Digital TrueFlow® Grid
HVAC System Air Flow Meter

Operation Manual

Manual Edition: April 2026

T·E·C
THE ENERGY CONSERVATORY

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ENERGY CONSERVATORY WARRANTY

EXPRESS LIMITED WARRANTY:

Seller warrants that this product, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for a period of 24 months, or such shorter length of time as may be specified in the operator's manual, from the date of shipment to the Customer.

LIMITATION OF WARRANTY AND LIABILITY:

This limited warranty set forth above is subject to the following exclusions:

- **a)** With respect to any repair services rendered, Seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the Purchaser.
- **b)** Seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.
- **c)** Unless specifically authorized in a separate writing, Seller makes no warranty with respect to, and shall have no liability in connection with, any goods which are incorporated into other products or equipment by the Purchaser.
- **d)** All products returned under warranty shall be at the Purchaser's risk of loss. The Purchaser is responsible for all shipping charges to return the product to The Energy Conservatory. The Energy Conservatory will be responsible for return standard ground shipping charges. The Customer may request and pay for the added cost of expedited return shipping.

The foregoing warranty is in lieu of all other warranties and is subject to the conditions and limitations stated herein. No other express or implied warranty IS PROVIDED, AND THE SELLER DISCLAIMS ANY IMPLIED WARRANTY OF FITNESS for particular purpose or merchantability.

The exclusive remedy of the purchaser FOR ANY BREACH OF WARRANTY shall be the return of the product to the factory or designated location for repair or replacement, or, at the option of The Energy Conservatory, refund of the purchase price.

The Energy Conservatory's maximum liability for any and all losses, injuries or damages (regardless of whether such claims are based on contract, negligence, strict liability or other tort) shall be the purchase price paid for the products. In no event shall the Seller be liable for any special, incidental or consequential damages. The Energy Conservatory shall not be responsible for installation, dismantling, reassembly or reinstallation costs or charges. No action, regardless of form, may be brought against the Seller more than one year after the cause of action has accrued.

The Customer is deemed to have accepted the terms of this Limitation of Warranty and Liability, which contains the complete and exclusive limited warranty of the Seller. This Limitation of Warranty and Liability may not be amended or modified, nor may any of its terms be waived except by a writing signed by an authorized representative of the Seller.

TO ARRANGE A REPAIR: Please call The Energy Conservatory at 612-827-1117 before sending any product back for repair or to inquire about warranty coverage. All products returned for repair should include a return shipping address, name and phone number of a contact person concerning this repair, and the purchase date of the equipment.

Table of Contents

Chapter 1 **Introduction** **6**

Chapter 2 **System Components** **7**

2.1 Grid **7**

2.2 Adapter Plates **8**

2.3 Static Pressure Probe **8**

2.4 Gauge Options **9**

2.4.a DG-1000 Digital Pressure Gauge: 8

2.4.b DG-8 Digital Pressure Gauges: 8

2.5 Equipment Charging **10**

2.5.a Charging the Grid 10

2.5.b Charging the DG-8 and DG-1000 10

Chapter 3 **TrueFlow® App Test Procedures** **11**

3.1.a Outline of TrueFlow Measurement Using TrueFlow app 13

Appendix A **System Pressure Measurement Location** **14**

Appendix B **Installion Options of The Grid** **16**

Appendix C **TrueFlow® Grid Specifications & installation requirements** **19**

Appendix D **TrueFlow App Workflow Settings & Manage Data** **21**

Appendix E **Heat Mode System Details** **22**

Appendix F **Sample of flow and pressure analysis workflow** **26**

Appendix G **Sample of ANSI/ACCA/RESNET 310 workflow** **31**

Appendix H **ANSI/ACCA/RESNET 310 App Use at Altitude** **31**

Appendix I **Forecasting** **36**

Appendix J **References** **40**

Chapter 1: Introduction

The total air flow through residential HVAC systems is an important variable in estimating and optimizing the performance of heat pumps, air conditioners and furnaces. Numerous field studies of installed heating and cooling systems around the United States have found that often air flow is not properly set to maximize performance across the indoor coil is an extremely common problem. Low air flow can lead to decreased heating and cooling system capacity, increased energy use and comfort problems.

The most widely used methods for estimating the air handler flow rate, (the temperature rise method, static pressure and fan curve method, and the DuctBlaster® isolated return method) have been found to be either problematic or time-consuming to perform. The Energy Conservatory's Digital TrueFlow® Grid is designed to provide a simple and accurate measurement of air flow through residential air handlers rated from 1 to 5 tons. The TrueFlow® Grid can be used in various ways inside the typical air handler system to gather data when following the manual for the airflow measurements procedures.

Note: If the return duct system is very airtight, the air flow through the central return will be very close to the total air handler flow.

Extensive field testing of the TrueFlow® Grid has shown that it:

- Is easy and fast to use in the field. The TrueFlow® Grid provides direct CFM readings in approximately 5 to 10 minutes without extensive calculations or setup.

- Can be used in a wide range of applications and air handler fan configurations. Accessories of the TrueFlow® Grid allows it to fit most if not all applications.

- Has a flow accuracy of +/ 5% for most applications if there are 6 inches upstream and 2 inches downstream from the grid free from obstructions

- Can only be used with a TEC DG-8 or DG-1000 Bluetooth pressure gauge which has a resolution of 1 Pascal or 0.005 inH_2O or better.

Chapter 2: System Components

The Digital TrueFlow® Flow Meter consists of the following components:

- 1 digital Grid
- 1 static pressure probe.
- 10 feet of blue tubing and 10 feet of green tubing.
- QR scan operation manual.
- Carrying case.
- USB-C charger.
- 1 to 10 adapter plate(s) which allow the grid to be used in multiple filter sizes
- A DG-8 Bluetooth digital pressure gauge (Optional purchase) or a DG-1000 Bluetooth blower door pressure and flow gauge (Optional purchase)

2.1 Grid

The TrueFlow® Grid is constructed from durable plastic with a series of round metering holes, a flow sensor and Bluetooth transceiver.

The Grid is generally intended to be installed in place of the system air filter but can be used anywhere in the return where it can capture total system air flow. The front side of the Grid, as shown in Figure 1, should be facing into the direction of the airflow stream and will be labeled as “AIR IN”.

Figure 1: Front Side of Grid (should face into air flow)

2.2 Adapter Plates

The TrueFlow® Grid can be installed in various adapter plates; each adapter plate consists of a stamped plastic plate with integrated locking tabs for the digital Flow Grid. Along the outer edge of each plate is a gasket to ensure a proper seal for no airflow bypass.
The Grid has optional adapter plates available for purchase and custom plates are available for order upon request.

Digital TrueFlow®
Adapter Plate Set

2.3 Static Pressure Probe

The TrueFlow® Grid comes with one static pressure probe. During the air flow measurement procedure, the operator will need to measure the operating pressure in the duct system, both with the existing filter in place and with the TrueFlow® Grid in place. These two operating pressure measurements are used to adjust the measured air flow through the Grid for differences in resistance between the existing filter and the TrueFlow® Grid. Multiple locations can be used to make the static pressure measurements. Details of these locations are shown in appendix C.

2.4 Gauge Options

To use the TrueFlow® Grid, the operator will need a TEC digital Bluetooth pressure gauge with a resolution of 1 Pascal (or 0.005 In. H_2O) minimum. The TrueFlow Meter can be purchased with any of The Energy Conservatory's Digital Pressure Gauges (Models DG-8 and DG-1000). **See Figure 2 for more details.**

2.4.a DG-8 Digital Pressure Gauge:

The DG-8 capable pressure gauge has a single pressure sensor with the option to switch from inches of water column to pascals with the press of a button. The digital gauges are shipped in a separate padded case and has integrated magnets on the back of the gauge to allow for easy mounting to any metallic surface. The DG-8 provides an air flow measurement accuracy of +/- 5% when used with the TrueFlow® Grid and corresponding TrueFlow® app while Bluetooth connectivity.

2.4.b DG-1000 Digital Pressure and Flow Gauge:

The DG-1000 is a digital dual channel manometer. This meter is shipped in a separate padded case along with a charging cable with various 110V adapters, tubing, and a static pressure probe. With the integrated magnets on the back of the gauge, this meter allows for easy mounting to any metallic surface. The DG-1000 gauge provides an air flow measurement accuracy of +/- 5% when used with the TrueFlow® Grid and corresponding TrueFlow® app with Bluetooth connectivity.

2.5 Equipment Charging

The Grid, DG-1000, and DG-8 have batteries which can be recharged via a USB-C port/cable.

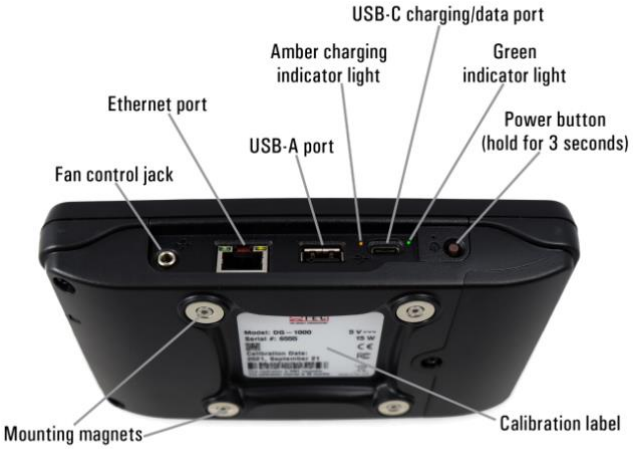
2.5.a Charging the Grid

The Grid is equipped with a USB-C charging port located at top center of the Grid. The Grid is also equipped with a green led indicator representing that a 5 volt power source has been applied to the charging port. The yellow led indicator represents that the battery is charging.

USB-C Charging Port

2.5.b Charging the DG-8 and DG-1000:

The DG-8 and DG-1000 have a USB-C charging port located at top of the gauge.



Chapter 3: TrueFlow App Test Procedures

The flow metering process using the Digital TrueFlow® Grid is completed following the free TrueFlow® app, available in IOS and Android. The app provides a step-by-step workflow for taking the total system air flow measurement with detailed process aligned to the specific system being measured.

To measure total system air flow, it is best practice to install the TrueFlow® Grid in a filter slot as close to the blower fan as possible to minimize the impact of duct leakage on the measurement.

A TrueFlow® Grid can be installed in the return duct system using the filter slot, filter grille or through other accessories which allow the grid to capture the total air flow in the return.

In a system with multiple grille returns, an accepted practice is to block off the smaller return(s) and use the TrueFlow® grid on the largest return, ensuring all the system airflow is passing through the grid. The TrueFlow® app will complete the corrected flow calculation and inform the user if this calculated air flow is within accepted range to meet stated accuracy specifications. If it is outside the accepted range, it will alert the user, and an alternate workflow can be pursued.

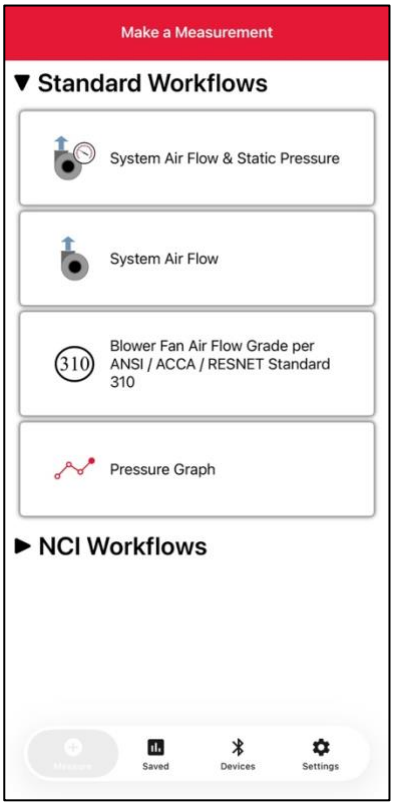
Four standard workflows supported in the TrueFlow App.

System Air Flow & Static Pressure provides a detailed analysis of the entire HVAC system, including the ability to diagnose issues within the entire ducted system.

System Air Flow is a workflow focused on only capturing the system air flow.

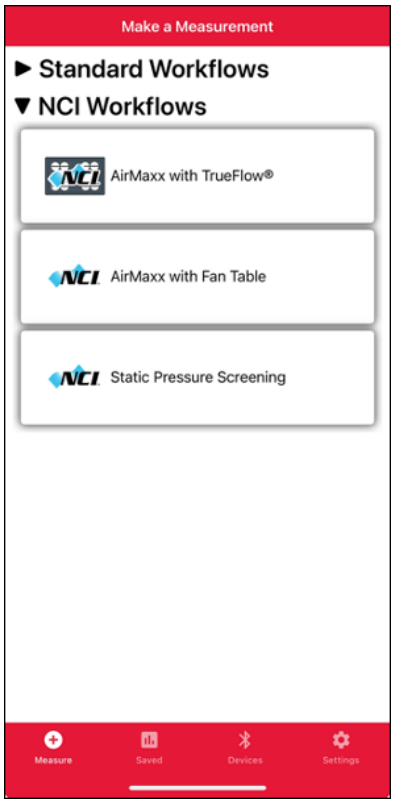
Blower Fan Air Flow Grade per Standard 310 also measures air flow, but with a specific process and report aligned to ANSI/ACCA/RESNET standard 310 for grading new HVAC installations.

Pressure Graph is a workflow which allows the user to capture and plot static pressure reading on a data log graph.



Chapter 3: TrueFlow App Test Procedures Cont'd

Three NCI workflows supported in the TrueFlow App



AirMaxx with TrueFlow® is a workflow that provides a detailed analysis of the entire HVAC system, including the ability to diagnose issues within the entire ducted system.

Note: Diagnostics will differ from the Standard Workflow as Airmaxx With TrueFlow is based on the principles taught in technician training by the National Comfort Institute™.

AirMaxx with Fan Table is a workflow which allows the user to capture the pressure profile of the HVAC system in the app and use either the original equipment manufacturer's fan table or the NCI generic fan table for an estimated air flow input.

Note: TEC manometers are not required for use of this workflow but are recommended for a higher level of accuracy of measurement. To use a generic manometer for pressure profiling, select manual entry when requested as shown in the image to the right. Diagnostics and reporting are not available with this workflow due to not having a flow measurement from the Digital TrueFlow Grid.

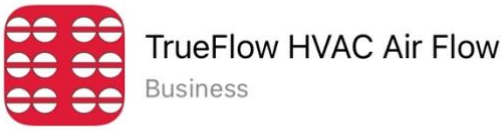
Static Pressure Screening is a workflow which allows the user to capture the pressure profile of the HVAC system in the app. No air flow input is available for static pressure screening workflow.

Note: TEC manometers are not required for use of this workflow but are recommended for a higher level of accuracy of measurement. To use a generic manometer for pressure profiling, select manual entry when requested as shown in the image to the right. Diagnostics and reporting are not available with this workflow due to not having a flow measurement from the Digital TrueFlow Grid.

3.1.a Outline of TrueFlow® Measurement Using TrueFlow® app

Following the TrueFlow® app:
See Appendix F through H for sample workflows

1. Install and open TrueFlow® app from IOS or Android store.



2. Power up the digital TrueFlow® Grid and DG-8 gauge by holding the power button (white button on the left of the devices) until the green light flashes. If using a DG-1000 hold down the power button on top of the gauge.
3. Select a workflow from the measure screen.
    a. System Air Flow & Static Pressure
    b. System Air Flow
    c. Blower Fan Air Flow Grade per Standard 310
    d. Pressure Gauge
    e. AirMaxx with TrueFlow
    f. AirMaxx with Fan Table (TEC hardware not required, see chapter 3 details)
    g. Static Pressure Screening (TEC hardware not required, see chapter 3 for details)
4. Select Grid and digital gauge from the device screen.
    a. Select the + to connect, Select the – to disconnect from a device.
5. Select the proper indoor unit type.
6. Select the orientation of indoor unit installation.
7. Choose applicable system detail selections
8. Read test instructions and if necessary, prepare indoor system for test.
9. Follow TrueFlow® app prompts and capture static pressure measurement(s) as directed by illustrations on TrueFlow app. See appendix A for more details on taking static pressure measurements.
10. TrueFlow app will prompt user to remove filter and install TrueFlow® Grid with chosen accessory. See appendix B for more details on installing the TrueFlow® Grid in various system locations.
11. Save test
12. Select the create report icon at the bottom of the system performance screen.
    a. On the create report screen enter customer information, address, user/company info.
    b. Once create report is selected, the next following screen will show a document of all the collected and input data specific to the task at hand. By clicking the share button, the user can send this document via email. Selecting close will default back to the create report screen.

Appendix A: Process and options for measuring static pressure

a) Locate the air handler system filter and replace if dirty,

Locate the air handling system filter and if it is dirty, replace with a new one. A dirty filter can significantly reduce air flow through the air handling system.
Note: If you wish to measure the air flow with the dirty filter, leave the dirty filter in place.

b) Open all registers and outside window.

Make sure all supply and return registers are open. Open a window or door between the building and outside to prevent pressure changes in the building during the test. If the air handler fan is installed in an unconditioned zone (e.g., crawlspace, attic), open any vents or access doors connecting that zone to the outside (or to the building) to prevent pressure changes in the zone during the test.

c) Options for location of static pressure measurements for compensating TrueFlow measurements

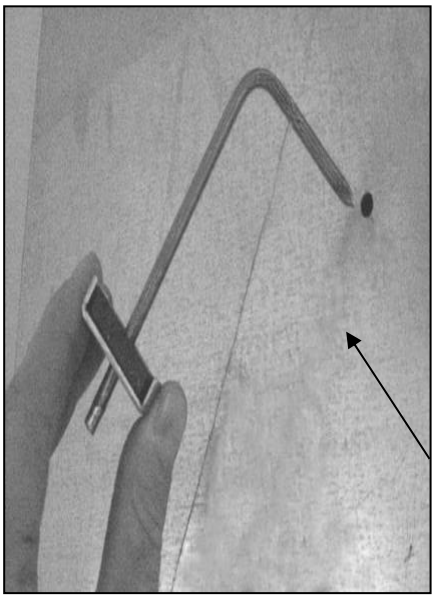
Install the static pressure probe into the ductwork according to the TrueFlow® app workflow selection (the operator will typically need to drill or punch a small hole in the ductwork in order to insert the static pressure probe):

- Insert the static pressure probe into the side surface of the supply plenum. The static pressure probe should point into the airstream.

- Or, insert the static pressure probe in the side surface of the return plenum. The side of the return plenum chosen should **not** have a trunk line, return duct or return register connected to it. The static pressure probe should point into the airstream.

  Note: If the Grid will be installed at a remote filter grille, the static pressure probe may not be installed in the return plenum (i.e. install it in the supply plenum).

- Or, insert the static or total pressure probe in the supply register approx. 2.5 inches upstream of the grille. In this mode, the app will ensure the pressure reading is high enough to provide an accurate calculation of flow to accuracy of 7% or better (vs. 5% or better for other locations). If the app is not seeing high enough pressure, it will alert the user and suggest trying another register or measure in the supply plenum.



d) Connect the static pressure probe to a pressure gauge.

Connect one end of the static pressure probe to the 10-foot length of tubing. Now connect the remaining end of the tubing to the positive (+) end of the pressure gauge. **Note:** If you are using the "dead-end" corner location, you may simply insert the end of the tubing into the "dead-end" corner and not use a static pressure probe.

- **DG-1000**

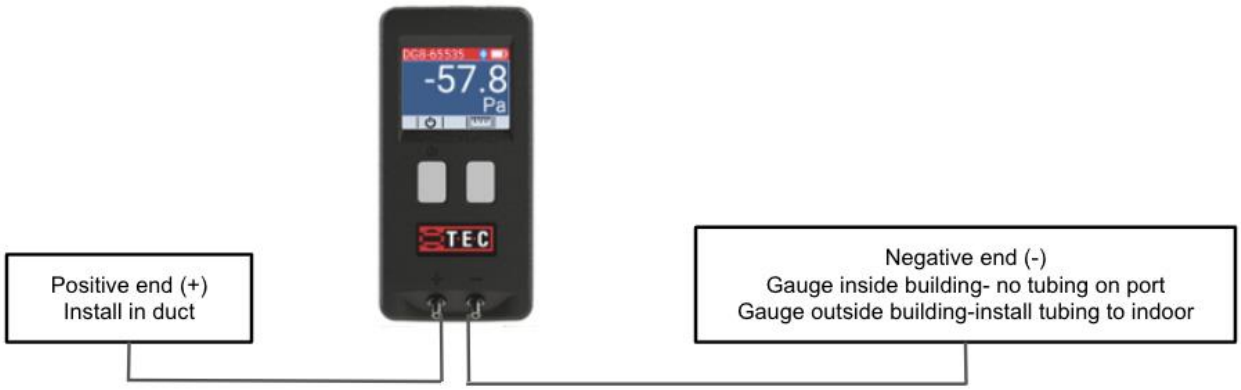
If using a DG-1000 digital pressure gauge, connect the end of the blue tubing to the “INPUT” end of **Channel A** pressure tap. If the pressure gauge is located inside the house, leave the **Channel A Reference** tap on the gauge open (we want to measure the system operating pressure with reference to the house). If the pressure gauge is not located in the house (e.g., it is in the crawlspace, garage, or attic), run the 30-foot piece of clear tubing from the **Channel A** Reference “REF” tap to inside the house. **See figure 5.**

Figure 5: Connecting the Static Pressure Probe to a DG-1000

- **DG-8**

If using the DG-8 digital pressure gauge, connect the end of the blue tubing to the positive end (+) input pressure tap. If the pressure gauge is located inside the house, leave the negative end (-) reference tap on the gauge open (we want to measure the system operating pressure with reference to the house). If the pressure gauge is not located in the house (e.g., it is in the crawlspace, garage, or attic), run the 30-foot piece of clear tubing from the negative end (-) reference tap to inside the house. See figure 6.

Figure 6: Connecting the Static Pressure Probe to a DG-8



Appendix B: Installation Options of The Grid

Installation Notes

- Obstructions within 6 inches upstream or 2 inches downstream of the Grid that are blocking air flow through any of the metering holes may reduce the accuracy of the device.
- If there is an obstruction, try to install the Grid in one of our other various acceptable locations.

Installing at a Filter Slot:

If using in place of filter, remove the existing filter and slide the TrueFlow® Grid with the corresponding adapter plate completely into the empty filter slot. Install the Grid so that the front side of the plate is facing into the air flow (front side has the wording “AIR IN” in the middle of the plate). The adapter plate gasket should provide a seal around the cabinet - all the air flow should pass through the Grid and not around the plate. If you wish to install the Grid in a blower compartment and there is no filter slot built into the compartment, it is sometimes possible to temporarily tape the Grid into the compartment for the test procedure. In this case, be sure that the tape is not blocking any of the metering holes in the plate. Close the filter access opening. Temporarily seal around the filter slot cover with masking tape to prevent air leakage and to direct all air flow through the Grid.

Installing with multiple Filter Slots:

If using in place of filter, remove the existing obvious main filter and slide the TrueFlow® Grid with the corresponding adapter plate completely into the empty filter slot. Install the Grid so that the front side of the plate is facing into the air flow (front side has the wording “AIR IN” in the middle of the plate). The adapter plate gasket should provide a seal around the cabinet - all the air flow should pass through the Grid and not around the plate. If you are installing the TrueFlow® Grid at the filter grille of a multiple return duct system, when the TrueFlow® app prompts the user to remove filter and install the Grid, the user should install the Grid in the most obvious main return and blank off the additional return(s), ensuring all system air flow passes through the Grid. If you wish to install the Grid in a blower compartment and there is no filter slot built into the compartment, it is sometimes possible to temporarily tape the Grid into the compartment for the test procedure. In this case, be sure that the tape is not blocking any of the metering holes in the plate. Close the filter access opening. Temporarily seal around the filter slot cover with masking tape to prevent air leakage and to direct all air flow through the Grid.

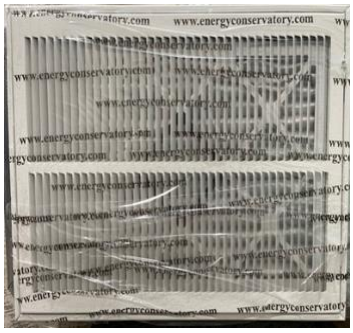
Note: If the TrueFlow® app registers low flow, then the operator may need to use another method to obtain more system air flow through the plate.

Installing at a Single Central Return:

If you are installing the TrueFlow® Grid at the filter grille of a single return duct system, simply push the plate into the empty filter rack when prompted by the TrueFlow app. Install the Grid so that the front side of the plate is facing into the air flow (front side has the wording “AIR IN” in the middle of the plate). The adapter plate gasket should provide an airtight seal around the filter grille housing - all the air flow should pass through the Grid and not around the plate. Keep the filter grille door open during the remainder of the test.

Installing with Multiple Central Returns:

If you are installing the TrueFlow Grid at the filter grille of a multiple return duct system, when the TrueFlow app prompts the user to remove filter and install the Grid, the user should install the Grid in the most obvious main return and blank off the additional return(s), ensuring all system air flow passes through the Grid. Install the Grid so that the front side of the plate is facing into the air flow (front side has the wording “AIR IN” in the middle of the plate). The adapter plate gasket should provide an airtight seal around the filter grille housing - all the air flow should pass through the Grid and not around the plate. Keep the filter grille door open during the remainder of the test.



Note: If the TrueFlow® app registers low flow, then the operator may need to use another method to obtain more system air flow through the plate.

Installing in a Capture Accessory:

If you are installing the TrueFlow® Grid at the filter grille of a single return duct system or multiple return duct system, simply install the Grid into the capture accessory and press capture hood over most obvious main return. Other additional return(s) will need to be blanked off at the same time as capture hood measurement is taking place. Install the Grid so that the front side of the plate is facing into the air flow (front side has the wording “AIR IN” in the middle of the plate). The capture hood gasket should provide an airtight seal around the filter grille housing - all the air flow should pass through the Grid and not around the plate.

Note: If the TrueFlow® app registers low flow, then the operator may need to use another method to obtain more system air flow through the plate.

Appendix C: TrueFlow Grid Specifications & Installation Instructions

TrueFlow Grid Specifications

Flow Accuracy:	+/- 5% for most applications *1
Measurable Flow Range:	Grid: 300 cfm to 2,500 cfm *2
Digital Communication:	Bluetooth® low energy, USB 2.0
Power:	2,000 mAh lithium-ion polymer rechargeable battery USB-C charger/power adapter
Battery Life:	Typically over 24 hours
Auto-off:	30 minutes
Grid Dimensions:	18 inch width x 12 inch height x 0.75 inch depth
Grid Weight:	2.1 LBS
Recommended Calibration Interval:	48 months
Operating Temperature Range:	32°F to 115°F (0°C to 45°C)
Storage Temperature Range*3:	Less than one month: 15°F to 115°F (-10°C to 45°C) One month to one year: 32°F to 77°F (0°C to 25°C)

*1) In standard installation with no obstruction 2 inches downstream and 6 inches upstream of Digital TrueFlow Grid.

*2) The Digital TrueFlow® Grid can measure 300 – 2000 CFM directly, however with larger equipment the NSOP / TFSOP adjustment will normally increase the measurement such that equipment flowing 2500 CFM is measured accurately.

*3) Storage limits are based on batteries. Storing outside these limits may require battery replacement.

Appendix C: TrueFlow Grid Specifications & Installation Instructions Cont'd

TrueFlow Grid Installation Instructions

Ensuring Accurate Readings

When applied properly, the Digital TrueFlow grid provides air flow measurement at +/- 5%

Installation requirements for TrueFlow

1. The TrueFlow needs a short space of unobstructed duct upstream and downstream to provide accurate readings at +/-5%.
   Upstream = 6 inches, downstream = 2 inches. (See Figure 1A)
2. The TrueFlow should be < 65° from perpendicular. (See Figure 1B)

Other considerations when applying TrueFlow

1. TrueFlow is very accurate at measuring flow going past the grid.
2. When measuring blower fan (system) air flow, it is best to have the TrueFlow grid as close to the blower as possible, so duct leakage between the TrueFlow location and Blower fan is limited. If there is significant duct leakage between the grid and blower, the TrueFlow will read lower by the amount of duct leakage present.
3. This is most common when using a TrueFlow in a filter grille

Figure 1A

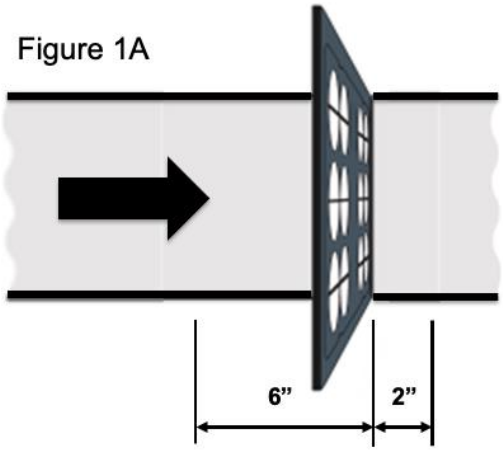
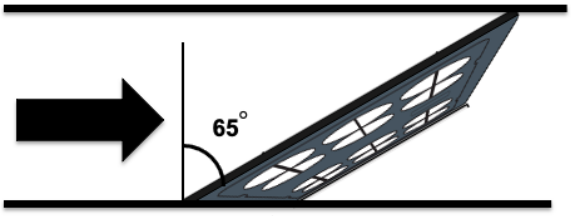
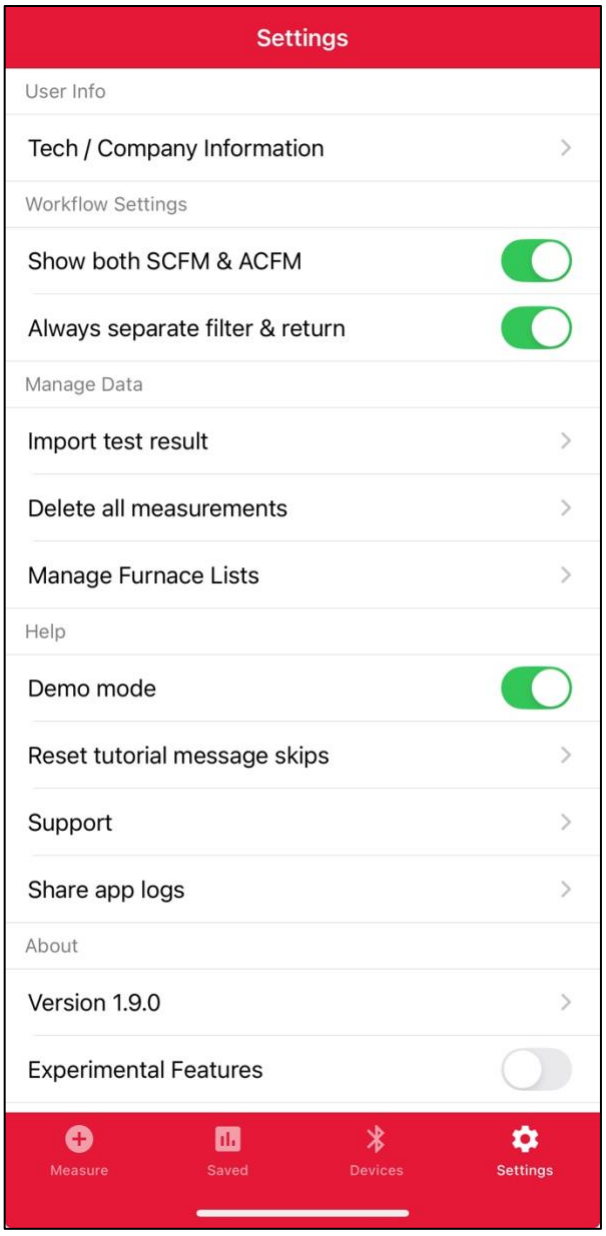


Figure 1B



Appendix D: TrueFlow App Workflow Settings & Manage Data

Workflow Settings Menu



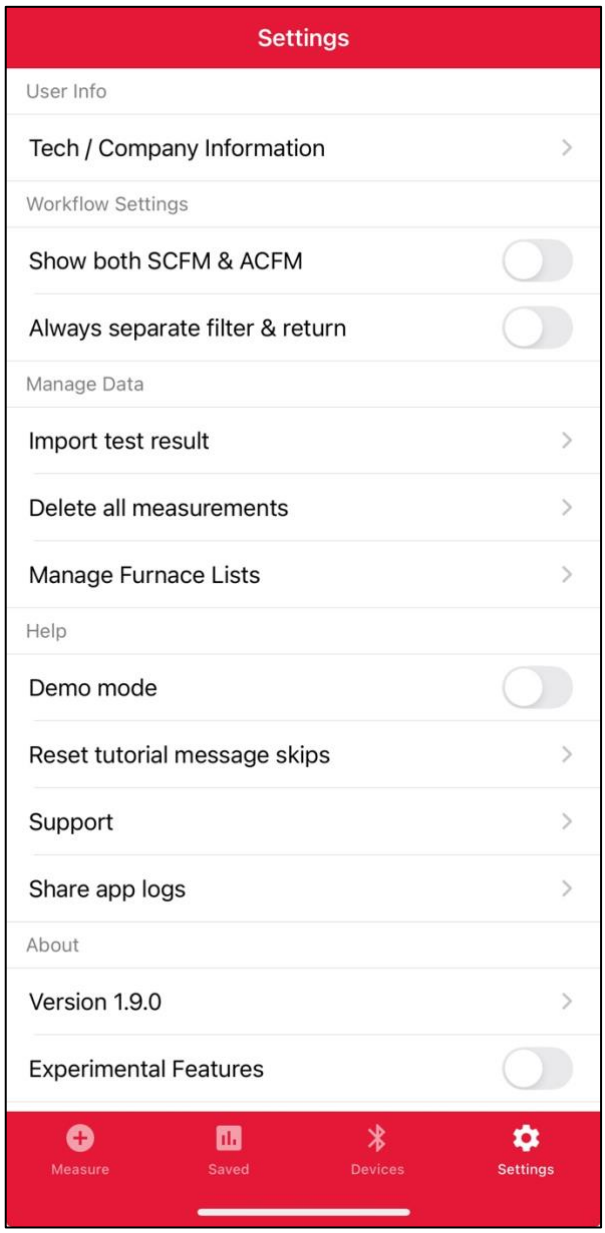
Show both SCFM & ACFM – The app defaults to Standard Cubic Feet Per Minute (SCFM) only. To report Actual Cubic Feet Per Minute (ACFM) and SCFM, turn on the toggle.

Always Separate Filter & Return – When Always Separate Filter & Return is toggled on, all workflows that require pressure profiling of the system will have an additional pressure measurement location added to separate the filter grille pressure from the return duct pressure. When toggled on in settings, the user will not be required to toggle this setting on in the workflow.

Demo Mode - When toggled on, allows the user to connect to fake hardware and complete a workflow. This feature is for classroom training purpose when live equipment is not available for training.

Appendix D: TrueFlow App Workflow Settings & Manage Data Cont'd

Manage Data



Import test result – This feature allows a user to download a shared TrueFlow test sent from a TrueFlow app from another user.

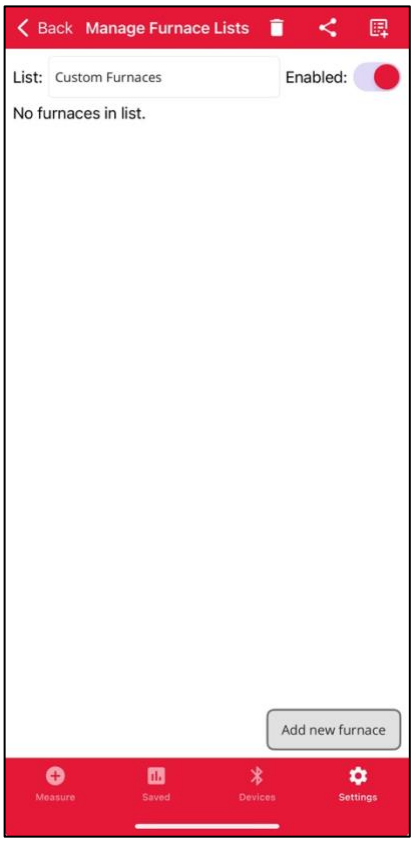
Delete all measurements – This feature will delete all tests that are saved on the IOS or Android device.

Manage Furnace Lists – This feature will store furnace equipment data that can be used in a heating furnace forecasting workflow. (see Manage Furnace List con't on page 23).

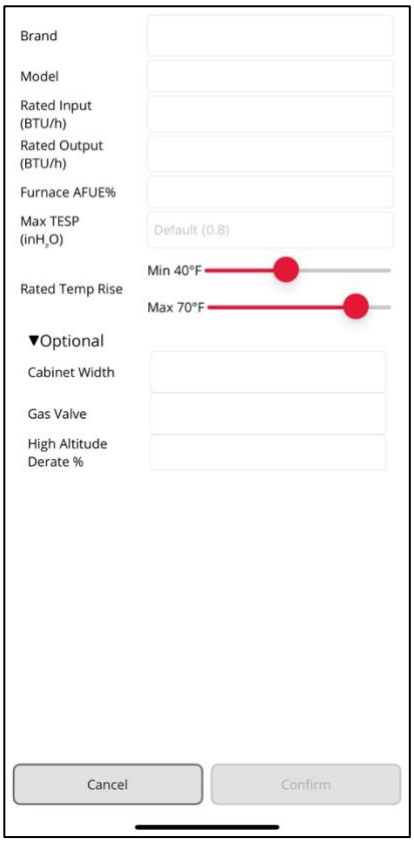
Appendix D: TrueFlow App Workflow Settings & Manage Data Cont'd

Manage Data – Manage Furnace Lists

Beginning Screen



Add New Furnace



The three icons located at the top of the beginning scree provide the following functions:

Delete List: Removes an existing furnace list from the device.

Share List: Allows the user to share a selected furnace list (json fie) with the other users.

Create/Import List: Enables the user to create a new furnace list or import an existing list.

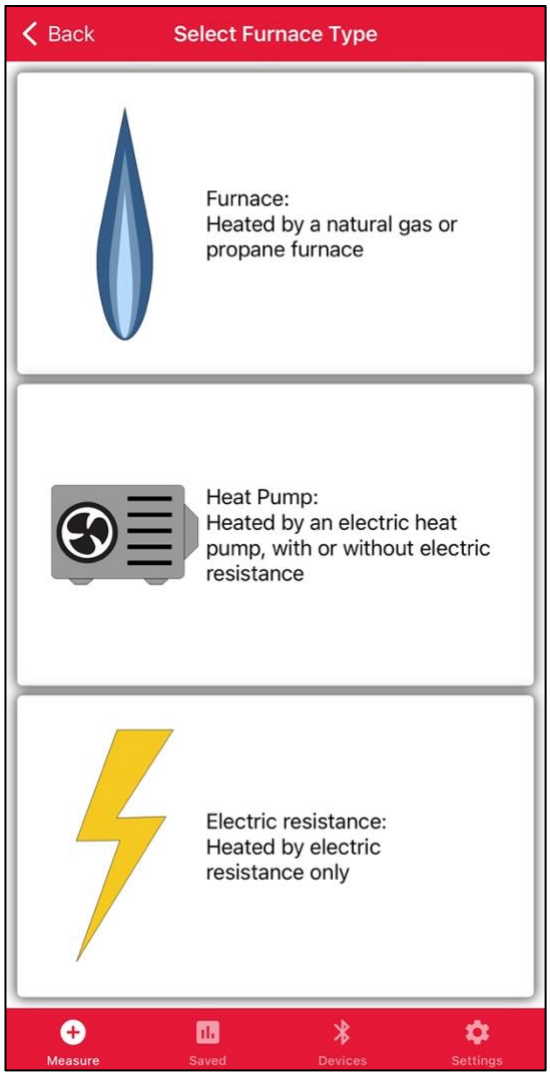
Custom Furnaces: This is the default furnace list on the app.

Add New Furnace: A new furnace can be added to any furnace list. To do this, select the list in which you want to add the new furnace, then select Add New Furnace. Enter the furnace details and select Confirm when complete. Note: Cabinet width, gas valve, and high-altitude derate percentage are optional inputs and are not required to save a furnace to a list. Any existing furnace can be edited by selecting that furnace in the list.

Enabled Furnace List Toggle: Each furnace list can be enabled or disabled using the toggle control. The toggle must be enabled to have the list appear in the heating furnace forecasting workflow.

Appendix E: Heat Mode System Details

Select Furnace Type **Description**



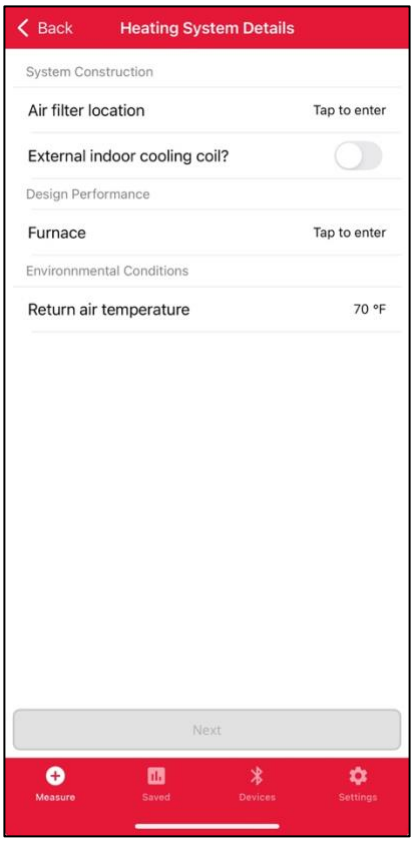
*Furnace: Provides air flow and static pressure diagnostics heated by natural gas or propane

*Heat Pump: Provides air flow and static pressure diagnostics heated by an electric forced air heat pump

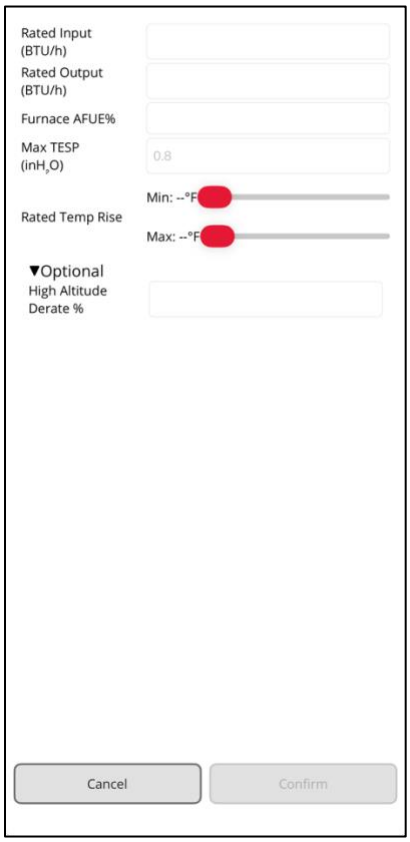
*Electric Resistance: Provides air flow and static pressure diagnostics heated by electric resistance only

Furnace System Details

*1



*2

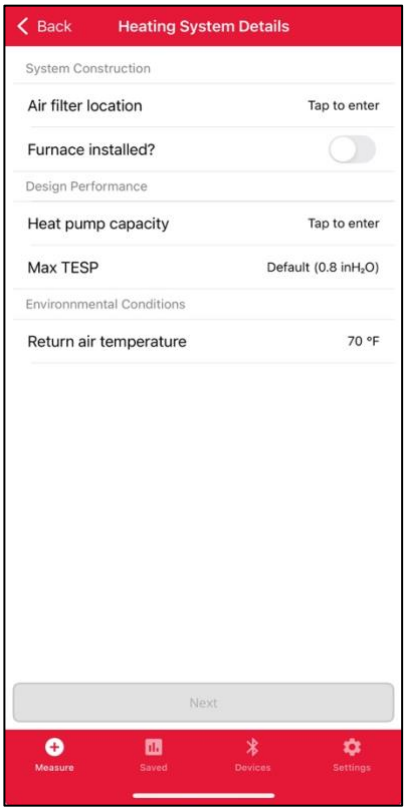


*1) When External indoor cooling coil? is toggled on, the user is telling the app that an indoor coil is mounted downstream of the furnace. If there is no downstream coil, then this toggle should be left in the off position.

*2) Max TESP (inH_20) - The default value is 0.8 inH_20, representing a common manufacturer-specified limit for residential equipment. For most accurate results, adjust this setting to match the maximum Total External Static Pressure (TESP) specified in the equipment's OEM documentation.

Heat Pump System Details

***1 *2**

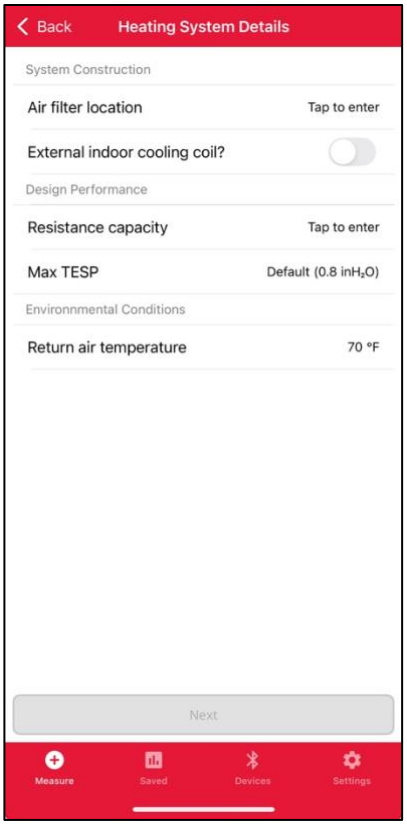


*1) When Furnace Installed? is toggled on, this means the user is telling the app that the system being tested is a dual fuel system with a furnace and a downstream heat pump indoor coil. If the system does not have a gas furnace installed, then this toggle should be left in the off position.

*2) Max TESP (inH_20) - The default value is 0.8 inH_20, representing a common manufacturer-specified limit for residential equipment. For most accurate results, adjust this setting to match the maximum Total External Static Pressure (TESP) specified in the equipment's OEM documentation.

Resistance Heat System

***1**

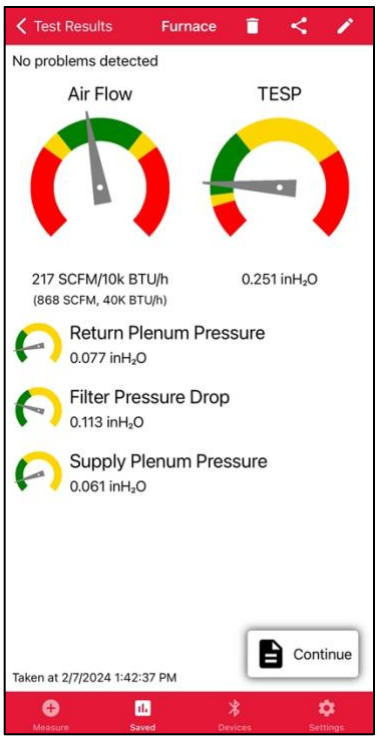


*1) When External Indoor Cooling Coil? is toggled on, the user is telling the app that an indoor coil is mounted downstream of the electric furnace. If the indoor coil is mounted inside the same cabinet of the blower, or if there is no indoor coil, then this toggle should be left in the off position

*2) Max TESP (inH_20) - The default value is 0.8 inH_20, representing a common manufacturer-specified limit for residential equipment. For most accurate results, adjust this setting to match the maximum Total External Static Pressure (TESP) specified in the equipment's OEM documentation.

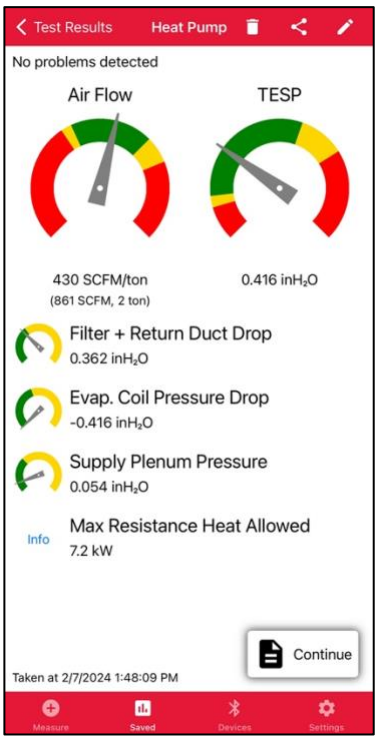
Furnace Test Results

*1



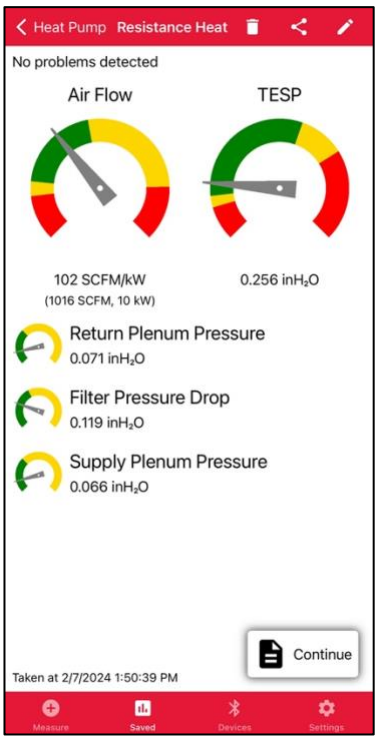
Heat Pump Test Results

*2 *3



Resistance Heat Test Results

*4



*1) Furnace results are displayed in two ways. First as SCFM/10K BTU/h and then as SCFM/Total BTU/h.

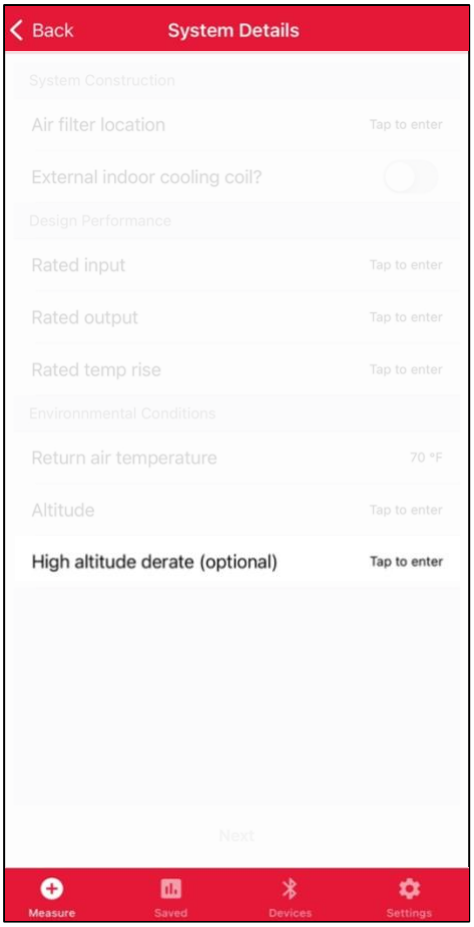
*2) Heat pump results are displayed similar to cooling. First as SCFM/Ton and then as SCFM/Total Tonnage.

*3) “Max Resistance Heat Allowed” is the maximum resistance heat that can operate simultaneously with the heat pump running. This data point is based on measured flow.

*4) Resistance heat results are displayed in two ways. First as SCFM/kW and then as SCFM/Total kW.

Furnace High Altitude Setting

***1 *2**

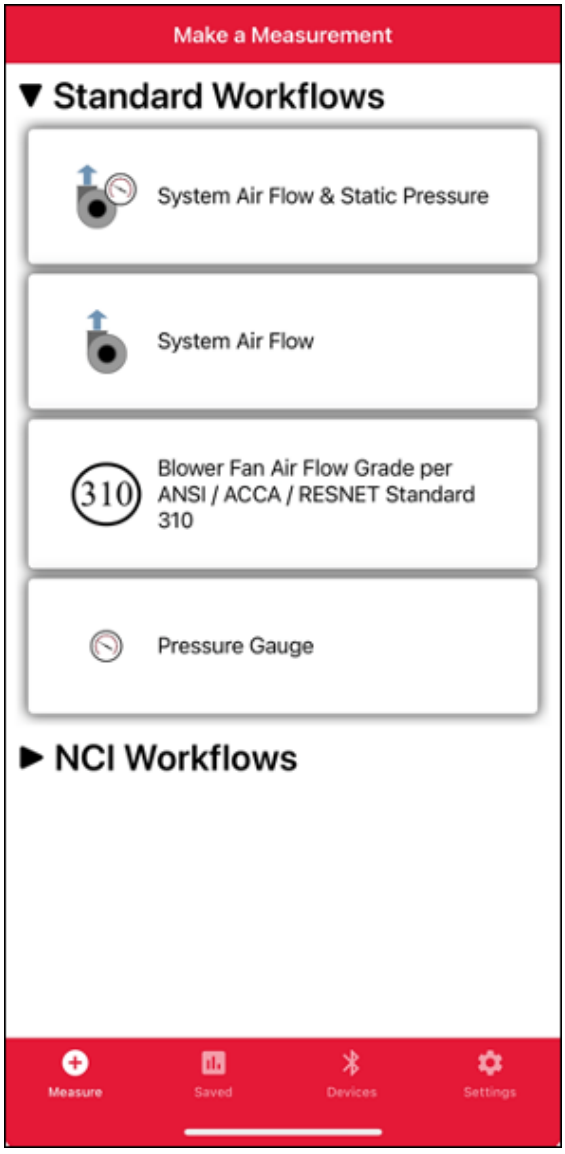


*1) Altitude input will appear on all system type workflows when the IOS or Android device does not have internet connection. Without internet, the app will not geotag your altitude automatically. If altitude appears, this input can be entered manually, or the user can select to retry the GPS capture feature. Keeping the altitude within an accuracy of 1,000 feet is suffice for accurate results.

*2) Most furnace models will require deration of the capacity due to high altitude. On average, this is 4% derate for every 2,000 feet beginning after the initial 2,000 feet above sea level. The proper high altitude derate percentage should be selected based on the equipment manufacturer instructions. This is an optional input; a user is not required to enter an input into the field to move forward in the app process. If no input is entered, the app will use sea level condition.

Appendix F: Sample of System air flow & Static Pressure Analysis

Select Workflow **Description**



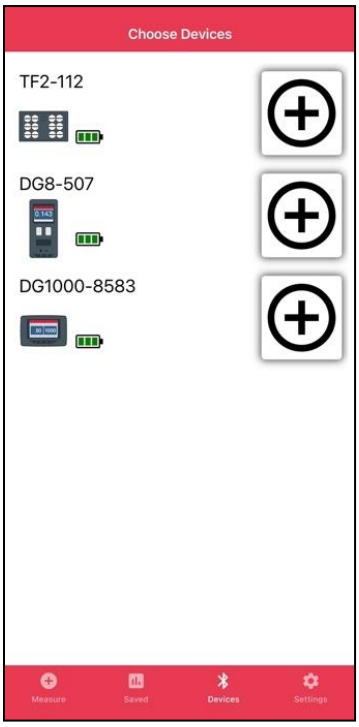
*Provides air flow and pressure diagnostics

*Provides air flow diagnostics

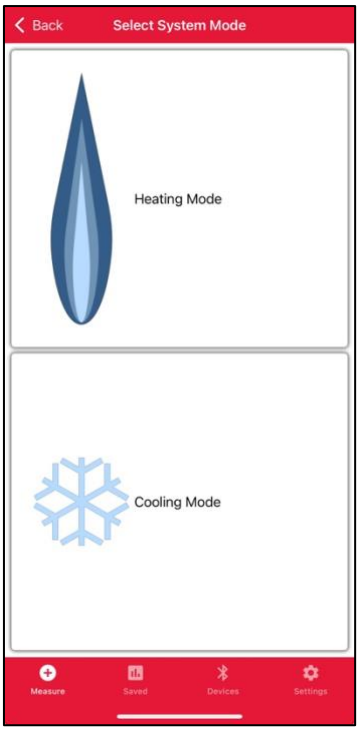
*Provides air flow diagnostics and grading for ANSI/ACCA/RESNET Standard 310 testing

*Provides Pressure readings for diagnostics

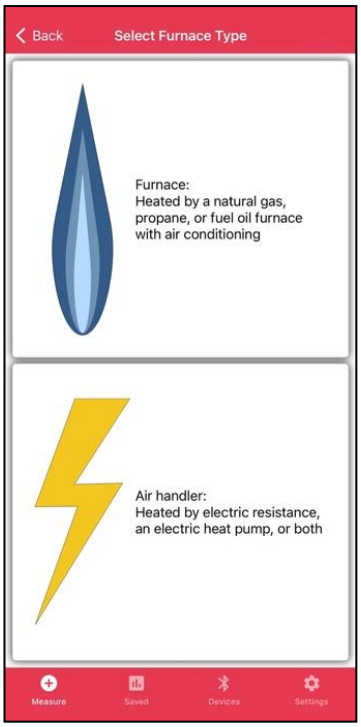
Select Devices



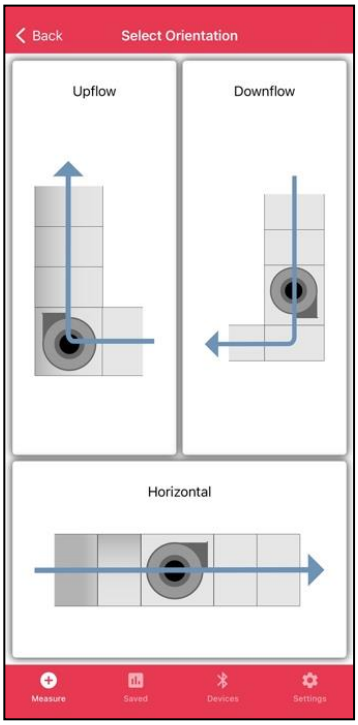
Select System Mode



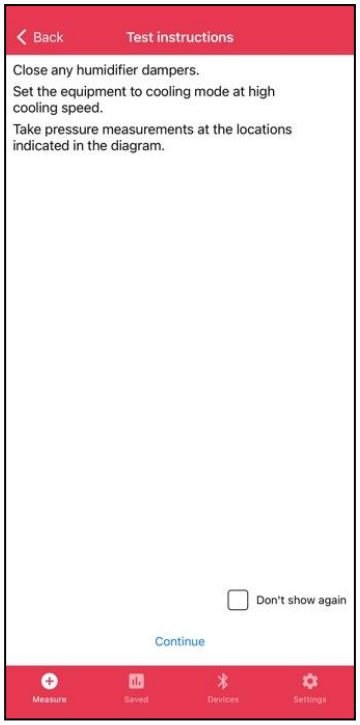
Select Indoor Unit



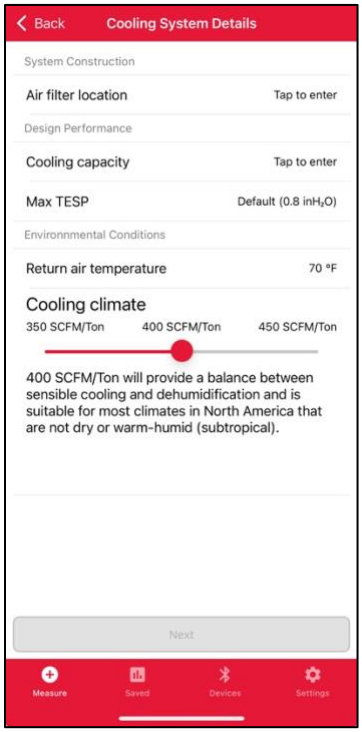
Select Orientation



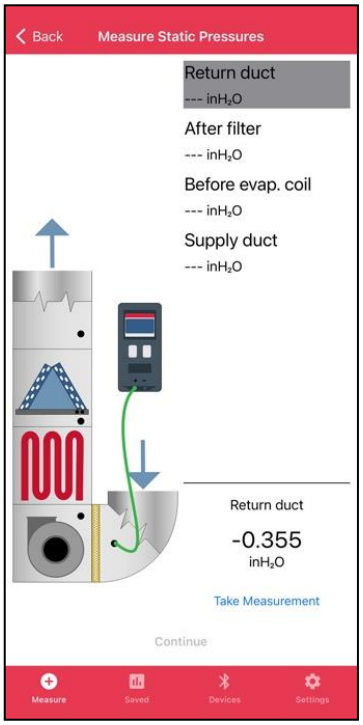
Prepare Indoor Unit



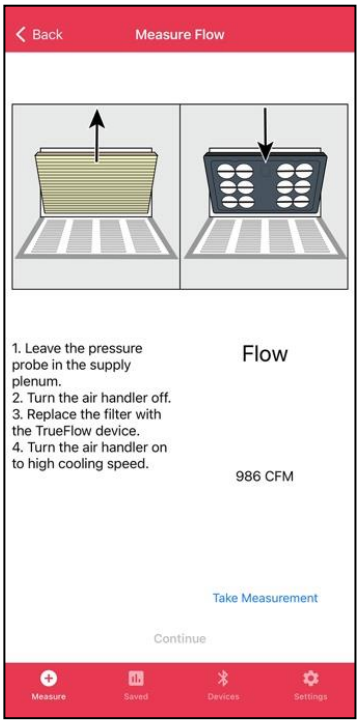
Select System Details



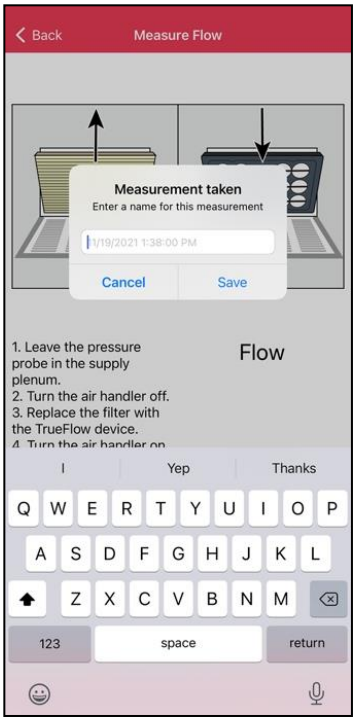
Take Pressure Measurements



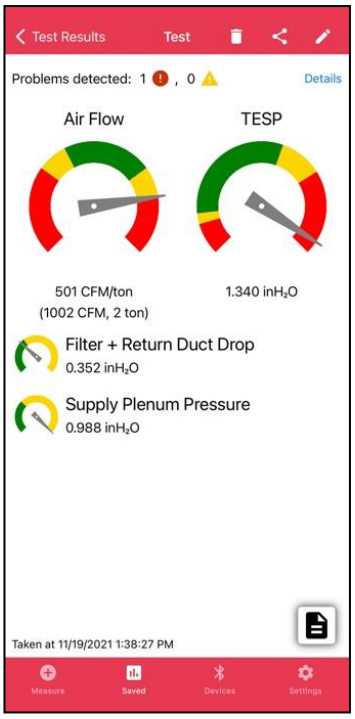
Install Grid



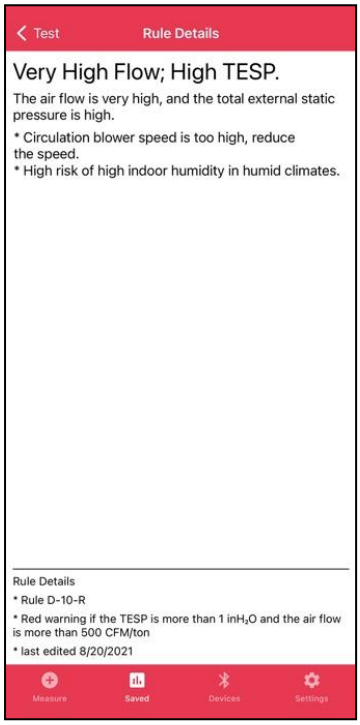
Save Measurements



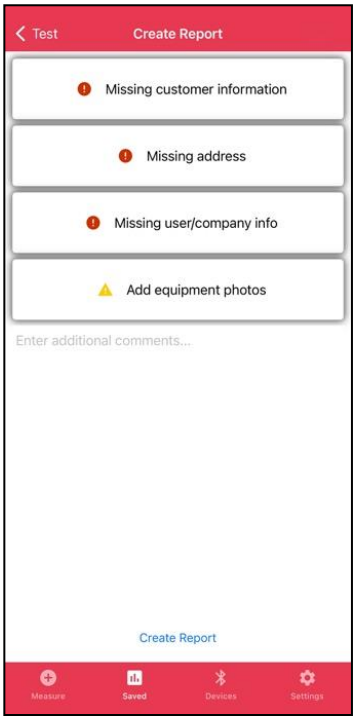
System Performance



Rule Details



Job Information



System report (available for email directly from app)

Tech info
Name: Chris
ID: N/A
Title: HVAC Management
Credentials: N/A
Email: chughes@energyconservatory.c…

Date tested: 11/22/2021

Company info
Name: The Energy Conservatory
Email: chughes@energyconservatory.c..
Phone: N/A

True Flow System Air Flow and Static Pressure Analysis

Air measurements

Total air flow = 774 CFM
Return duct = -0.345 inH_2O
Supply duct = 0.107 inH_2O

System & conditions

System Type: Electric
Orientation: Upflow
Cooling Capacity: 2
Filter Location: InGrille
Cooling Climate Type: Humid
Elevation: 7 m

Summary calculations

Flow		387 CFM/ton
TESP		0.452 inH_2O
Filter + Return Drop		0.345 inH_2O
Supply Plenum		0.107 inH_2O

Summary of Warnings

No warnings.

Customer

Name: Chris
Phone: (612) 827-1117
Email: chughes@energyconservatory.com
Address: 2801 21st Ave S Minneapolis MN 55407 United States

System report continued (available for email directly from app)

Test Equipment

Flow:
TrueFlow®
Serial: TF2-112
Calibrated: 6/3/2021

Pressure:
DG8
Serial: DG8-507
Calibrated: 10/15/2021

Additional Comments

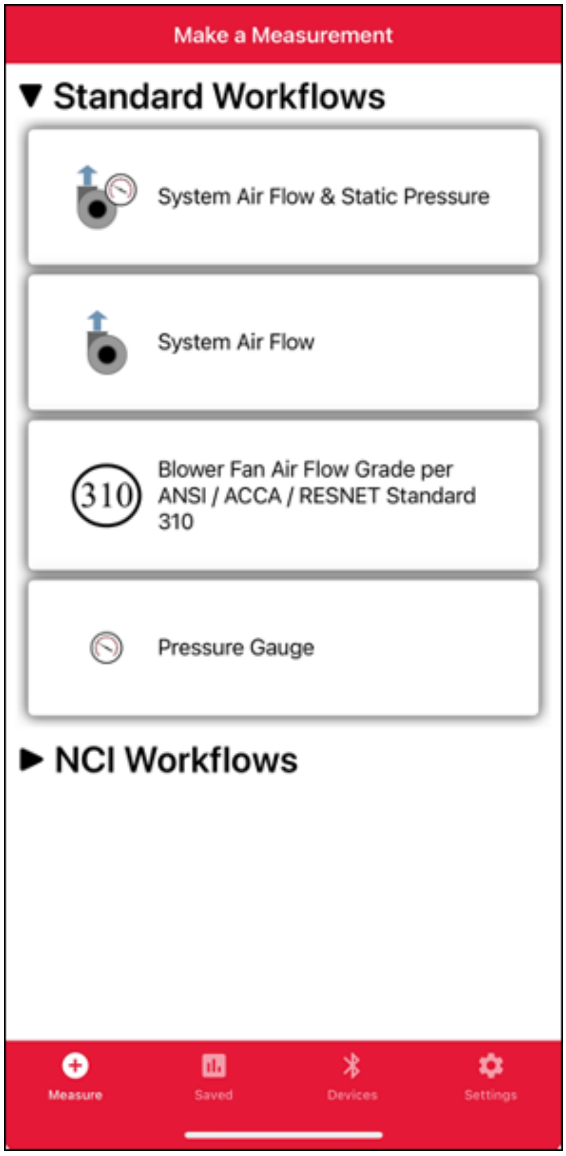
Return air grille is 20x20.

Equipment Photos

11/22/2021 10:32:14 AM

Appendix G: Sample of ANSI / ACCA / RESNET 310 Workflow

Select 310 workflow **Description**



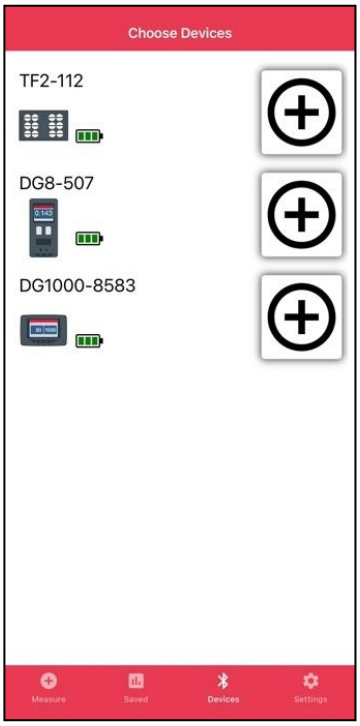
*Provides air flow and pressure diagnostics

*Provides air flow diagnostics

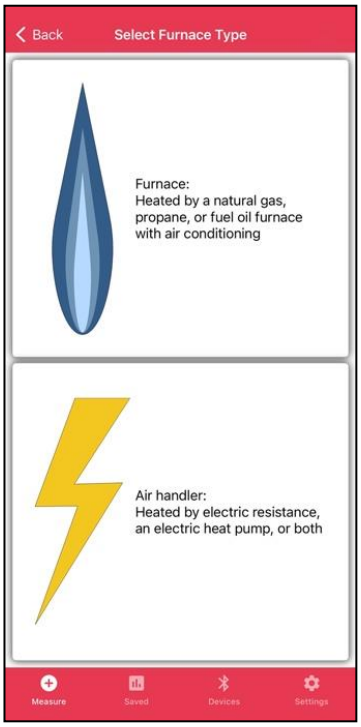
***Provides air flow diagnostics and grading for ANSI/ACCA/RESNET Standard 310 testing**

*Provides Pressure readings for diagnostics

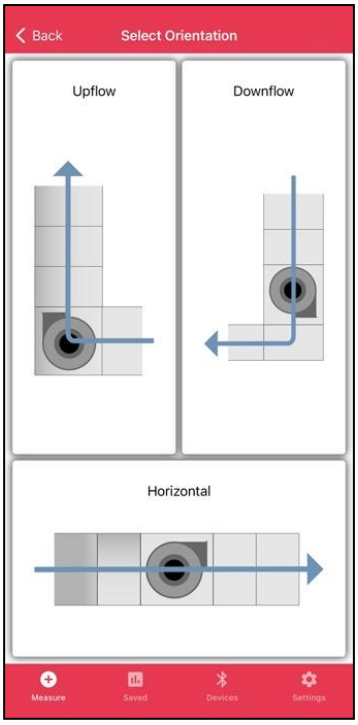
Select Devices



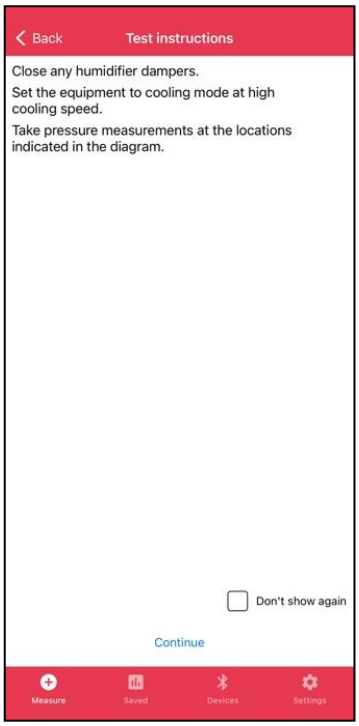
Select Indoor Unit



Select Orientation

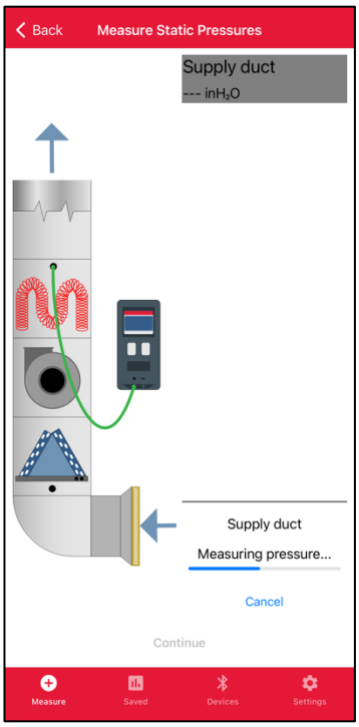


Prepare Indoor Unit

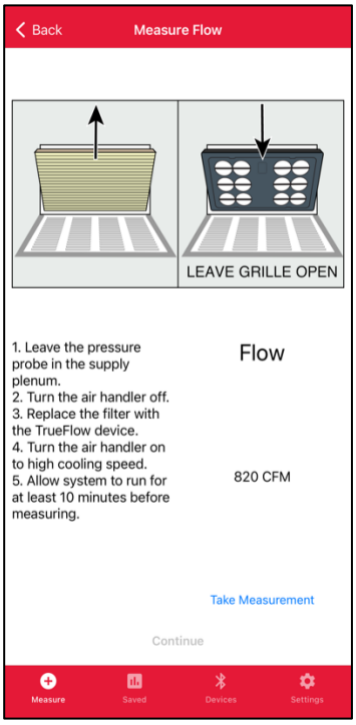


Select System Details

Take Measurements with app

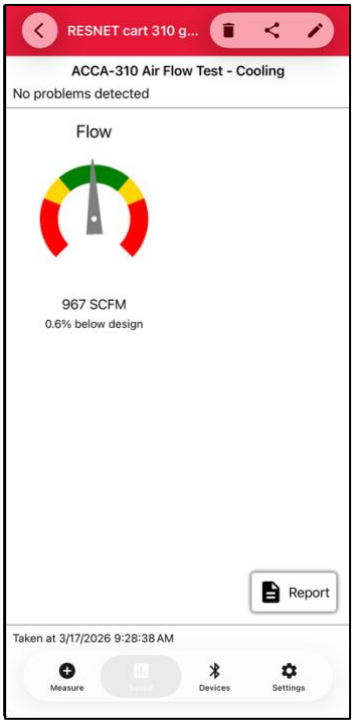


Install Plate in desired location

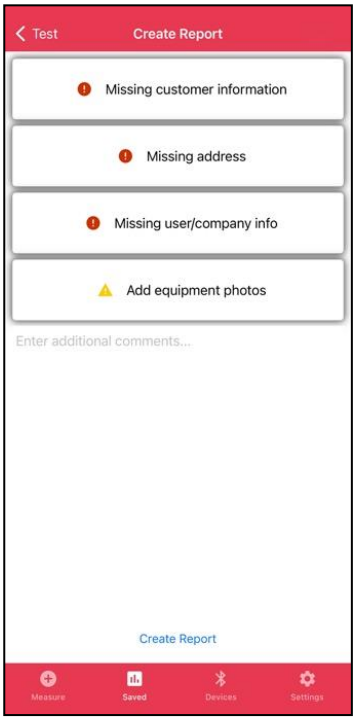


Save Workflow

System Performance



Job Information



System 310 report (available for email directly from app)

Date tested: 3/17/2026
ANSI/ACCA/RESNET 310
Company info
Name: TEC
Phone: (612) 254-2176
Email: chughes@energyconservatory.com

Tech info
Name: Chris
ID: 1234
Title: Tech
Credentials: 12-24

Air measurements

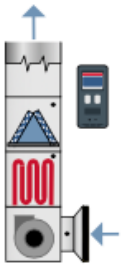
Total air flow = 967 SCFM
Supply duct = 0.264 inH_2O

System & Conditions

System Mode: Cooling
Elevation: 683 ft
Return temp: 70° F

System Type: Fuel
Orientation: Upflow
Cooling Capacity: 3
Filter Location: InGrille
Design Air Flow: 972 SCFM
Design Volumetric Flow: 1000 ACFM

Summary Calculations



Flow (% of Target)

0.6% below design

RESNET / ACCA - 310

GRADE I

deviation: -0.6%

Grade Designation	Percent Deviation		
I	≤0 and >-15%	or	≥0 and <+15%
II	≤-15% and >-25%	or	≥+15% and <+25%
III	≤-25%	or	≥+25%

Customer

Name: N/A
Phone: N/A
Email: N/A
Address: N/A

System 310 report continued (available for email directly from app)

Test Equipment

Flow:
TrueFlow®
Serial: TF2-344
Calibrated: 11/29/2021

Pressure:
DG8
Serial: DG8-500
Calibrated: 9/23/2021

Additional Comments

2 returns, both are 14x20 with 1" filters

Equipment Photos

7/22/2022 9:33:47 AM

Appendix H: ANSI / ACCA / RESNET 310 App Use at Altitude

Background
TEC's Digital TrueFlow Grid is one of four methods used to evaluate the blower fan air flow to meet the requirements in ANSI / ACCA / RESNET Standard 310. The grading requires evaluating the measured air flow against the design air flow of the HVAC system. Traditionally load calculation software refers to design airflow as "CFM" or Cubic Feet per Minute. However, this term is ambiguous and could mean either "ACFM" or "SCFM", depending on the source and context where it is used. Usually, the difference between ACFM and SCFM is small enough to be ignored, but at higher altitudes, the difference becomes important to the design, evaluation, and operation of an HVAC system.

Definitions
ACFM: Actual Cubic Feet per Minute of air measured at the temperature and absolute pressure of the HVAC system operation. This value does not correlate directly to a mass flow of air (such as pounds per minute) without first making corrections for air density.
SCFM: Standard Cubic Feet per Minute of air, corrected to standard air conditions of 68F, 14.696 psia (29.92 in Hg) and 50% Relative Humidity. This value uses a fixed air density and correlates directly to a mass flow of air, such as pounds per minute of air flow.
CFM: Cubic Feet per Minute of air is ambiguous. Without clarification it is not clear whether this value is ACFM or SCFM.

Evaluation and Grading Procedure
ANSI / ACCA / RESNET Standard 310 defines a procedure for grading the blower fan volumetric air flow into three grades, Grade I, Grade II, or Grade III. The grade is important because it is often used to determine compliance with building codes or it may contribute to HERS Index Score points, which affect incentives and compliance for home construction. The procedure comprises the following three steps, relevant to the grade.
1 - Determine the design Blower Fan airflow (section 4.2, especially 4.2.5.5.1). This is usually done using ACCA Manual J and S (see section 4.2.4.3).
2 - Test the air flow of the system (section 6.6)
3 - Designate a grade for the air flow of the HVAC system. (section 6.9)
Notes:
Section 4.2 refers to ACCA Man J. Manual J and S are used together to determine design air flow.

Air Flow Units
ACCA Manual J and S require the practitioner to make altitude corrections to the load of the house and to the capacity of the equipment at elevations above 2500 ft. The ACCA manuals do not require any corrections to the system air flow based on altitude. See section 2-5 and Appendix 5 of Manual S (second Edition, Version 1.00, 2014). The ACCA Manuals are all written with "CFM" as the flow units and it is not explicit about whether this means ACFM or SCFM. However, careful reading of the relevant sections, like Appendix 5 of Manual S (See especially A5-2) make it clear that the authors' intent when using "CFM" was ACFM. So the "design Blower Fan airflow" that results from following ACCA Manuals J and S will be ACFM.
By contrast, ANSI / ACCA / RESNET Standard 310 is explicit in section 4.2.5.5.1 that the design air flow and the measured air flow should be expressed in SCFM, not ACFM. This difference in units makes miscommunication likely, and that has a significant impact for systems at altitude.
Usually, the HVAC designer is a different person from the person measuring the HVAC system once installed in the field, and they often don't work for the same company. Unless the HVAC designer has knowledge of the details in Standard 310, they are likely to communicate the design air flow in ACFM, while the measurement made with TrueFlow grid in the field will default to SCFM.

Best Practice for TEC Digital TrueFlow App Use

Because of the situation described above, TEC has made improvements to the TrueFlow app to try to reduce the likelihood of miscommunication. The improvements are as follows. The changes were included in version 1.10 which was released in January 2026. Contact TEC with questions about measurements made before this version.

1. 2. 3. Where the user enters the design air flow, label it explicitly as ACFM (per ACCA Manual S). Also provide a “help” or “more info” link for a more complete explanation.

On the report, we show the design air flow in both ACFM and SCFM with a note. The note at the bottom of the report reads: “ANSI / ACCA / RESNET Standard 310 requires the use of SCFM. The TrueFlow app converts the design air flow to SCFM and calculates the measured air flow as SCFM, then compares the measured SCFM to the target SCFM to determine the grade.

Example

A 3-ton heat pump system is designed for use in Denver at an altitude of 5280 ft. The system capacity has been derated per ACCA Manual S and the load was calculated using the correct conditions and adjustments for the altitude in Manual J.

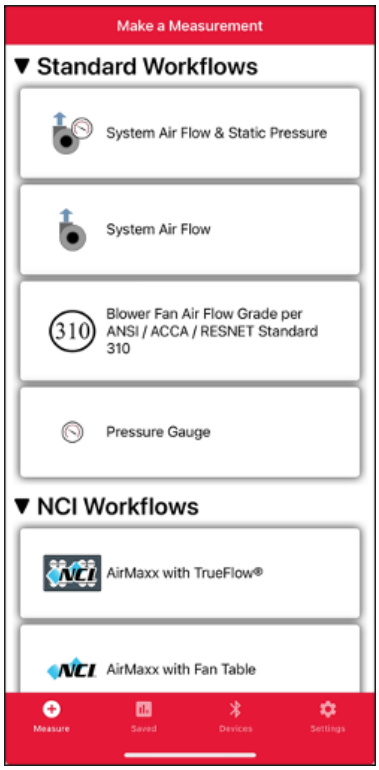
The resulting design air flow is 1220 CFM, and a careful reading of Manual S tells us this is 1220 ACFM. At 5280 ft, the atmospheric pressure is about 12.1 psi, compared to 14.7 psi at sea level. The design air flow is converted to SCFM with the atmospheric pressures as follows:

SCFM = ACFM * 12.1 / 14.7, so the design air flow is 1004 SCFM.

When the system air flow is measured in the field, the user inputs a design air flow of 1220 ACFM into the TrueFlow app. The air flow measurement is then made with the TrueFlow grid and comes out at 925 SCFM. The app calculates that the measured air flow is 7.9% below the design air flow (both in SCFM) and the system is correctly determined to be Grade I, for system air flow.

Appendix I: Forecasting

Forecasting – Details & Settings



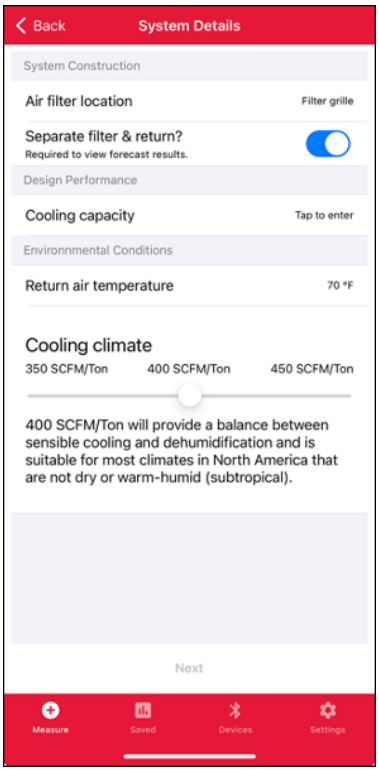
Workflow Information:

Forecast is a feature that allows the user to predict how the pressure and flow will respond from making a change to the air flow or from a system replacement based on the original equipment test conditions.

Forecast accommodates all equipment types and operating conditions. A user can test in heating or cooling and forecast in the opposite condition.

Two current workflows offer forecasting; they are System Air Flow & Static pressure under the Standard Workflow category and AirMaxx With TrueFlow under the NCI Workflow category.

Note: A Digital TrueFlow Grid must be deployed for use of the forecasting feature.



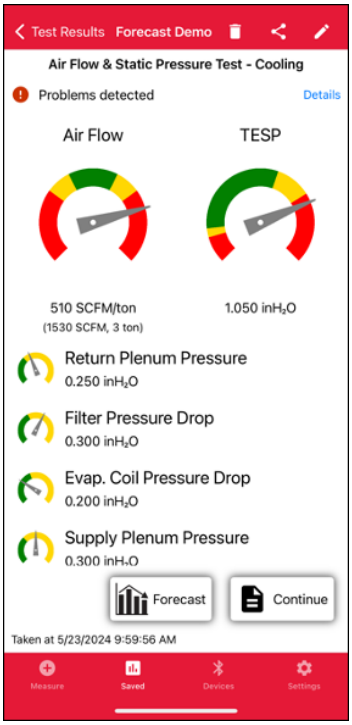
Forecast Setting Details:

Forecasting will work with all filter installations. If the user selects filter slot, no additions questions will need to be answered. If the user selects filter grille or multiple filter grilles, a new drop-down toggle will appear that says, “Separate Filter & Return?”. This toggle must be toggled ON to activate forecasting. When toggled on, this setting will require an additional pressure measurement to be taken during the pressure profiling screen.

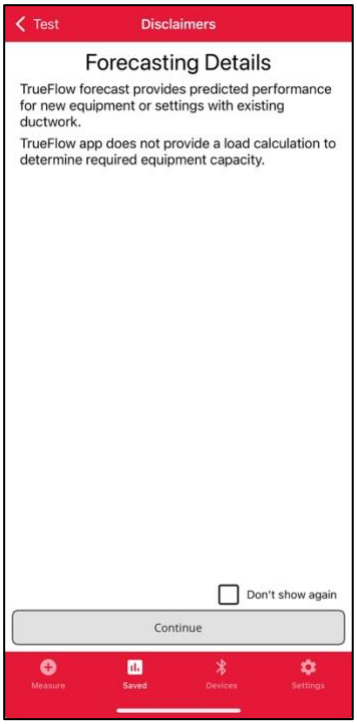
Note: To turn this feature to “Always On” see appendix D.

Sample of Forecasting – Change Air Flow on Existing Equipment

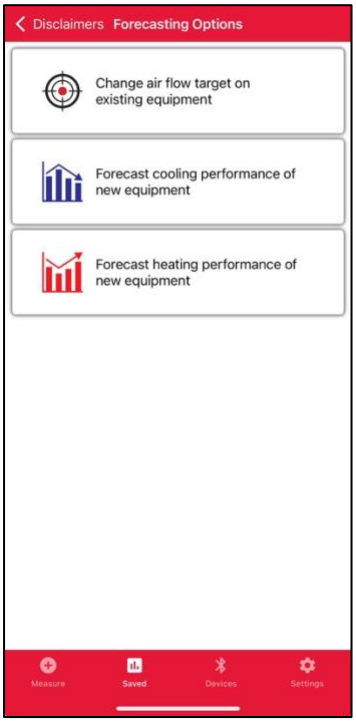
Select Forecast



Forecast Details

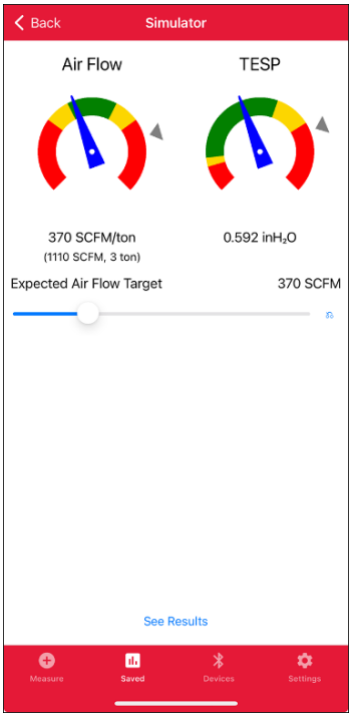


Forecast Options

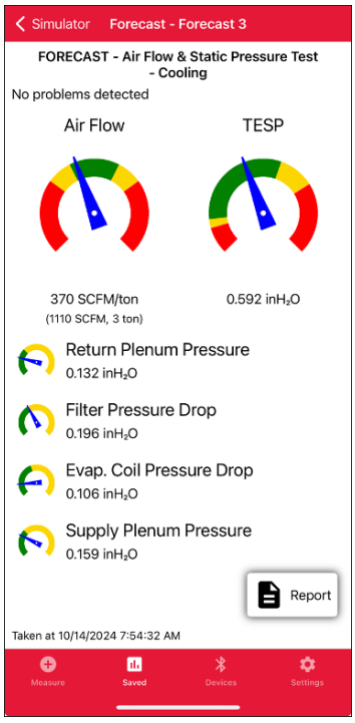


Deploy Simulator

***1**



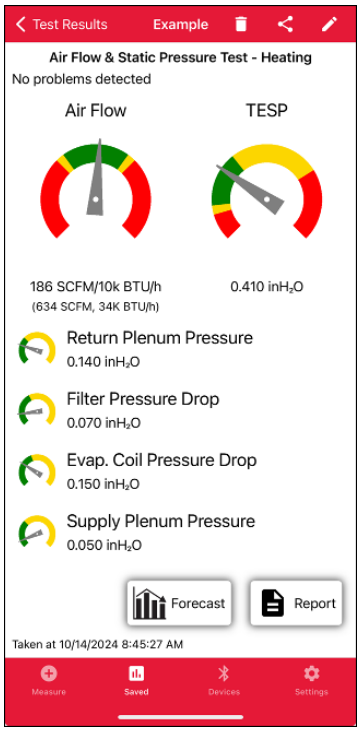
See Results



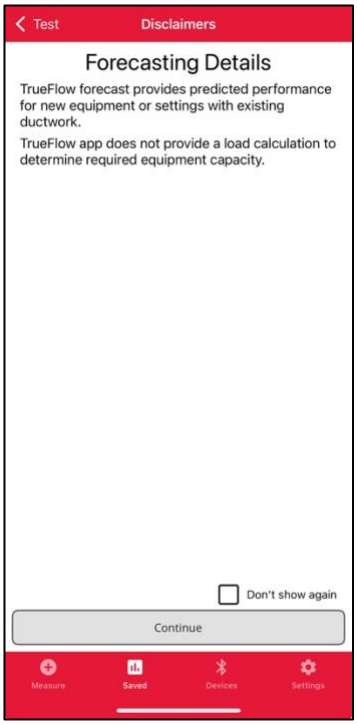
***1) Gray triangles on simulator page represent original test in conditions.**

Sample of Forecasting – Furnace to Heat Pump Replacement

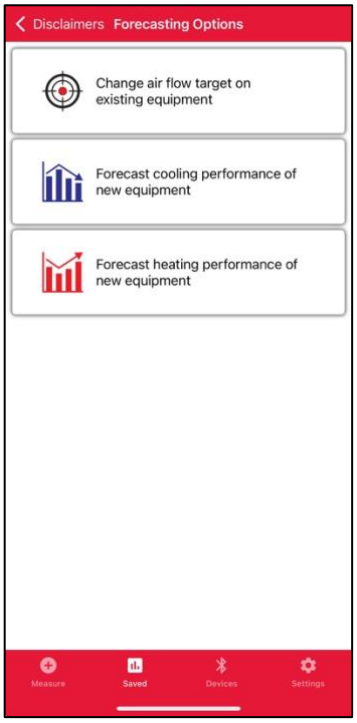
Select Forecast



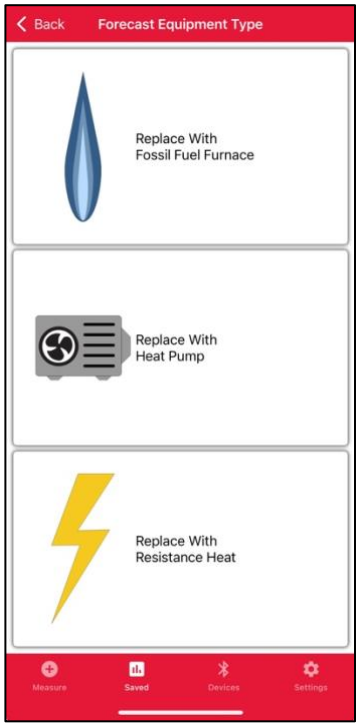
Forecast Details



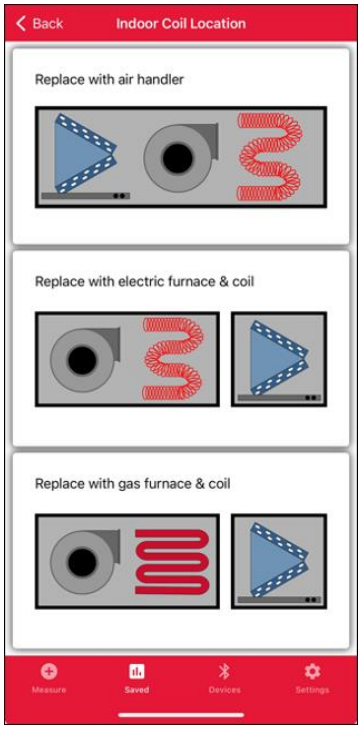
Forecast Options



Select Replacement Type

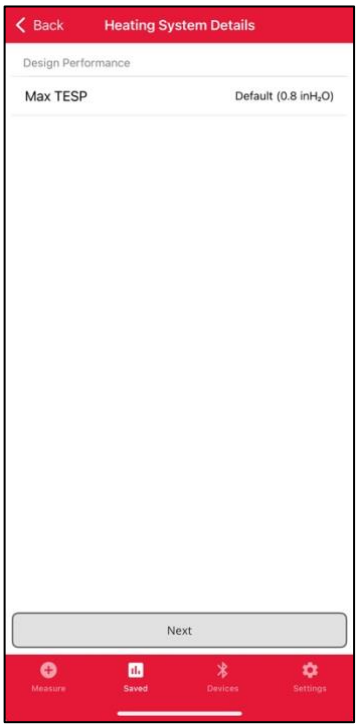


Select Indoor Coil Location



Enter Blower TESP

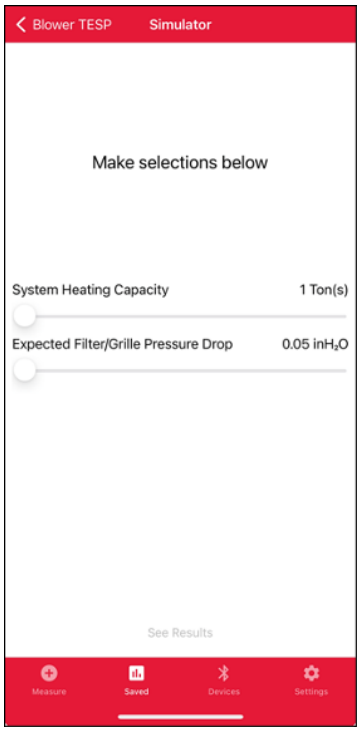
*1

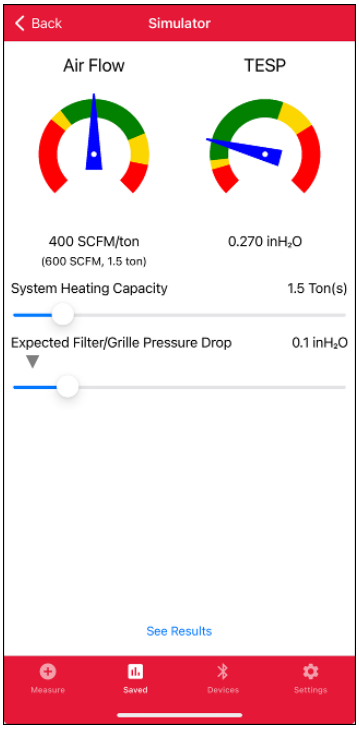


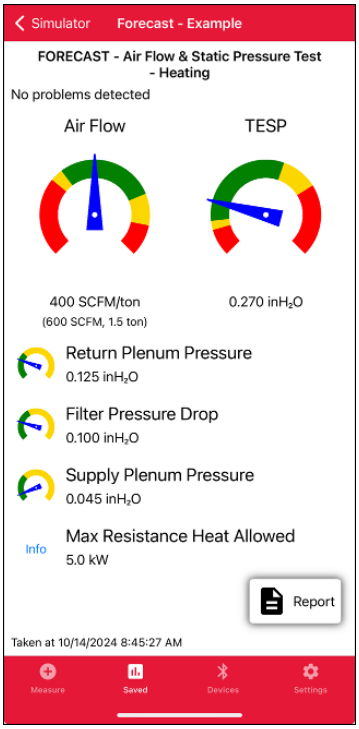
Sample of Forecasting – Furnace to Heat Pump Replacement Cont'd

Deploy Simulator **Select Capacity & Pressure(s)** **See Results**

*2 *3







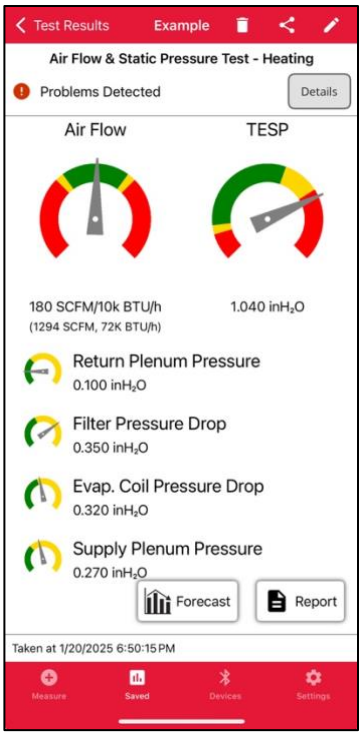
*1) Enter Blower TESP – App defaults to 0.8 inH_20. It's recommended for the user to find the OEM blower max TESP for the equipment tested in forecast application.

*2) The user must make selections in each slider category to deploy Air Flow and TESP dial predictions.

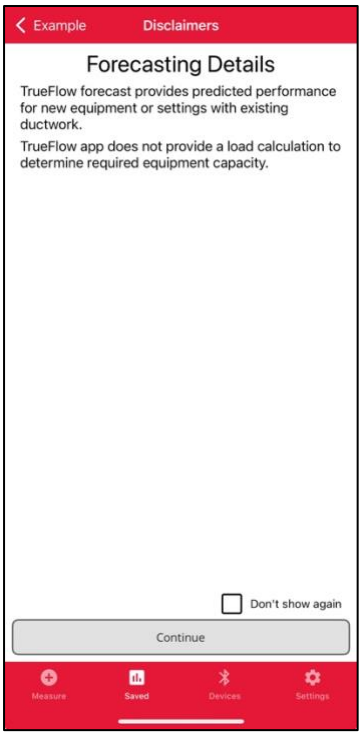
*3) Gray triangles on simulator screen represent forecasted pressure drop(s) of the existing filter & if applicable the existing external indoor coil at the new system capacity selection and corresponding air flow target.

Sample of Forecasting – Furnace to Furnace Replacement

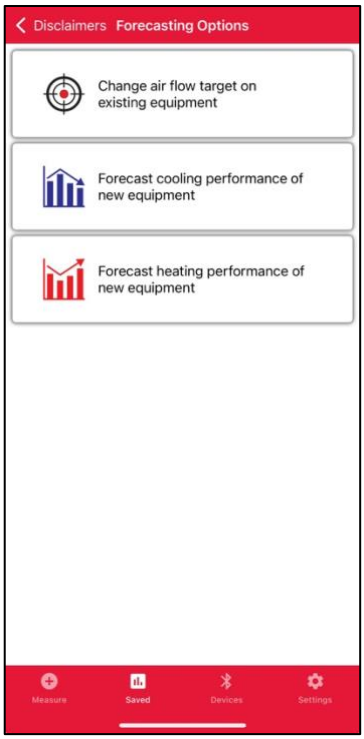
Select Forecast



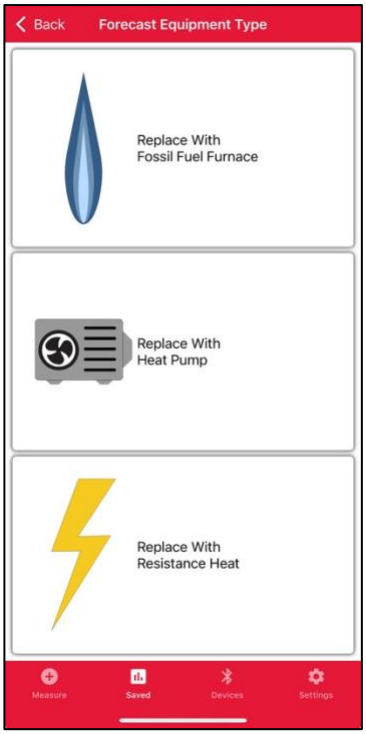
Forecast Details



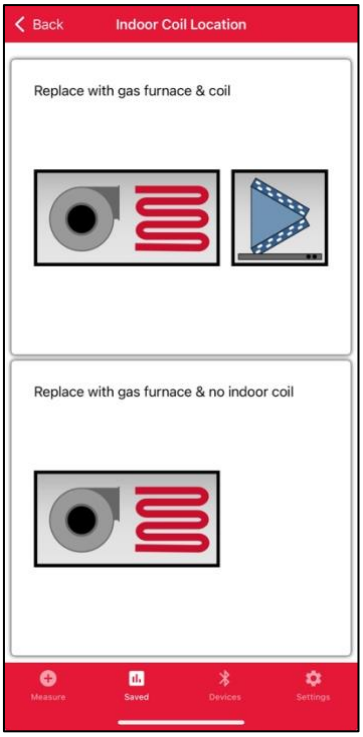
Forecast Options



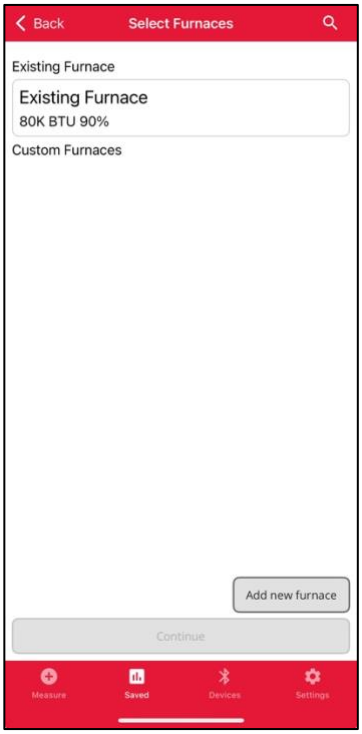
Select Replacement Type



Select Indoor Coil Location



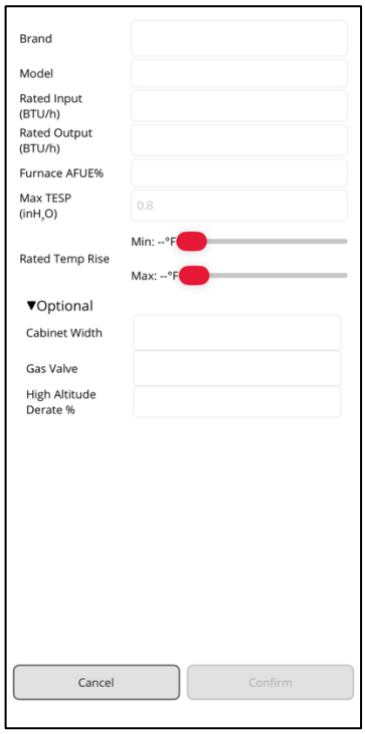
Select Existing or Add New Furnace



Sample of Forecasting – Furnace to Furnace Replacement Con't

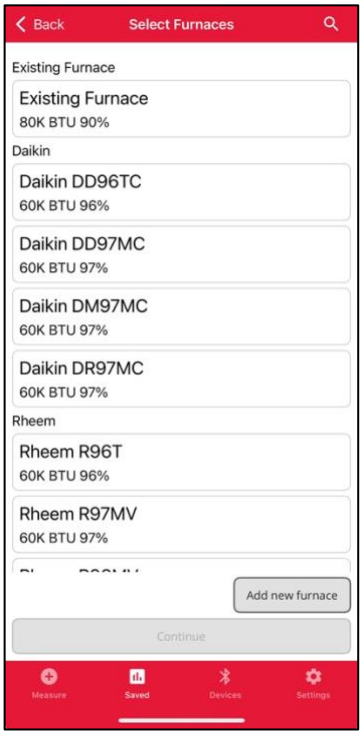
Add New Furnace Details

*1

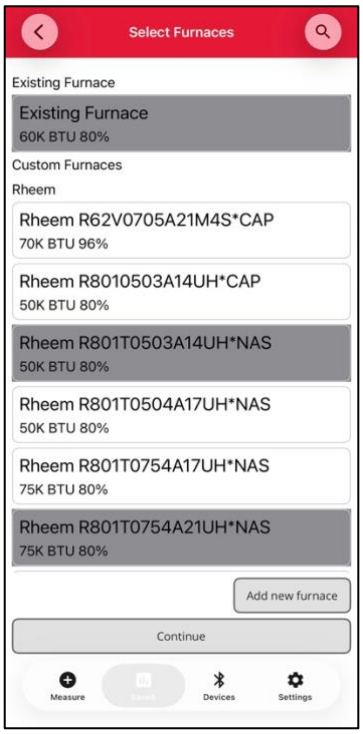


Select Furnace(s) to Test

*2

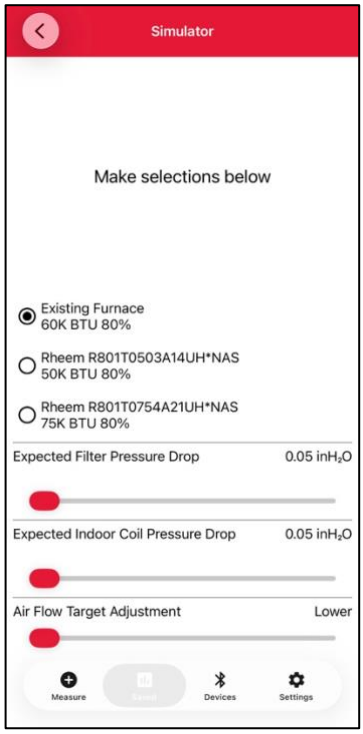


Forecast Furnaces Selected



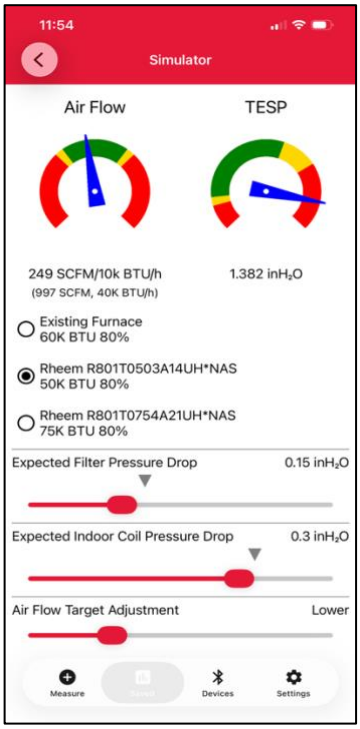
Deploy Simulator

*3

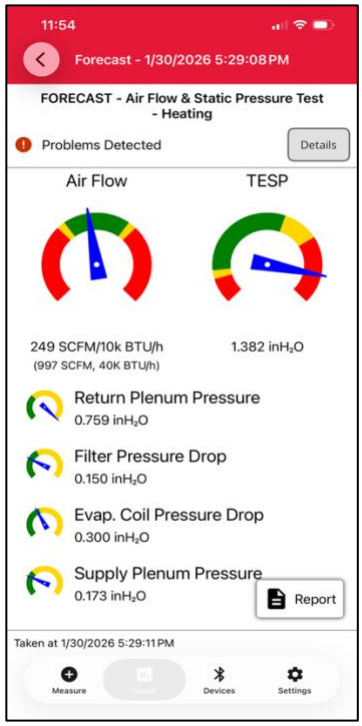


Select Furnace & Pressure(s)

*4



See Results



Sample of Forecasting – Furnace to Furnace Replacement Con't

*1) Enter Blower TESP (Optional) – App defaults to 0.8 inH_20. It's recommended for the user to find the OEM blower max TESP for the equipment tested in forecast application.

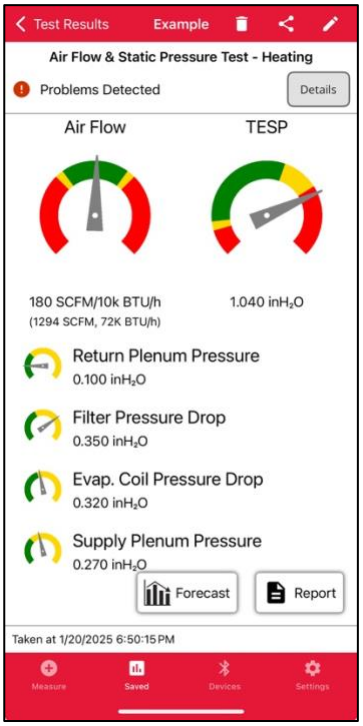
*2) Furnace lists can be turned on/off in the settings menu. See Manage Furnace Listings in Appendix D.

*3) The user must make selections in each radio button and slider category to deploy Air Flow and TESP dials.

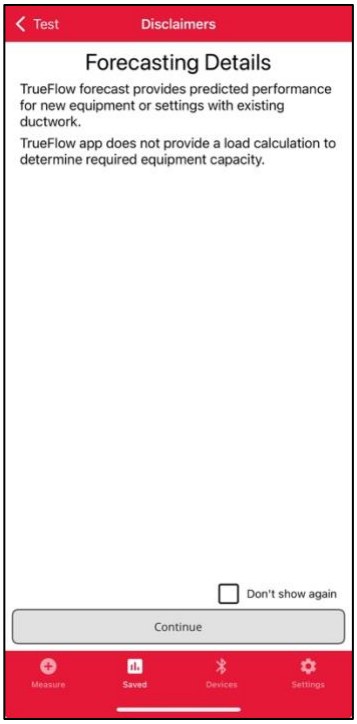
*4) Gray triangles on simulator sliders represent forecasted pressure drop of the existing filter & if applicable the indoor coil at the new system capacity selection and corresponding air flow.

Sample of Forecasting – Furnace to Electric Resistance Replacement

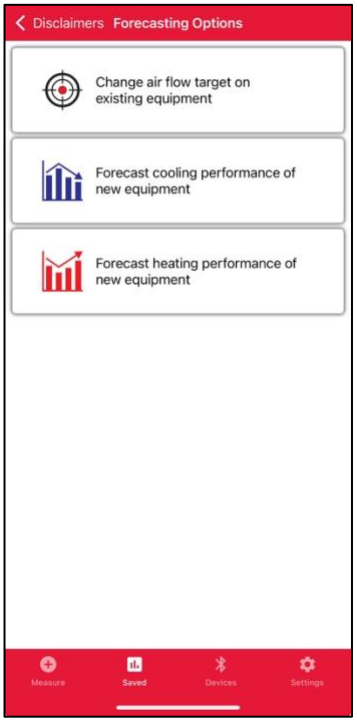
Select Forecast



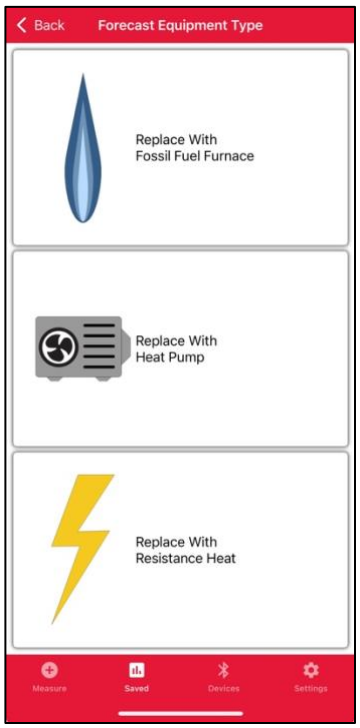
Forecast Details



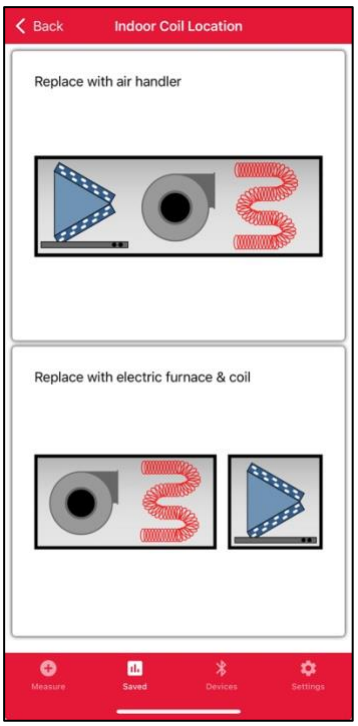
Forecast Options



Select Replacement Type

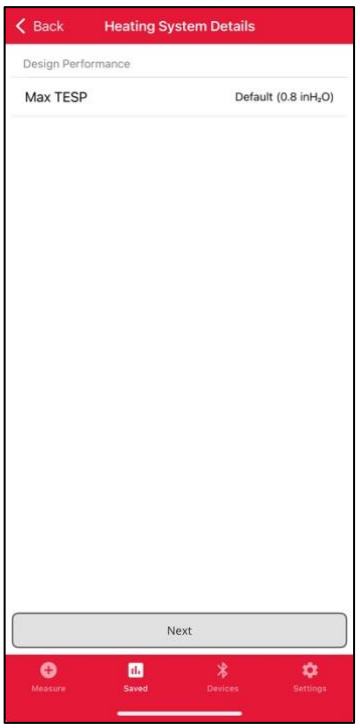


Select Indoor Coil Location



Enter Blower TESP

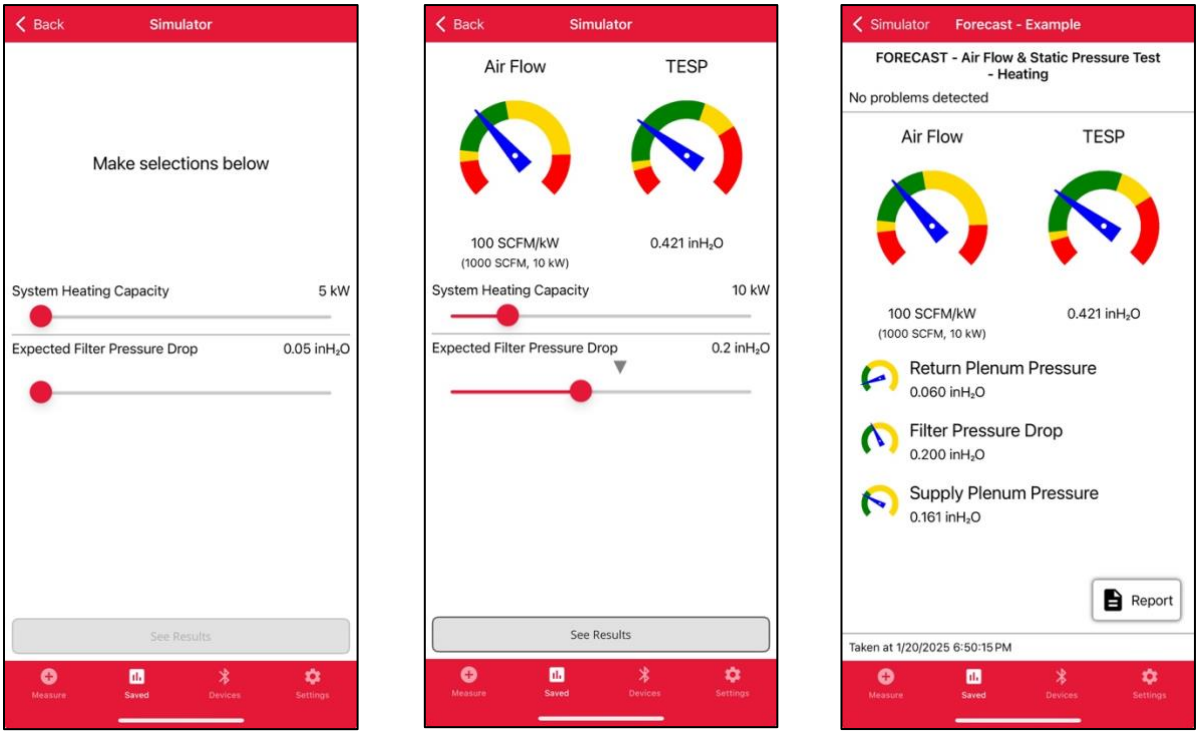
*1



Sample of Forecasting – Furnace to Electric Resistance Replacement Cont'd

Deploy Simulator **Select Capacity & Pressure(s)** **See Results**

*2 *3



*1) Enter Blower TESP – App defaults to 0.8 inH_20. It's recommended for the user to find the OEM blower max TESP for the equipment tested in forecast application.

*2) The user must make selections in each slider category to deploy Air Flow and TESP dial predictions.

*3) Gray triangles on simulator screen represent forecasted pressure drop(s) of the existing filter & if applicable the existing external indoor coil at the new system capacity selection and corresponding air flow target.

Appendix J: References

D. Parker, 2000, "Summary of Impacts of Refrigerant Charge, Air Flow and Maintenance Issues for Residential Air Conditioning Systems", Proceedings of the ACEEE 2000 Summer Study on Energy Efficiency in Buildings.

D. Parker et al., 1997, "Impact of Evaporator Coil Airflow in Residential Air Conditioning Systems", ASHRAE Transactions, Vol. 103, Pt.2.

M. Blasnik et al., 1996. "Assessment of HVAC Installations in New Homes in APS Service Territory", Proctor Engineering Group.

M. Blasnik et al., 1995. "Assessment of HVAC Installation in New Homes in Nevada Power Company's Service Territory", Proctor Engineering Group.

J. Proctor, 1990, "Pacific Gas and Electric Appliance Doctor Pilot Project", Proctor Engineering Group.