



# 855 DIGITAL BACKFLOW TEST KIT

Operation Manual

Mid-West Instrument

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# 1. General Information

## Warranty

The Test Kit hardware is warranted to be free of defects in materials and quality for five years from the date of shipment. Service, repairs, or product disassembly in any manner performed without permission by the factory voids this warranty.

Hardware / Software added by the purchaser that affects the performance of this product's intended purpose is not covered under the warranty.

## Test Kit Software

This product contains software intellectual property. The end user shall not copy, disassemble, or reverse-engineer the Test Kit software. Any modification or attempted modification of the Test Kit software will void the warranty.

# 2. Safety

## User Requirements

For proper safety, the user must make sure:

- ✓ No dangerous media is used.
- ✓ Technical specifications are observed.
- ✓ The Test Kit is operated, serviced, and repaired by authorized and qualified personnel.

## Environment

The Model 855 Test Kit is an electronic precision instrument. Protect from extreme humidity, impacts, strong magnetic fields, static electricity, and extreme temperatures.

## Cautions and Warnings.



- **During use:**

- ✓ Use caution when inserting and securing cell phone into holder.
- ✓ Close the Test Kit needle valves finger tight. Do not overtighten.
- ✓ When connecting the Test Kit to an assembly, always have the filters closer to the test cocks to prevent debris and miscellaneous objects from entering the Test Kit.

- **After use:**

- ✓ Disconnect hoses from the Test Kit manifold.
- ✓ Open all valves and drain water from the Test Kit.
- ✓ Leave the valves open during storage.
- ✓ Protect the Test Kit in its case and transport it with care.
- ✓ Store the Test Kit in an environment not subject to freezing temperatures, as freezing may significantly damage it.

- **General**

- ✓ The Model 855 Test Kit contains a Li-Ion battery. Limit exposure to high temperatures and extreme cold temperatures.
- ✓ Replace USB-C Dust Cover when the charging port is not in use.
- ✓ Do not open the enclosure. Opening the enclosure will void the warranty.

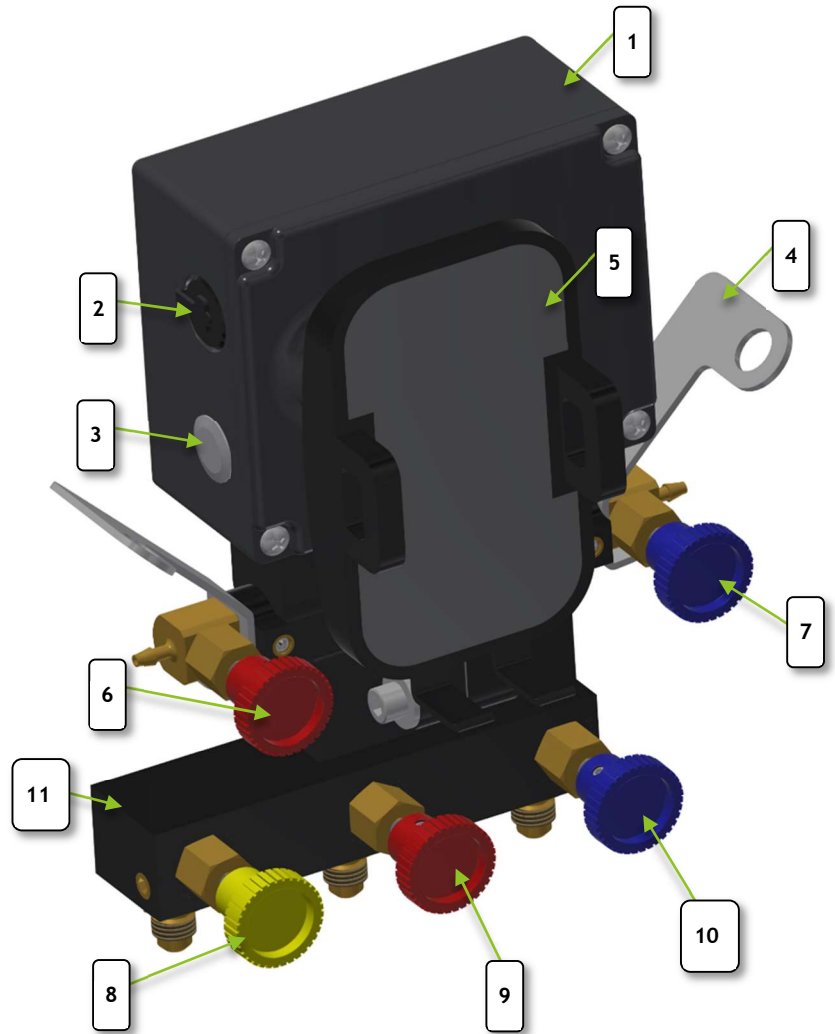
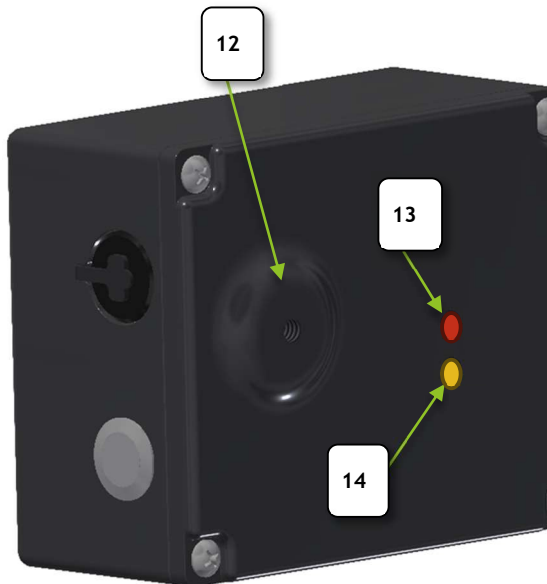
### 3. Product Description

The Model 855 Digital Test Kit, when used in conjunction with the MachBackflow mobile device application, can perform testing and document standard backflow prevention assemblies, including Reduced Pressure Principle Backflow Prevention Assemblies (RP), Double Check Backflow Prevention Assemblies (DC), Pressure Vacuum Breaker Assemblies (PVB), and Spill Resistant Vacuum Breakers (SVB). The Test Kit transmits line and differential pressure data to the phone via Bluetooth®. The mobile app captures and stores test data without manual transcription. The data from saved tests can be viewed in the app at any time.

#### Test Kit Features

- Overview

1. Weatherproof Electrical Enclosure
2. Weatherproof USB-C Charging Port and Dust Cover
3. On/Off Button
4. Balancing Strap Bracket
5. Phone Holder (included but optional feature)
6. High Side Bleed Valve
7. Low Side Bleed Valve
8. Bypass Control Valve
9. High Side Control Valve
10. Low Side Control Valve
11. Control Manifold
12. STD 1/4" - 20 Thread Mount
13. On/Off, Bluetooth® Indicator, Low Battery Indicator
14. Charging Indicator



## Electrical Features Descriptions

- **On/Off Button (Figure 1 #3)**

To turn on the Test Kit, depress the On/Off button for 2 seconds. To turn off the Test Kit, depress the On/Off button for 2 seconds.

*Note: Optionally, you can press and hold the switch until the red on/off indicator turns on (for on) or press and hold the button until the on/off indicator turns off (indicator can be red or blue before turning off).*

- **On/ Off/ Bluetooth® Indicator/ Low Battery Indicator (Figure 1 #13)**

**Red** indicator identifies that the Test Kit is on and ready to communicate with the phone app.

**Blue** indicator identifies that the phone app has paired with the Test Kit; however, line pressure and DP data transmission will be locked until the app has cleared security and is ready for use.

If battery level drops below 20%, RED led will flash. If connected via Bluetooth, the blue LED will flash purple in a low battery condition.

*Note: See Connecting to the Test Kit for more security information.*

- **Charging Port (Figure 1 #2)**

The Test Kit is equipped with a weatherproof rated USB-C Charging Port for charging from an external source such as a battery pack, computer, or wall plug with a USB-C cable. The Test Kit is also equipped with a non-serviceable Li-Ion rechargeable battery.

- **Charging Limitations**

For safety, the Test Kit will only allow charging if the temperature is between 0°C (32° F) and 50°C (122° F). Charging is automatically disabled after the battery is fully charged or the charging time exceeds 6 hours.

*Note: The Test Kit can be charged while on or off.*

- **Charging Port Plug (Figure 1 #2)**

The port has a dust-proof tethered plug. It is recommended that the user insert the plug when the port is not being used to prevent debris from impacting the ability to charge the Test Kit.

- **Charging Indicator (Figure 1 #14)**

The charging indicator will turn yellow if the battery is charging. If the Test Kit is plugged in, and the indicator is not illuminated, then one or more of the following conditions that disable charging may be true:

- The temperature is outside the allowed range of 0°C (32° F) and 50°C (122° F).
- The Test Kit has been charging for longer than 6 hours.
- The battery is fully charged.

- **Battery Charge Time**

The Test Kit takes about 4 - 5 hours to charge fully. The Test Kit's charge time may depend on the limitation of the charging source. For example, charging from a computer USB port could result in longer charge times than a wall plug.

- **Battery Discharge Time**

When fully charged, the Test Kit has approximately 16 hours of on-time.

- **Battery Level**

When connected via Bluetooth®, the Test Kit battery state of charge can be found in the phone application in percent of full charge. When less than 20% of the battery remains, the On/ Off/ Bluetooth® Indicator/ Low Battery Indicator will flash.

- **Auto Shutdown**

To preserve battery life, the Test Kit will shut down automatically after 30 minutes when not connected to a mobile device.

- **Charging Operation**

The Test Kit contains dynamic power-path management circuitry and can be operated while charging. The power-path management simultaneously can power the electronics and independently charge the battery.

## Mechanical Feature Descriptions

- **Phone Holder**

A standard phone holder ball mount on the electronics housing allows for the attachment of a mobile phone holder.

- **Brackets and Strap**

A removable strap is provided to attach to the hanging brackets on either side of the Test Kit.

- **Valves & Manifold**

Designed to share a common color scheme with the Mid-West Instrument 845-5 Test Kit.

- **Pressure Rating**

All pressure-containing components and sensors are rated to the full working pressure of 200 PSIG.

- **Enclosure**

A weather-proof and impact-resistant enclosure is used to house and protect sensitive non-serviceable electronic components. Opening the enclosure will void all warranties.

## 4. Phone App Features and Operation

### Application

To test the backflow prevention assemblies, the Test Kit requires interfacing with the **MachBackflow** application on an Android or Apple mobile device (Excluding Tablets).

### Premium vs Basic Features

MachBackflow App has a collection of basic features and, with a paid subscription, access to several premium features.

Basic features include:

- Read differential and line pressures.
- Enter assembly and customer information manually.
- Test in offline mode.
- Complete a test.
- Save completed tests to the cloud.
- Retest and repair failed assemblies.
- Search completed tests.
- Filter completed tests.
- Read and save tester information to the cloud.
- Read and save test kit information to the cloud.

Premium Features include but are not limited to:

- Autofill customer and assembly information.
- Create PDF reports.
- Export completed tests to a .CSV file.
- Full list of premium features and pricing can be found on [machbackflow.com](http://machbackflow.com).

### App Installation

See Appendix A and Appendix B REF for the procedures to install the **MachBackflow** app on an Android mobile device or an iPhone respectively.

*Note: The features and operation are common between iPhone and Android Phones, with minor exceptions required to meet Apple and Android interface standards.*



### Initial Assembly Data Download

When a user first logs into the app, it must first download all the assembly records associated with the company that the tester belongs to. Once the download is completed the first time, all assembly records can be accessed instantly with or without cellular or Wi-Fi signal.

The app will show Sync Data... in red at the bottom of the app when the download is occurring.

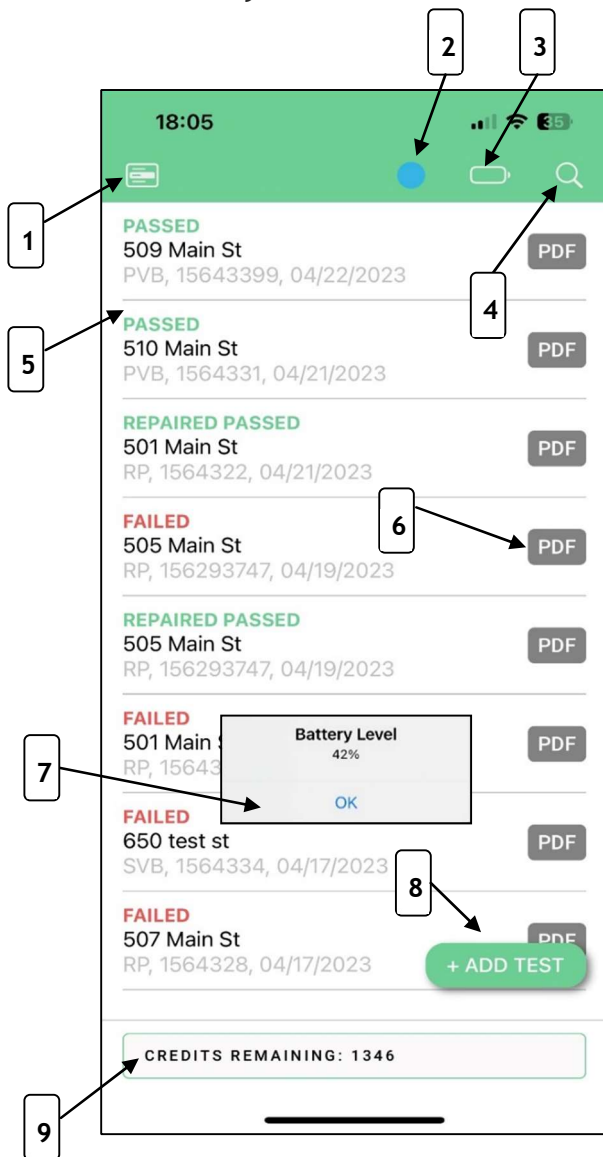
SYNC DATA...

Once the download is complete it will show CREDITS REMAINING: #####

CREDITS REMAINING: 5000

The first load time can vary depending on the number of assemblies in the company's database and the strength of the Wi-Fi or cellular signal used. It is recommended that first time users connect to a strong Wi-Fi signal to ensure the quickest download. Disclaimer: Data rates may apply if you complete the initial assembly download on a cellular service. With a strong Wi-Fi signal 30,000 records can be downloaded in 3 min.

## Home Screen Layout



### 1. Menu

Access app settings and filter test results on the home screen.

### 2. Test Kit Connection

Search and connect/disconnect from different Test Kits

### 3. Test Kit Battery Level

Read the Test Kit battery level. (Click to Display Level)

### 4. Test Results Search

Search for saved test results.

### 5. Completed Test Results

Shows saved test results with the address, assembly type, serial number, and test date.

### 6. PDF Icon

Select the grey PDF icon to view a previously generated PDF.

### 7. Battery Level Pop-up Display

Battery level displayed in percent charge.

### 8. Add Test Button

Used to start new assembly test.

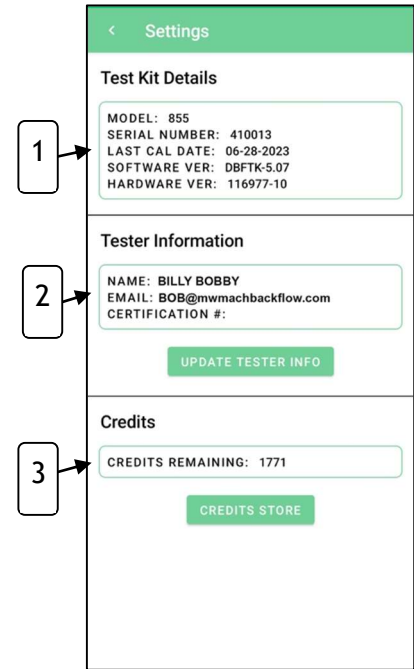
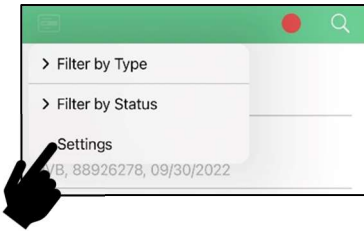
### 9. Credits Remaining

Shows the number of credits the user has remaining.



## Settings Menu

Open menu in upper left-hand corner of the home screen (#1 in Figure 2 Home Screen). Choose “Settings” from the drop down (Figure 3 Settings Menu)



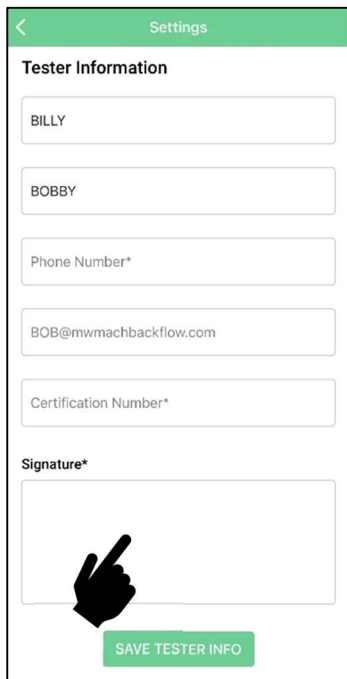
## Settings Page Overview (Figure 4 Settings Page)

1. Connected Test Kit details
2. Tester’s information and certification number that will appear in test results and generated PDFs
3. Remaining credits for premium features and in app credit purchase.

*Note: Credits can also be purchased from the developer at a bulk discount through the “Contact Us” on [machbackflow.com/contact-us](http://machbackflow.com/contact-us)*

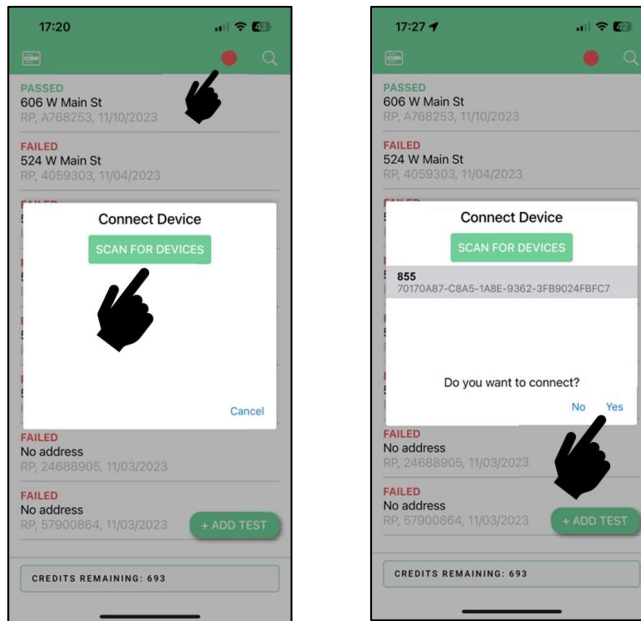
## Tester Information

1. To update, select the “UPDATE TESTER INFO”
2. To update signature, click on the signature box. Use a finger or stylist to write and apply the signature.
3. Verify tester information and select “Save Tester Info” button return to settings screen.



## Connection to the Test Kit

1. Turn the Test Kit on by depressing the **ON** button until the Test Kit light illuminates red.
2. Open *MachBackflow* app on the phone.
3. In the app, select the red dot in the upper right corner.
4. Select “SCAN FOR DEVICES”

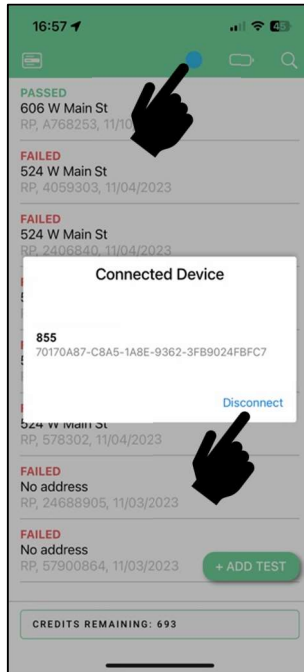


5. Select Test Kit and select yes to connect. The connected Test Kit’s indicator (Figure 1 Test Kit Overview #13) will illuminate blue.

*Note: If this is your first time connecting the Test Kit to the app and the connection icon (dot) does not turn blue (stays yellow), please verify that you have a suitable cell or WIFI connection. The initial pairing of the Test Kit to the phone requires cellular or WIFI internet access. Operation of the kit after this initial pairing no longer requires WIFI or a cellular connection.*

6. In the app the red dot will turn yellow while the Test Kit is verified. Once security is cleared, the yellow dot will turn blue, indicating the Test Kit is fully connected to the app and is ready to test backflow devices (#2 Figure 2 Home Screen).

## Disconnecting from the Test Kit



Method 1: Select the blue dot in the upper right corner of the app and (Figure 3 #2) press “DISCONNECT”.

*Note: When disconnected, the Test-Kit On/Off/Bluetooth® indicator (Figure 1 Test Kit Overview #13) and the app indicator will turn from Blue to Red.*

Method 2: Turn the Test Kit off manually by depressing the Test Kit On/Off pushbutton for 2 seconds. The app Bluetooth® indicator will turn blue to red.

*Note: For the Android Phone, there may be a noticeable delay before the app turns Bluetooth® Indicator red.*

## Starting an Assembly Test

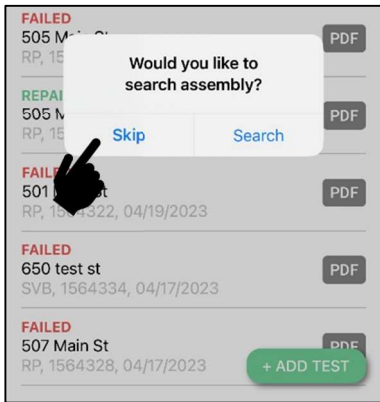
Method 1: Manual Assembly Information Entry (Basic Feature Option) - Enter assembly location and assembly details as desired. (Manual Assembly Information Entry (Basic Feature) pg. )

*Note: Manually entered assembly information will be stored and is available for autofill on any subsequent testing if premium subscription is purchased.*

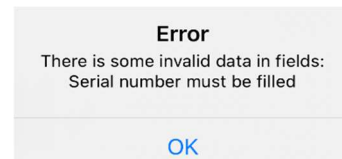
Method 2: Autofill (Premium Feature Option) - Autofill the Assembly info by searching by street address or serial number. (AutoFill (Premium Feature) pg.)

## Manual Assembly Information Entry (Basic Feature)

1. Select “+ ADD TEST” Button (Item 8 Figure 2 Home Screen)
2. Select “Skip” on the popup window.



3. Enter the optional assembly property information.
4. Enter the serial number of the assembly. This is a required field; an error will appear if not populated.

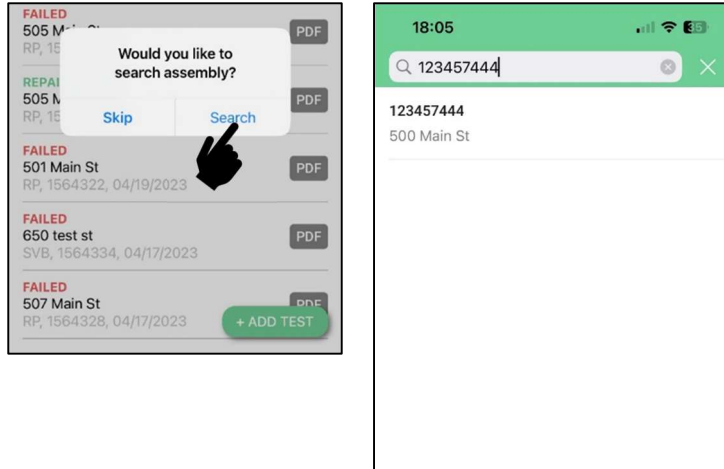


5. Enter the assembly type. This field is required and will change the fields displayed when testing is in progress.
6. Use the “START ASSEMBLY TEST” button to begin the assembly test.
7. Proceed to instructions in the section Testing an Assembly pg. .

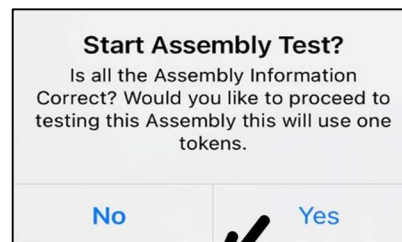
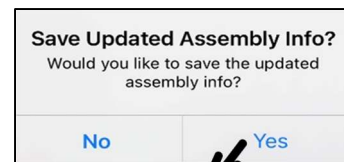
## AutoFill (Premium Feature)

1. Select “+ ADD TEST” Button
2. Select the “Search” option in the pop-up that appears. This feature will use one credit.

- Use the search box to find the assembly to test. Assemblies can be searched by the serial number or customer location.

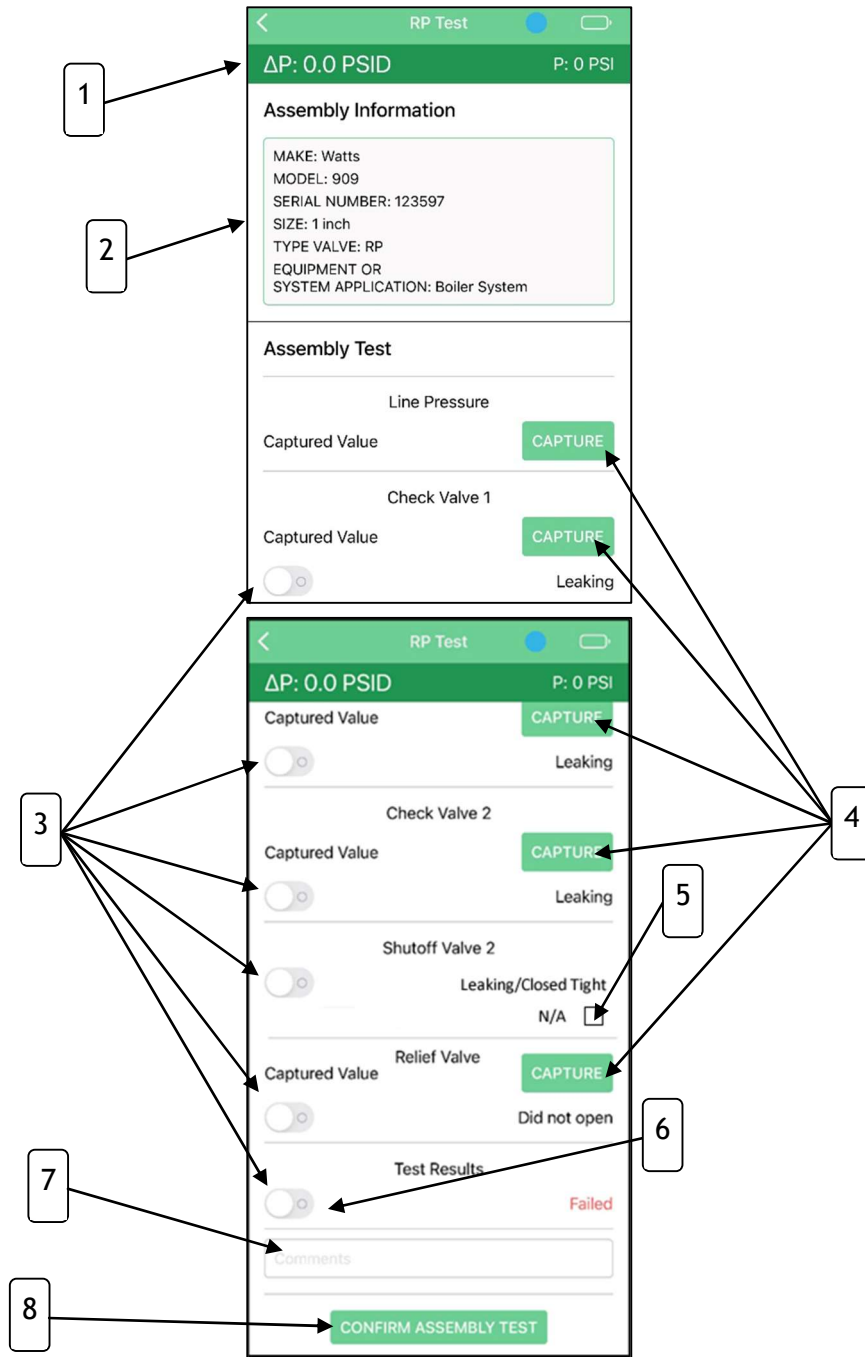


- Select the assembly to test from the search results.
- Property information and assembly information will populate required fields based on selected assembly.
- Review the information.
- If changes are required, select “UPDATE INFORMATION” and edit any fields. If no changes are required select “START ASSEMBLY TEST” button and proceed to section Testing an Assembly Pg. 8. Use the “SAVE ASSEMBLY INFO” button to accept the changes.
- Select “Yes” on the “Start Assembly Test” popup. Proceed to instructions in the section Testing an Assembly pg. .



## Overview of Assembly Testing Screen

Note: The view seen in Figure 13 Testing Screen is for an RP test. DC, PVB, and SVB are all similar.  
 Note: All slider buttons default to the “fail” position. Tester must test the device and change the “TEST RESULTS” to pass if the results dictate.



### 1. Pressure Bar

Shows Test Kit pressure, both ΔP (differential pressure) and P (line pressure).  
 Note: Differential pressure range is limited to 17PSID - 22PSID. Any differential pressure exceeding the range will continue to be displayed as 17PSID - 22PSID.

### 2. Assembly Information

Shows information from the current assembly under test.

### 3. Slider Buttons

Used to note result of check valve test, relief valve test, or air inlet test. Defaults are set to “Leaking”, and “Did not open.”

### 4. Capture Buttons

Used to record the current pressure on the Test Kit for a given test field.

### 5. N/A Option for Shutoff Valve

Used to indicate if the #2 shut-off was tested. If the #2 shut-off is not tested, check N/A.

### 6. Test Status Slider

Sets the final status of the test (Failed/Pass). (Default = “Failed”)

### 7. Comments Box

Enter any comments that are required.

### 8. Confirm Assembly Test Button

Used to move to the next screen to review the completed assembly test results.

## Testing an Assembly

1. Record all the required pressure values by hitting the capture button.

*Note: pressures are not required to be captured in order the fields are listed. Complete the assembly test according to the approved test procedure for the jurisdiction.*

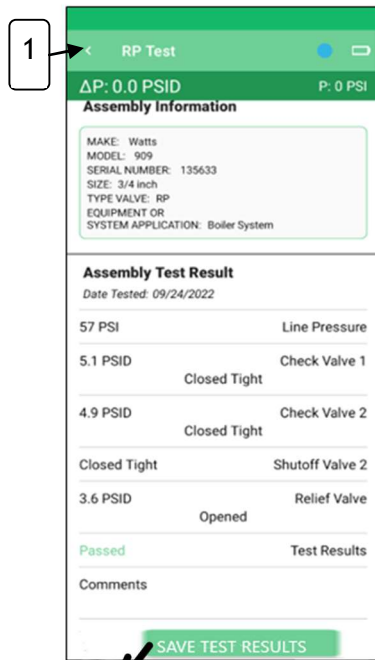
2. Record the status of the check valves (Leaked/Closed Tight), Relief Valve/Air Inlet (Did Not Open/Opened), and Test Results (Failed/Passed) by using the status sliders Figure 15 #3
3. When testing a relief valve drip opening or air inlet select capture at opening point.

*Note: See procedure for Capturing PVB Air Inlet Point.*

4. Enter any required comments.

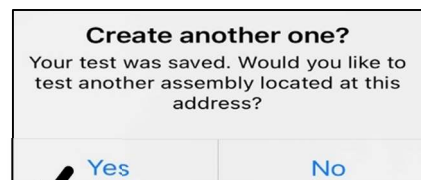
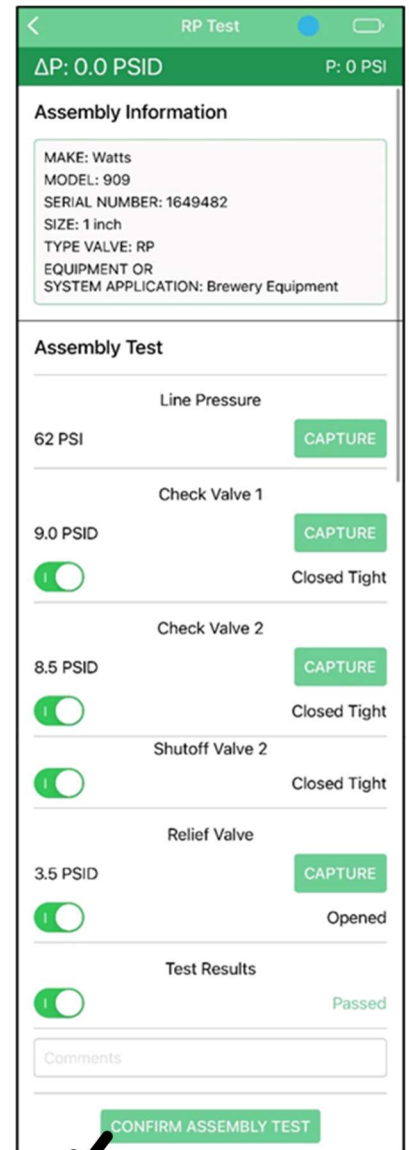
*Example: “#2 Check valve backpressure tested.”*

5. Select “CONFIRM ASSEMBLY TEST” to review the test results.
6. If required, the back button in the upper left-hand corner of the app (Figure 14 Review Test Screen #1) can be used to return to the testing screen.



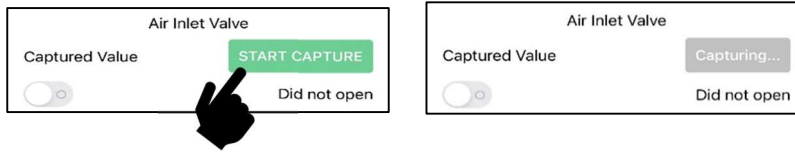
7. Once test results, assembly, and customer information are verified select “SAVE TEST RESULTS”.

8. If testing an additional assembly at the same address, when prompted by a popup and select “YES”. The app will begin a new test and will populate fields with the same customer information. Otherwise, select “NO” and the app will return to the home screen.

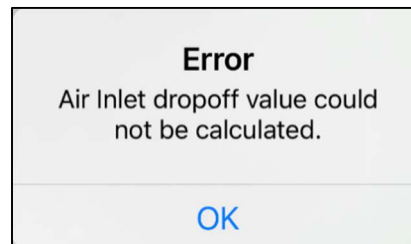
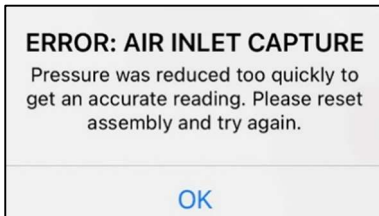
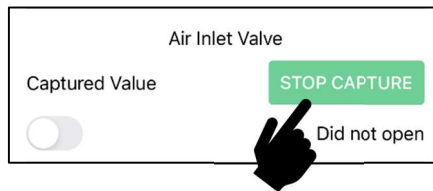


## Capturing PVB Air Inlet Point

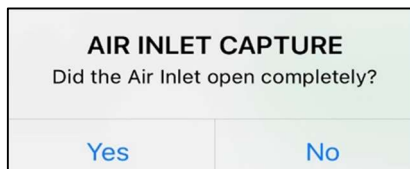
1. Close the number one shut off valve, and center the Test Kit at test cock #2:  
*NOTE: Test Kit must be at the proper height to get an accurate PVB air inlet opening*
2. Open the bleed high valve of the Test Kit slowly and confirm the line pressure is decreasing.
3. When the  $\Delta P$  falls below 15 PSID, use the bleed high valve to slow the pressure drop rate.
4. Click “Start Capture” under the Air Inlet Valve section on the app.



5. The app will change the text to “CAPTURING...” as the  $\Delta P$  continues to slowly drop.
6. If successful, the gray “CAPTURING...” will turn to green “STOP CAPTURE”.
7. If pressure is decreased too quickly, the app will alert the user. Hit “OK” to continue.
8. An error will appear if the app cannot calculate an opening point. Hit “OK” to continue. Return to the beginning of this procedure to reset and restart the test.



9. Select “STOP CAPTURE.” A prompt will appear asking, “Did the Air Inlet open completely?” Select Yes or No.
10. If “YES,” the opening point is calculated and captured, and the slider button indicates the air inlet opened.



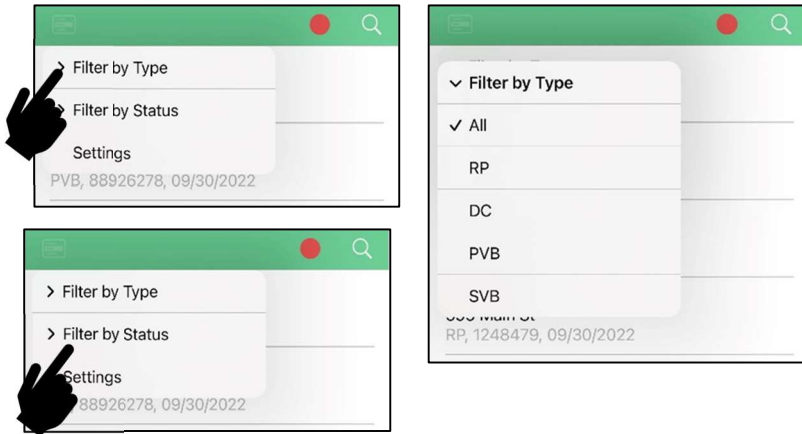
11. If “NO,” the app will not record an opening point pressure, and the slider will remain as valve “did not open.”

## Filtering Completed Tests

1. Open menu in upper left-hand corner of the home screen. (Figure 2 Home Screen #1)



2. Filter by tested assembly type by selecting drop down in menu.



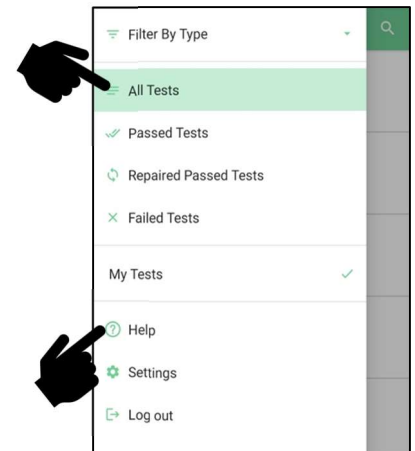
3. Filter by status by selecting drop down in menu, down filter by “Passed”, “Failed”, “Repaired”

*Note: Filtering is a stacking function. Filtering by type “RP”, and then filtering by status “Repaired” will display “Repaired RP” assemblies.*

## User Accounts

There are 2 levels of user account: “Tester” and “Admin”.

1. Tester Account - Default account type. Has access to tests completed by the account user through the home screen.
2. Admin Account - Intended for management of multiple tester accounts. Has the option to view tests completed by the account user or to view all tests completed by multiple tester accounts (Figure 34). As a premium feature option, Admin Accounts can be used to export assembly test results from the app developer website [machbackflow.com](http://machbackflow.com). Admin users can be assigned by contacting app developer through [machbackflow.com/contact-us](http://machbackflow.com/contact-us).



## Help

Selecting the Help navigates to the app developer’s website to visit frequently asked questions, training videos, and support contact information.

## 5. Troubleshooting

Please contact Mid-West Instrument at [model855support@midwestinstrument.com](mailto:model855support@midwestinstrument.com) for support.

## 6. Certifications

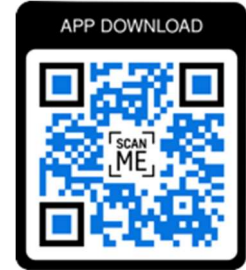
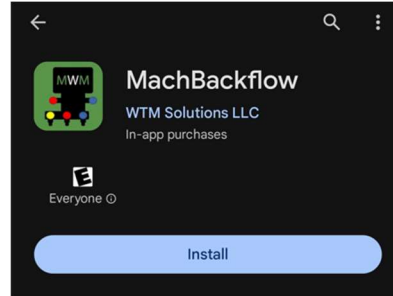
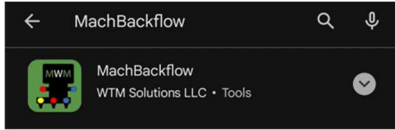
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device contains transmitter module FCC ID: 2AC7Z-ESPWROOM32

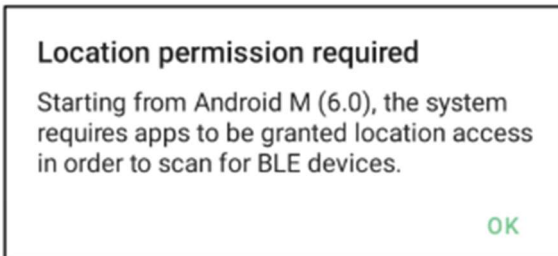
The **Bluetooth®** word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by [licensee name] is under license. Other trademarks and trade names are those of their respective owners.

## ✓ APPENDIX A: Android MachBackflow Application Installation

1. Go to Google Play store on Android Phone or Scan QR Code
2. Search by “MachBackflow”
3. Select “MachBackflow”

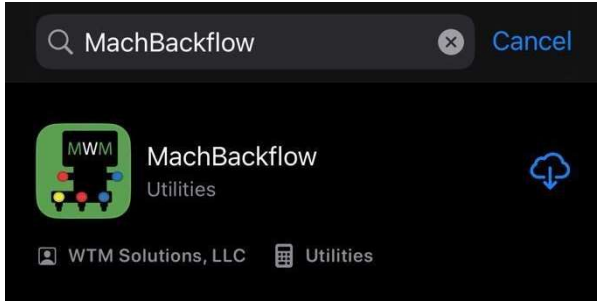


4. Select “Install”
5. Open app by selecting “Open” while still in the google play store or locating the app on the phone and opening the app
6. Login using your email and password (If you need to create an account refer to Appendix D)
7. Allow permissions for app to search for Bluetooth® devices



## ✓ APPENDIX B : iPhone MachBackflow Application Installation

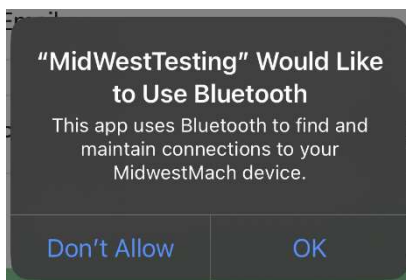
1. Go to App store on iPhone or Scan QR Code
2. Search by “MachBackflow”
3. Select “MachBackflow”
4. Select “Install”



5. Open app by selecting “Open” while still in the App store or locating the app on the phone and opening the app



6. Login using your email and password (If you need to create an account refer to Appendix D)
7. Allow permissions to for app to search for Bluetooth®



## ✓ APPENDIX C : Registering an Account

There are two different types of testers and both are required to register in a slightly different way. There is a full explanation on [machbackflow.com/sign-up](http://machbackflow.com/sign-up).

### Unique Domain Name

Testers that work for a company with multiple testers or individual testers that have a unique domain name for their testing company email, for example [billy@backflowtesting.com](mailto:billy@backflowtesting.com) or [timothy@backflow.com](mailto:timothy@backflow.com).

1. The company information and the domain name must be provided to be entered into the database before tester(s) can register. Please register your company @ [machbackflow.com/sign-up](http://machbackflow.com/sign-up) through the company registration form.

2. Once the Company is added in the database and the domain name is linked you will receive an email stating that you are able to create all the required accounts. Follow “Creating Account with Unique Domain Name” guide below to register accounts.

### Generic Domain Name

Individual Tester without a unique domain name, for example [bob1@gmail.com](mailto:bob1@gmail.com) or [timmy109@aol.com](mailto:timmy109@aol.com).

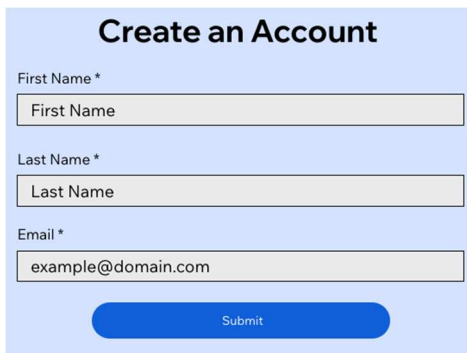
1. Please register your company @ [machbackflow.com/sign-up](http://machbackflow.com/sign-up) through the company registration form.

2. Once the company info is in the database you will receive an email that you can go to the app reset your password and login to start testing.

### Creating Account with Unique Domain Name

1. go to [machbackflow.com/sign-up](http://machbackflow.com/sign-up)

2. Enter First, Last Name and Email Address (If you are employed by a testing company must use your company email address) then hit the Submit button



**Create an Account**

First Name \*

Last Name \*

Email \*

Submit

3. Confirmation email will be sent to the entered email. Be sure to check junk/spam mail folder if the email is not received. The email will prompt to create a password.

4. Once account is confirmed go to the MachBackflow app and enter your email and the password you created to login