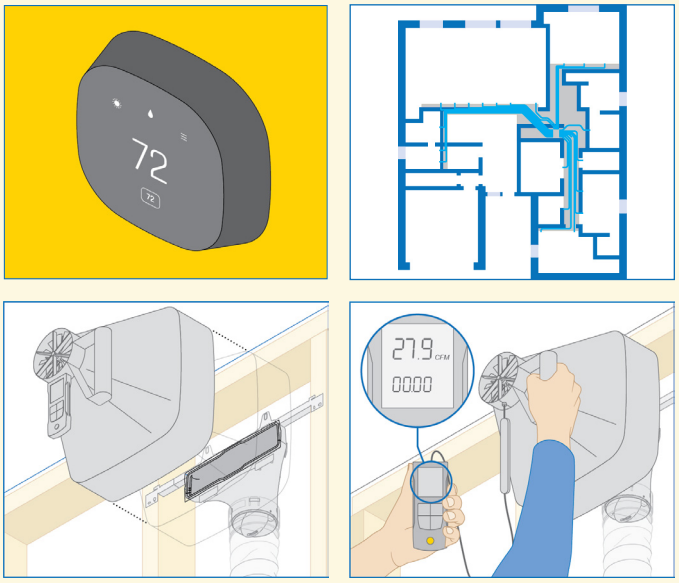
How to take an airflow measurement

Directly following the static pressure measurement process, each Rheia diffuser's airflow must be measured and input into the Verify app. Airflow is measured in cubic feet per minute (CFM). When all of the airflows in a room have been entered, the status of that room will display a green checkmark on the "Room Selection & Status" screen.

To take an airflow measurement:

Gather the necessary tools needed to safely measure the airflow at each Rheia outlet.

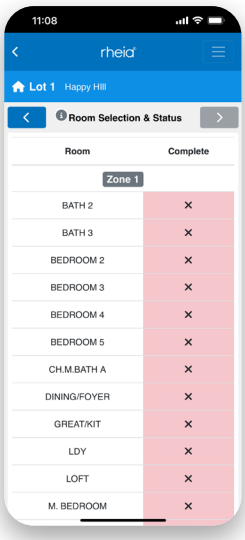
1. Set the HVAC system to a steady-state operating condition (cooling or heating mode), and ensure that all exterior doors and windows are closed.
2. Work around the house referencing the Rheia Verify app for number and locations of diffusers in each room.
3. Hold the flow hood against the wall, floor, or ceiling and center the boot (or diffuser if installed) inside the flow hood.
4. Wait a few seconds, and note the CFM shown on the flow hood display. If the airflow measurement is inconsistent, take multiple readings and average them out to get a final CFM for that location.
5. Enter the reading into the Rheia Verify app.
6. Move on to the next location in the room. Repeat the process for all rooms in the house.



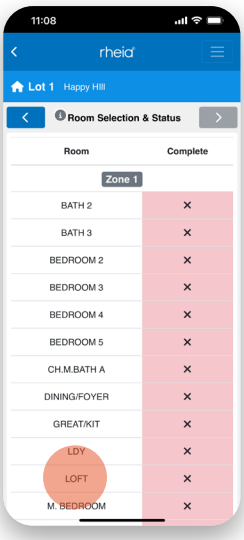
PRO TIP: Work through the house in a thoughtful manner, you do not have to follow the sequence of rooms in Rheia Verify.

PRO TIP: Airflow measurements can be taken with the Rheia Diffuser installed or removed. Confirm on the Rheia Verify app that this setting is consistent with the method of measurement.

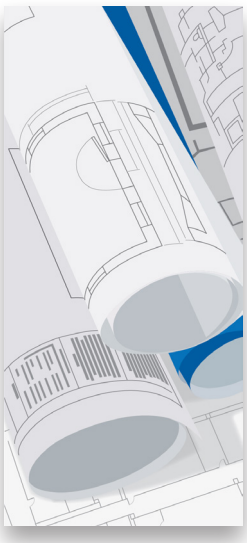
Enter the room airflow measurements into Rheia Verify



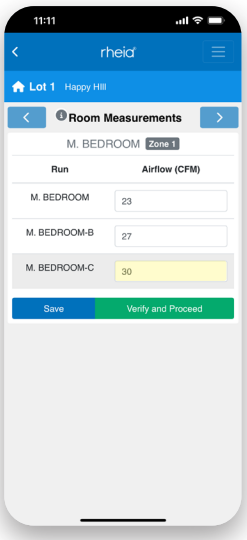
1: Navigate to the "Room Selection & Status" screen on Rheia Verify. A list of rooms will be displayed.



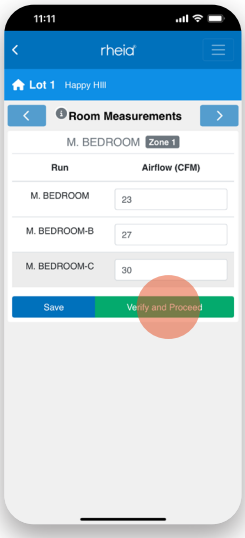
2: Select a room. A list of diffusers in the room will be displayed.



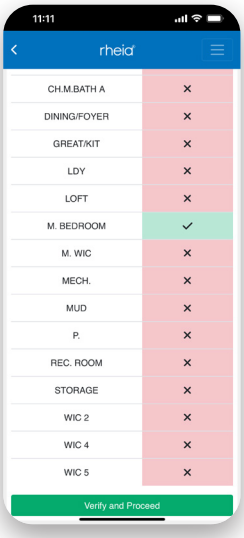
3: To identify each diffuser, cross reference the **HVAC Design Report** document.



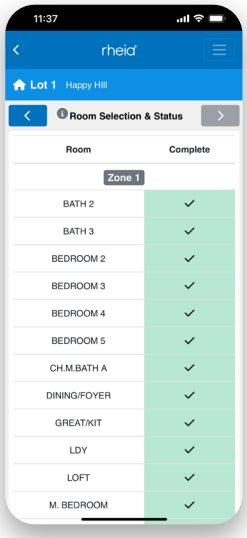
4: For each diffuser on the list, measure the airflow and input the airflow CFM into the "Airflow (CFM)" field.



5: When all room airflows have been entered, select "Verify and Proceed", then move on to the next room,



6: A checkmark will be displayed when each room is completed. Select "Verify and Proceed".



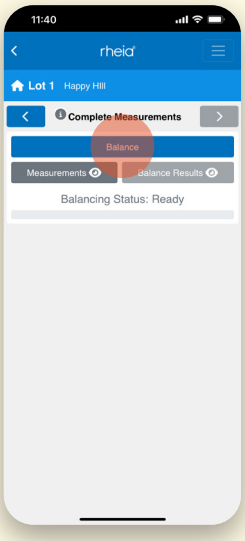
3: Repeat the process until all rooms have been completed. Select "Verify and Proceed".

⚠ **ALERT:** During airflow measuring, **DO NOT** proceed if the number of diffusers in a room does not match the number in Rheia Verify. Contact trhe HVAC designer and the builder.

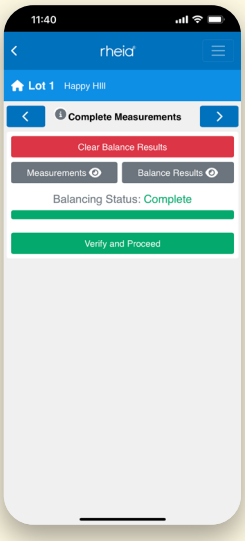
Calculate the system balance

After gathering all the room airflow measurements, the balancing damper settings are determined to achieve the target (heating, cooling, or average). The balancing algorithm will close dampers until the design static pressure for the supply and return ductwork is met.

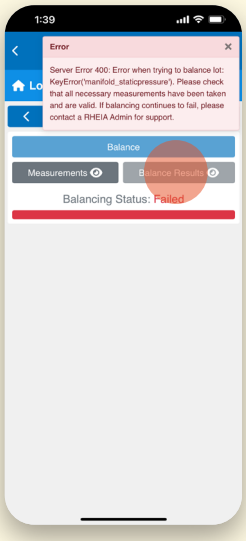
Run the balancing process and get the final damper settings



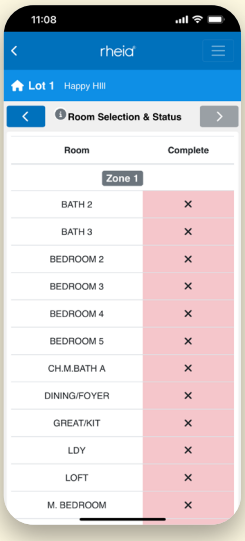
1: Navigate to the "Complete Measurements" screen. Click the "Balance" button.



2: "Balancing Status Complete" will be displayed, indicating that the process ran correctly. Select "Verify and Proceed".



3: If the installation cannot be balanced, the screen will display an "Error" alert. Close the pop up window, and select "Balance Results".

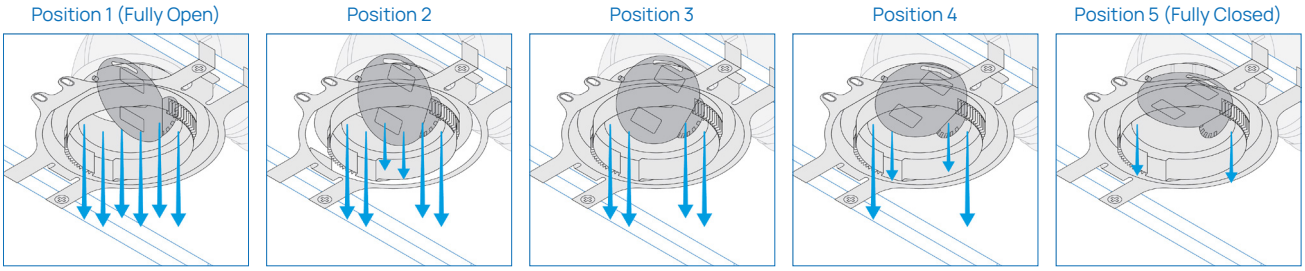


4: If the balancing process was **unsuccessful**, the app will show an "x" for each room that needs adjustment to finalize the system's balance.

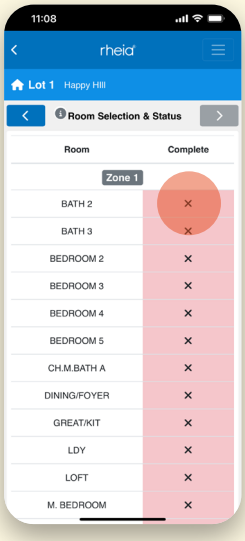
Balance the installation

The final step is to make adjustments to dampers that are not within the airflow range referenced from the calculated damper positions in Rheia Verify.

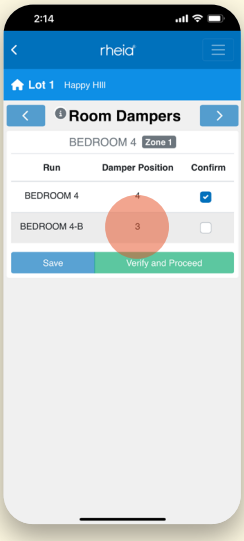
All Rheia dampers have the same five-position settings from position #1, which is fully-open, to position #5, which is fully-closed. Note that position 5 still allows some airflow through the boot into the room.



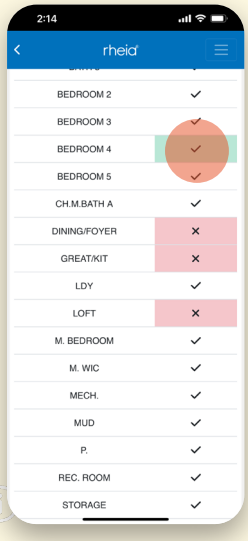
To identify and change dampers that need adjustment



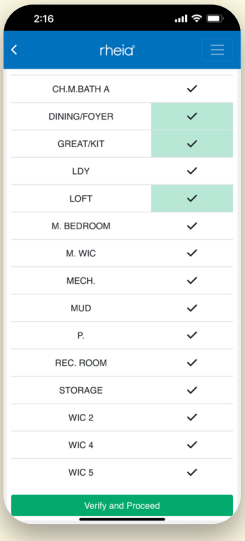
1: On the "Room Selection and Status" screen, tap the first "x" on the room list to open the room balancing dampers screen.



2: On the "Room Dampers" screen, review the damper position(s) for the duct run(s) in the room selected. Access the boots and physically move the dampers to the indicated positions. When done, tap the "Confirm" checkbox and select "Verify and Proceed".



3: A checkmark will indicate completion. Move to the next room on list, and tap the "x".



4: Once all rooms with an "x" have been adjusted, and select "Verify and Proceed".

ⓘ Access to the individual measurements files are available for download via Rheia Manage in the event of a balancing issue.

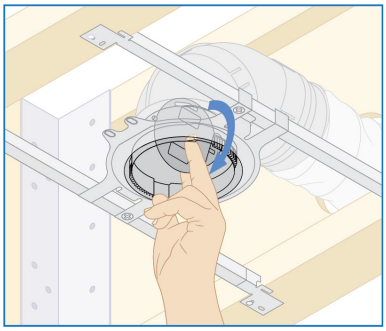
Adjust the dampers

The damper adjustments are made by referencing the calculated damper positions in Rheia Verify.

The open position is #1 and fully closed is position #5. If there is audible noise, open the damper one position. For example, if it is fully closed and hisses, open it one stop to position #4.

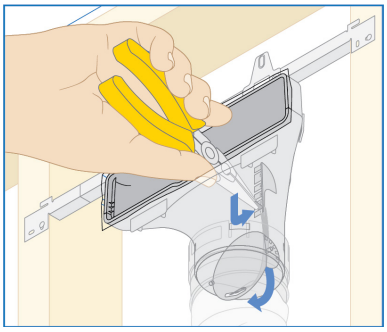
To adjust a Ceiling Boot damper:

1. Remove the Diffuser by twisting anti-clockwise a quarter of a turn to release it from the boot.
2. Set the damper to the new position by pressing the side of the damper blade.
3. Refer to the damper setting in the “Balance Dampers” and count the number of clicks until the required position is achieved.



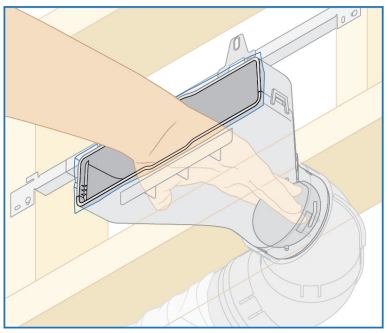
To adjust a High Sidewall Boot damper:

1. Pull either end of the diffuser away from the wall to release it from the boot.
2. Use needle nose pliers or your fingers to slide the damper strap to to the left, out of its current position.
3. Move the strap up or down to the correct slot. Each slot is numbered for reference.
4. Slide the damper strap to the right into its new position, make sure it is engaged in the slot.



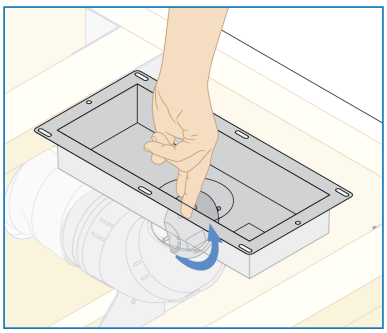
To adjust a Pass Through Boot damper:

1. Pull either end of the diffuser away from the wall to release it from the boot.
2. Set the damper to the new position by pressing the side of the damper blade.
3. Refer to the damper setting in the “Balance Dampers” and count the number of clicks until the required position is achieved.



To adjust a Floor Boot damper:

1. Lift the register away from the floor to release it from the boot.
2. Set the damper to the new position by pressing the side of the damper blade.
3. Refer to the damper setting in the “Balance Dampers” and count the number of clicks until the required position is achieved.

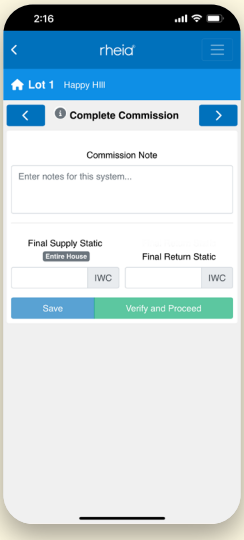


PRO TIP: To change to a different season (heating, cooling, or average), clear the balancing results and make the changes on the screen.

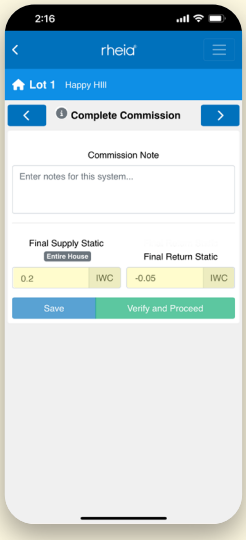
Take the final static pressure measurement

Final static pressures measurements need to be taken after balancing the system. If no dampers were adjusted and the system has not changed operation, these values should approximately match what was taken at the start of the test.

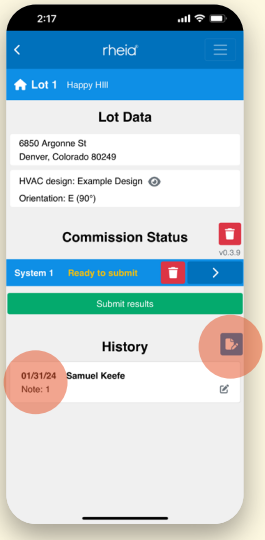
Enter the final static pressure measurements



1: After all dampers have been adjusted, the "Complete Commission" screen will be displayed. Select "Verify and Proceed".

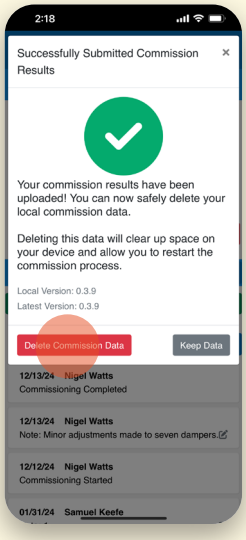


2: Measure and input final static pressure readings at the same supply and return locations as the beginning balance measurements. Double check the numbers and select "Verify and Proceed".



3: On the "Lot Data" screen add any notes that will be helpful to other technicians in the "History" field by tapping on the "Notes" icon.

Once complete, select "Submit results".



4: On completion, a successful commission is displayed. It is recommended to delete 'local' results by clicking the red "Delete Commission Data" button after submitting so as not to keep uneccessary data on the phone.

The **Energy Star Checklist for Quality HVAC installations** (ANSI / ACCA 5 QI – 2015) requires the measured external static pressure to be within the greater of 25% and 0.1 IWC.

ACCA Standard 310 sets the requirements for grading HVAC installations based on total system airflow and fan watt draw. A Grade 1 installation is achieved when the total airflow is within 15% of the design target. Because delivered airflow is directly affected by external static pressure (ESP), installers should aim to match the target ESP used during the duct system design.

ALERT: The design static pressure, should not be exceeded by more than 10%. Consult with the designer to check the equipment capacities.

Balancing zone systems

How to balance a zoned Rheia system

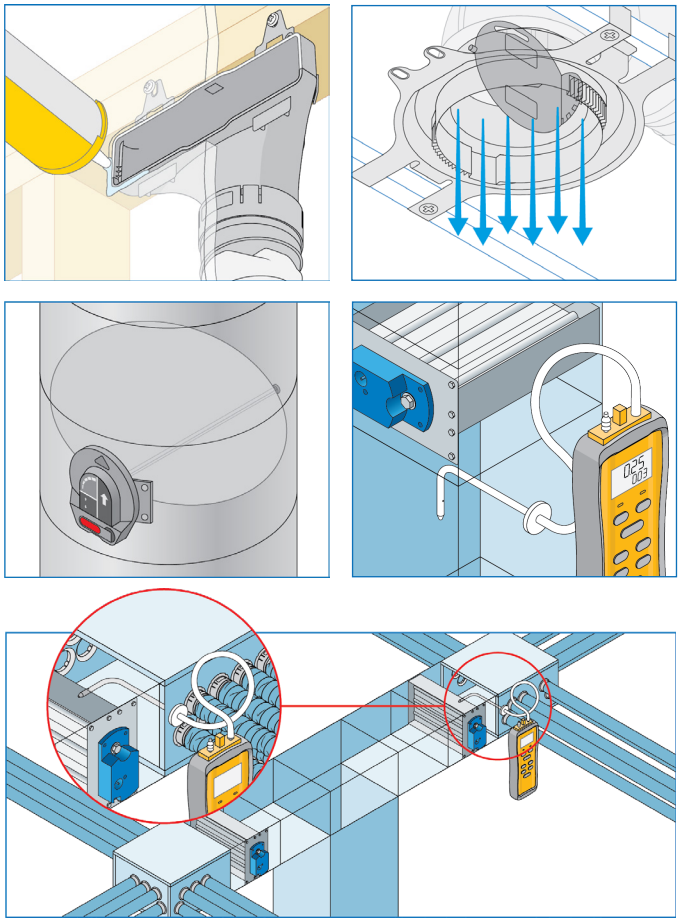
Before starting the static pressure measurement process:

1. Confirm the fan speed and total airflow are correct.
2. Confirm that the air filter is not installed unless it is specifically required to be in place. Check the AHU manufacturer's requirements for static pressure testing.

Per-zone measurement method

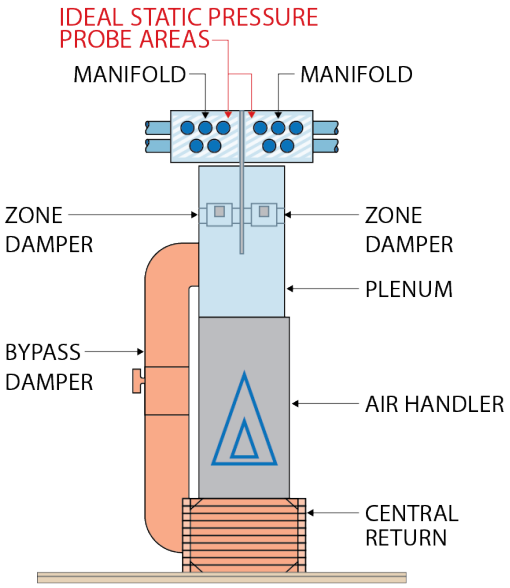
If the zone dampers are easily accessible, use this method to take a static pressure measurement for each zone:

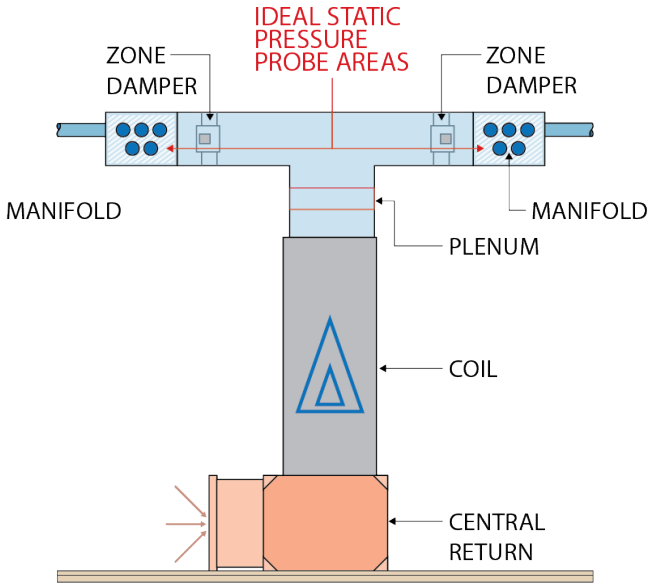
1. Confirm that all of the boots have been sealed to the drywall to prevent air leakage at the boot.
2. Confirm that all of the dampers in the wall, ceiling, and floor boots are set to their position #1 (fully-open positions).
3. Confirm the bypass damper is closed.
4. Measure the static pressure in each Zone.
5. Measure the static pressure in each zone either (**before** or **after** the zone damper, depending on access) and enter the values into Rheia Verify.
6. Enter the static pressure airflows for each zone into the Rheia Verify app and complete the Rheia balancing process.
7. Follow the manufacturer's guidelines to set up the bypass damper (based on the damper being installed).
   a. Set the smallest zone to 100% open and all other zones closed.
   b. Set the bypass damper to maintain the recommended static pressure of the design.



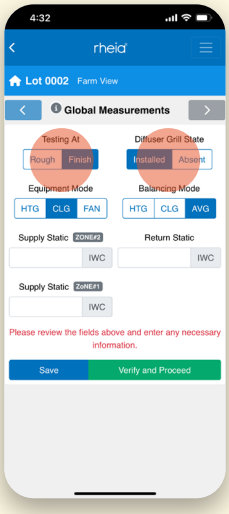
PRO TIP: Make sure each zone manifold and the zone dampers are accessible for servicing, repair, or replacement.

Static pressure testing locations

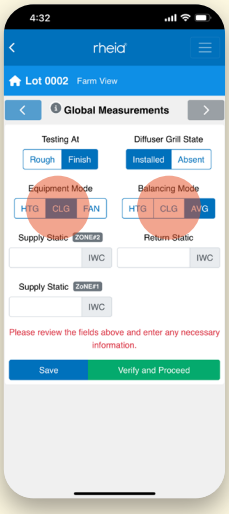




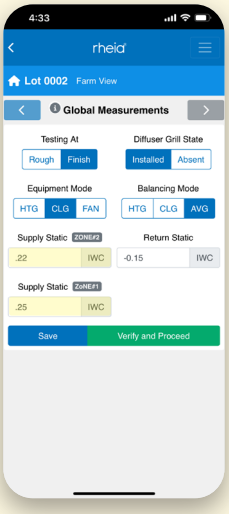
How to enter the static pressure measurements for each zone:



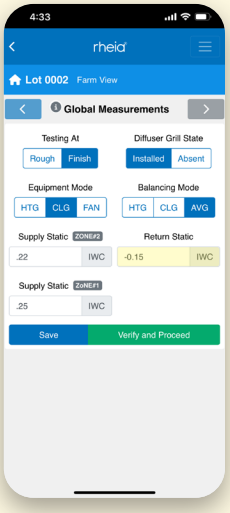
1: On the "Global Measurements" screen, Indicate whether testing is done at the rough or finish construction phase. Indicate whether the diffusers are installed. Select "Verify and Proceed".



2: Indicate the equipment mode: heating (HTG), cooling (CLG) or FAN only. Indicate the balancing mode: heating (HTG), cooling (CLG) or average (AVG). Select "Verify and Proceed".



3: Take a static pressure reading of the supply ductwork after the cooling coil and input into the "Supply Static". There will be one for each zone in the system. Select "Verify and Proceed".



4: Take a static pressure reading of the return ductwork, with the filter removed, and input into the "Return Static" field. Select "Verify and Proceed". Be sure to enter a **negative** number for the return static pressure. Select "Verify and Proceed".

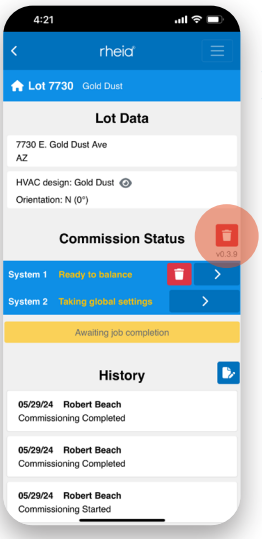
Troubleshooting the Rheia VERIFY app

How to clear cached data to improve app performance

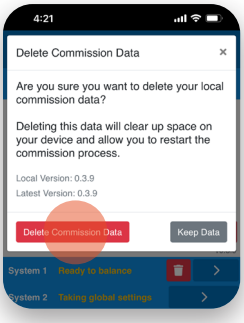
If you are commissioning a large number of Rheia installations with Verify, you're device will fill with data from those jobs. Occassionally you will need to clear it's cached data. This can be done at the lot level or for your entire local storage. Clearing data can resolve minor issues because clearing the cache resets the app. This process only delete's data on your device, it does not delete data in the Rheia Manage database.

Here's how to do it:

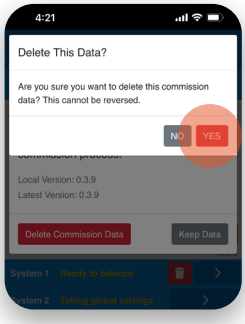
Clearing lot-level data for individual lots (this does not delete all lot data on your device):



1: Click into a lot and if there is local data you will see red trash can symbols. Click the red trash can button.

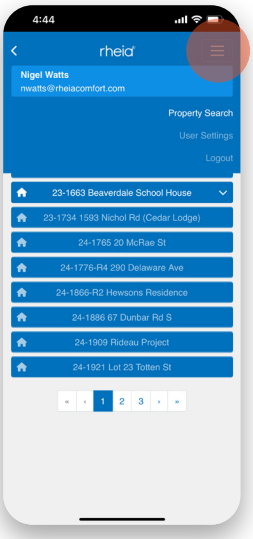


2: Tap the red "Delete Commission Data" button.

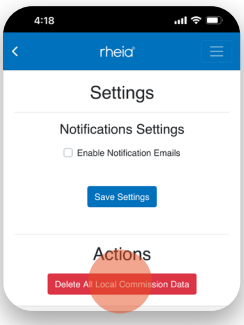


3: Confirm the selection.

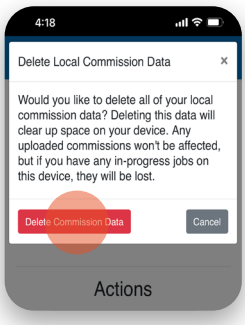
Clearing all device data:



1: Click the three-bar menu at the upper right of your Verify app screen. Select "User Settings".



2: Tap "Delete all Local Commission Data".

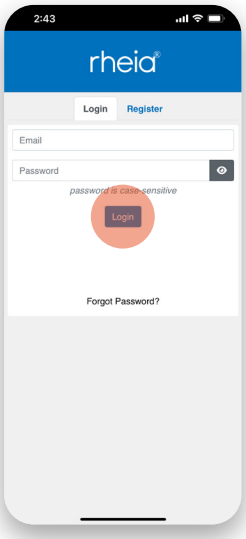


3: Confirm the selection.

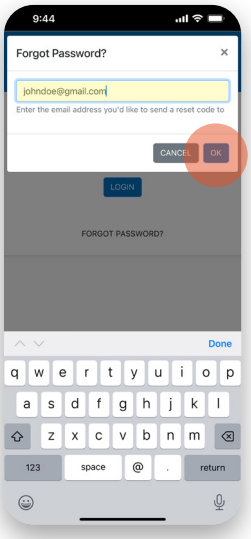
How to reset your username or password

If you need to reset your username or password, follow the steps on the app.

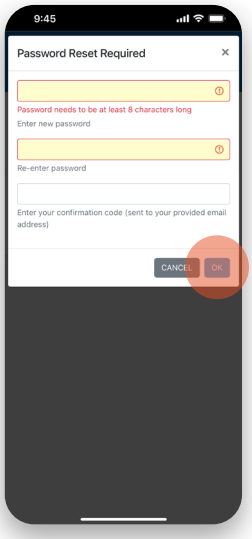
Here's how to do it:



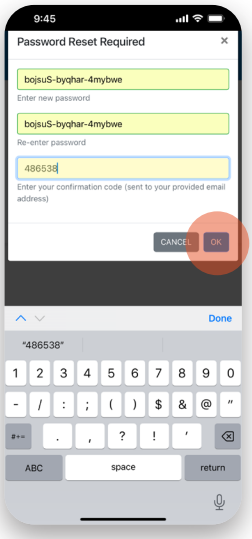
1: Navigate to the "Login" screen. Click "Forgot Password" on the login screen.



2: Enter your email address used for the account and click "OK".



3: Enter a new password in the requested fields and click "OK".



3: Check your email and enter the validation code you received on the screen. If you don't see an email, check your spam/ junk folder. Click 'OK'.

On screen errors

On rare occasions an error message will display indicating an issue with the balancing process. This will appear as a red overlay on the screen with an error message. This is usually caused by an issue with an input to the balancing function, namely the design file.

The most common causes that need to be fixed in the original Wrightsoft design file are:

- **A JSON is uploaded but does not contain any data.** This prevents clicking into a lot for commissioning.
- **Designs with duct runs that are not connected to the manifold.** This results in numerical errors when attempting to balance.

In both of these cases, reach out to your manager who will assist debugging the design file,

No internet connection

The Verify app requires an internet connection to:

- **Download design data.**
- **Request balancing damper positions.**
- **Submit the balancing results.**

Progress will be saved on your device if Internet service is interrupted and can be continued when a connection is re-established. Data can be entered into the app without the Internet after the initial design data is downloaded:

- **Before requesting damper positions.**
- **While setting dampers.**

If there is no internet connection, the technician must:

- Take all system measurements down on a notes app or on paper. These include supply and return static pressure.
- Go lo a location with an Internet connection and input the data into the app, then request the damper positions.
- Go back to the site and set the dampers.
- Submit the results when an Internet connection is available.

Incorrect JSON file loaded

If the wrong JSON has been uploaded, or not updated to a current design, commissioning cannot proceed.
Common indicators of the wrong JSON file are:

- The wrong number of ducts have been installed in a room.
- The wrong total airflow assumption for the system has been entered due to HVAC equipment changes.

Incorrect design information will cause poor performance and unexpected results. The correct JSON must be uploaded to ensure balancing accuracy and validity.

To replace a design to a new version

1. Navigate to the community on Rheia Manage where this design is referenced.
2. Click into the design library by clicking **"Manage HVAC Designs"** on the community page. If you do not see this button, request designer permissions from your administrator or have someone with access make the correction (either the original designer who uploaded it or your organization administrator).
3. Create a new design and upload the correct JSON file
4. Navigate to the lot in question.
5. Select the new design from the community design list to assign the new design to the lot, replacing the old one.
6. Finally, In Rheia Verify, delete any data associated with the lot. This will force a fresh download of the new design to your device.

Glossary

Static Pressure Limit

The HVAC system designer sets a maximum operating static pressure to ensure the equipment can properly condition the home. Exceeding this limit can reduce performance—potentially causing issues like frozen coils or increased wear on the blower. The balancing algorithm uses both the measured static pressures and the designer's specified limit to determine damper positions that avoid excessive pressure. If the system cannot close dampers due to high pressure, consult the designer. They may be able to raise the pressure limit, but only after confirming the equipment will still operate safely and effectively at the higher level.

Variable Speed Equipment

For variable speed HVAC equipment, airflow (CFM) is typically controlled by the system's control board, often based on a simple tonnage input. In most cases, the blower will deliver the required airflow up to the equipment's maximum static pressure limit, allowing the system to adjust as needed without compromising performance.

The air handler (AHU) is programmed to operate at the correct blower speed to deliver the necessary airflow over the cooling coil or heat exchanger. All modern equipment includes controls to adjust blower speed. In higher-end variable speed systems, airflow can be set directly, and the system will automatically adjust static pressure to maintain the correct flow across the coil..

Types of speed setting interfaces

Speed Taps

Most equipment that is used in production home building will be single or two-speed equipment that uses speed taps (switches) to set the blower speed. These speed taps are part of the control board and typically have 3-5 settings.

Dip Switches

With variable capacity equipment, dip switches are typically used to set the desired airflow for the unit.

Thermostat

The thermostat maintains the correct airflow over the coil and will not modulate (as much) with changes in static pressure, can offer some diagnostics related to static pressure, and will display pertinent warnings on the thermostat screen.

Fixed Airflow

Some newer units, such as the Daikin Fit system, will set a fixed total airflow for its full range of static pressures. The outdoor unit controls the system airflow setting.

There are two primary ways to determine the total airflow is correct: a blower table lookup and direct measurement. If setting a fixed total airflow system, this approach is not required.

The static pressure and airflow values can be used to determine the speed setting by cross-referencing the blower table from the equipment manual, the speed tap setting and static pressure estimate. The goal is to set the speed that will achieve the desired airflow at the estimated design static pressure.

A blower data table, typically located at the back of the installer's manual, will list the static pressure and corresponding total airflow for each blower speed.

The combination of static pressure and speed informs the CFM that will be delivered. The HVAC design provides the static pressure that was used to configure the duct system. Total Airflow Measurements can confirm the equipment is in range of design.

Note: Some HVAC contractors have reported variances between manufacturer listed performance data and field-measured values.

A duct blaster is used to determine the airflow of the equipment. This is done by pressurizing the system with the AHU, noting the pressure, and then matching the pressure with a duct blaster which has a known airflow.

Balancing Pressure

The final static pressure can be higher, but not significantly, than the initial static pressure at design. Ultimately, the total external static pressure limits based on the equipment manufacturers' recommended limits should be followed. Any questions about any particular system should be checked with the designer so they can fix any issues in the design files.

Balancing Mode

The balancing mode is the heating or cooling load profile that determines the balancing airflow targets per room.

System Maximum Airflow

Allow the system to cycle to its full speed before proceeding with static pressure measurements. The airflow needs to be at its highest value, otherwise the total airflow assumptions used for static pressure limiting will be incorrect.

Static Pressure

Static Pressure is akin to the blood pressure of the system and is the primary measure for overall system health. Poorly stretched duct work, major deviations from design duct layouts/ configurations (e.g. framing/plumbing interference) etc, lead to increased static pressure when they are not anticipated by the designer. When there are major differences between what is specified and what is installed, which is indicated by the measured static pressures, then the designer must be consulted to ensure an appropriate match-up.

Using a Duct Blaster

Only use a duct blaster for pressurizing the duct system if it can supply the full design CFM. The CFM needs to be as close as possible to the selected design CFM for accurate balancing.

Verifying Equipment

The Rheia duct system is designed to a specific equipment profile. Verifying the equipment specifications confirm that the installed equipment matches the design.

The equipment tonnage tracks approximately with the maximum airflow through the unit. The optimal range is typically between 350-400 CFM per ton of cooling load. The design engineer will have specified a system that can deliver air within this range.

For example, if a unit is listed as 3 tons but a 4 ton unit is installed, the technician can expect that at least 350 CFM additional air will be supplied to the duct system. This increased airflow will also increase the static pressure beyond design limits.

Conversely, if a unit is listed as 4 tons and a 3 ton unit is installed, the system could fail to fully condition the home.

If the equipment does not match what the designer has selected, total airflow could be an issue.

Specific equipment will have its own pressure/airflow relationship for each speed setting, and other equipment will have different airflows for the same static pressure.

With some newer equipment, the airflow is more consistent with varying pressure. This means it will do a better job at hitting the correct total airflow even if the pressure is high. However, this creates a different issue—increased energy consumption and equipment wear-and-tear.

When the installed equipment does not match the equipment listed in the design, the technician must consult the design engineer to check the compatibility of the new equipment. The design engineer will look at the duct system and decide whether the system can achieve the correct total airflow with the duct system that was designed for a different airflow.

Airflow Measurement

The device used to take airflow measurements must be used in accordance with its manufacturer's instructions.

It is more important to be consistent with airflow measurements. Measurements are used in the balancing process as a proportion of air delivered, **not as an absolute quantity**. The total system airflow is governed by the technician who sets the equipment's blower configuration on site.