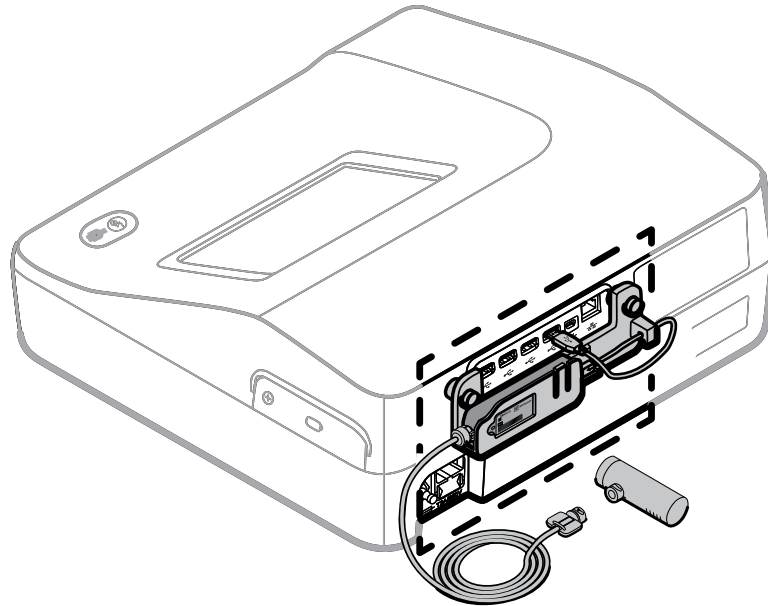


# CP 150 spirometry option

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## Quick reference guide

Software version 2.10.XX

**WelchAllyn**<sup>®</sup>

Advancing Frontline Care<sup>™</sup>

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DIR 80020997 Ver. A

This manual applies to the  901049 ELECTROCARDIOGRAPH  
and to the  901051 SPIROMETER



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# Overview of the testing process

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A single test comprises a set of efforts that can be a mixture of pre- and post-medication efforts.

## Prepare the patient

To prepare patients for any spirometry test, explain the entire procedure for the type of effort you want them to perform. Remind patients that the test should be painless. Demonstrate at least one effort for the patient. The accuracy of a spirometry test is highly dependent on the patient's understanding and cooperation. So, be prepared to coach and encourage the patient with your "body language" and your words — for example, "Blow, blow, blow, keep blowing until you can't blow any more out" — to ensure a good effort with reproducible results.

Instruct patients to do the following:

- Loosen any tight articles of clothing that might constrict lung function, for example, a tight belt, tie, vest, bra, girdle, or corset.
- Remove any foreign objects from the mouth, including loose dentures.

**Note** Use of a nose clip is optional. Patients may also pinch their nose to prevent air from escaping.

- Place your lips and teeth around a new transducer, sealing your lips tightly around the transducer. Grip slightly with your teeth in the groove. If you need to hold the flow transducer in your hand, keep fingers away from the screen on the back. Using the provided handle allows you to firmly hold the transducer and keep your fingers from blocking the screen and interfering with the transducer function. Blocking even part of this screen creates back-pressure, which makes the readings very high (as much as 200 or 300 percent), and the data will have to be discarded.
- Avoid bending forward as you blow.
- Keep your tongue away from the flow transducer to avoid blocking it.
- Keep your chin up so as not to restrict the airway.



**WARNING** Patients may become faint, light-headed, dizzy, or short of breath during spirometry testing. Watch patients closely. If they choose to stand during testing, keep a chair immediately behind them. If there is any reason for concern, stop the test and take proper action.



**WARNING** Patients should not bite on the flow transducer. Biting could result in sharp edges, which could injure the mouth.

**Note** The performance of the spirometer can be affected by the patient spitting or coughing into the spirometer during expiration or by extremes of temperature, humidity and altitude.

## About FVC efforts

“FVC” stands for forced vital capacity. The goal of an FVC effort is to measure the volume and flow of air. Patients inhale fully then exhale forcefully. Sometimes they also inhale forcefully.

When ready to begin an FVC effort, you coach the patient through these steps. (If preferred, you may reverse the order of inhaling and exhaling.)

1. Inhale fully — calmly fill your lungs as much as you can.
2. Place the flow transducer in your mouth.
3. Exhale forcefully — as fast as you can, as long as you can.
4. (Optional) Inhale forcefully — as fast as you can, as long as you can.

During FVC testing, an optional animated incentive screen provides an alternative way to view the data. This screen gives patients a goal to achieve while exhaling. Touch the **Settings** tab. Touch the **Spirometry** tab. Select one of the animation *Incentive options* from drop down menu.

- Fireman
- Frog
- Dandelion
- Birthday

## About pre- and post-testing

If desired, a spirometry test may include both pre- and post-efforts to measure the effectiveness of medication. The “before medication” and “after medication” efforts may be uninterrupted or interrupted.

- Uninterrupted — If there is no interruption between pre- and post-efforts (that is, no other patient has been tested and the device has remained on), the same screen continues to display. You simply continue with the procedure.
- Interrupted — If there is an interruption (that is, another patient has been tested or the device has been turned off), you need to recall the patient’s test-in-progress before continuing.

**Note** Pre- and post-efforts must happen on the same day. The next day tests become available for review only; you can no longer add efforts to them.

## About effort replacement

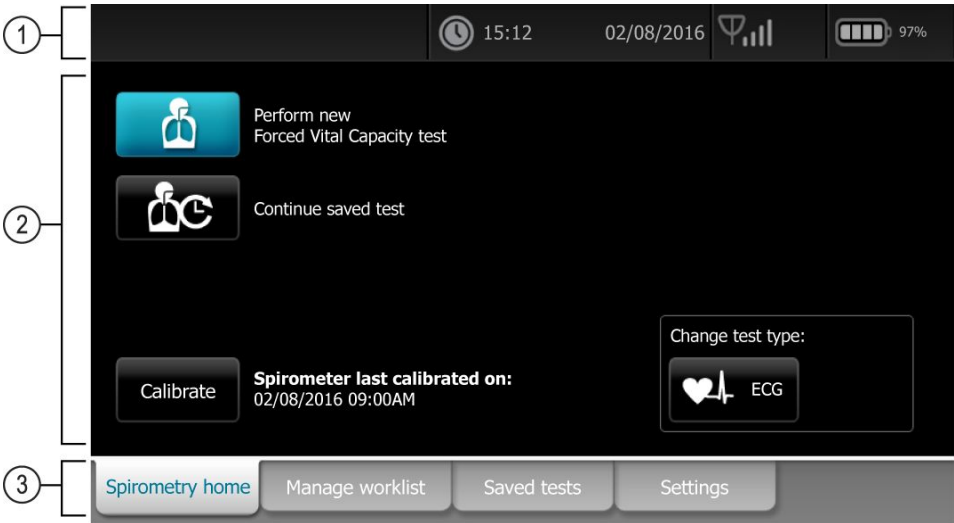
You can save up to 6 FVC efforts per test. After saving 6 efforts of a given type, the software compares each new effort with the saved efforts. If the new effort is better than the worst saved effort, the worst effort is deleted and the new one is saved. If the new effort is worse than all saved efforts, you are asked whether you want to save it.

If 6 pre-efforts have been saved, the worst pre-effort is deleted when you add a post-effort until you have saved 3 pre- and 3 post-efforts. After that, the “worst” post-effort is deleted.

# Spirometry home screen

## Spirometry home screen

The Spirometry home screen includes the following areas:



Item	Area
1	Device status
2	Content
3	Navigation

### Device status area

The Device status area, located at the top of the Spirometry home screen, displays:

- Patient Icon and Patient name. Once the patient context is established, the format of the Patient name appears as last name, first name.
- Time and date
- Connectivity status. The icons indicate which connection type, if any, is currently active.

- Battery status
- Error or information messages. These items are displayed until the condition has been resolved.

## Content area

The Content area includes 2 test selection buttons, a calibrate button, and a button to change the test type:

- **Perform new Forced Vital Capacity test**
- **Continue saved test**
- **Calibrate**
- **Change test type**

The content area also provides shortcuts to several controls.

## About the test types

### FVC



#### Perform new Forced Vital Capacity test

"FVC" stands for forced vital capacity. "FVC" is a type of test in which the patient inhales fully and exhales forcefully for as long as they can. The goal of a "FVC" effort is to measure the volume and flow of air. The "FVC" test may or may not include forced inhaling. When forced inhaling is included, it may be done either before or after exhaling.

### Continue saved test



A test that provides data to compare with pre-test data. Sometimes called post-Rx or post-BD (bronchodilator). A post-test must follow a pre-test within 24 hours.

### ECG



Change test type:

#### Auto ECG

- A report typically showing a 10-second acquisition of 12 leads of ECG information combined with patient data, measurements, and optional interpretation. Auto ECGs can be saved to the electrocardiograph's test directory or to a USB mass-storage device.

#### Rhythm ECG

- A continuous, real-time printout of rhythm strips with a user-defined lead configuration. Rhythm ECGs are printouts only. They cannot be saved.

#### Stat ECG

- An auto ECG that starts without waiting for you to enter patient data. Patient data does not appear.



## Navigation area

The Navigation area includes the following tabs:

- **Spirometry home:** Displays spirometry test types and provides shortcuts to several controls.
- **Manage worklist:** Includes patient data entered manually or orders downloaded when connected to a hospital information system.
- **Saved tests:** Accesses the patient spirometry and ECG tests.
- **Settings:** Accesses device configuration settings.

To navigate to a tab, touch the tab in the Navigation area with the corresponding name. The active tab is highlighted.

## General warnings

The following warning statements apply to spirometer use in general. Warning statements that apply specifically to particular procedures, such as preparing the patient for testing, appear in the corresponding sections of the manual.

Warnings indicate conditions or practices that could lead to illness, injury, or death.



**WARNING** To prevent the spread of infection, use a new flow transducer for each patient. Use protective gloves when replacing used flow transducers, and wash hands after touching them. Discard flow transducers after a single patient use.



**WARNING** Keep the reusable patient handle clean. Patient contact with contaminated equipment can spread infection.

# Example spirometry report

Spirometry Report - JOHN DOE
9/27/2013
1 / 1

**Patient Information:**  
 ID: 678901  
 Name: JOHN DOE  
 DOB: 6/5/1948 (65 yr)  
 Height: 6'1"  
 Gender: Male  
 Race: Caucasian

**Test Information:**  
 Test Type: FVC  
 Time: 01:28 PM  
 Post Time: 01:36 PM  
 Values Selected: Best Measurement  
 Norm Reference: NHANES III 1999  
 Protocol: PCP  
 BTPS (in/ex): 1.1/1.0  
 Last Calibration: 9/23/2013  
 Device Info: Welch Allyn  
 2.00.01 E0003  
 100001662813

**Test Results:**

Pre: FEV1 Variance 56 ml (0.1 L <sup>1</sup> )	FVC Variance 2 ml (0.0 L <sup>1</sup> )
Post: FEV1 Variance --	FVC Variance --
Improvement: 6% 2% FEV1 -4% FEV1	
FEV1: 104% Predicted	Lung age: 34 Years
FEV1% = 74 (FEV1/FEV6)	ATS Reproducibility Not Met

Quality Grades: F/F  
 Quality Messages: 1 - Blow out longer; 2 - Blow out longer; 3 - Blow out longer; 4 - Blow out longer;  
 results should be interpreted with caution

Unconfirmed Report

	Units	PRED	Best Pre #3	%Pred	Best Post #4	%Pred	%c
FEV1	L	3.8	3.9	102	4.0	104	--
FEV6	L	4.9	5.1	104	5.4	110	--
FEV1/FEV6	%	78	77	98	74	94	--

Flow: 2.7 mm/L/s Vol: 5.1 mm/L

Vol: 9.6 mm/L Time: 11.8 mm/s

**Legend**

- [ ] = Pre Effort
- [ ] = Post Effort
- [ ] = FVC
- [ ] = Variance after Rounding
- [\*] = Below LLN
- [\*\*] = Num too large

# Spirometry tests

---

## Perform a new Forced Vital Capacity spirometry test




**CAUTION** Patient data is not saved until the spirometry test is completed.

**Note** The spirometry configuration settings can be changed in the Settings tab. The following settings may appear differently if the default settings have been modified.

**Note** Set the Default patient entry tab to New patient in the Advanced settings.


1. From the ECG Home screen touch  .

**Note** If the *Daily Reminder* setting is enabled, the first time this button is pressed each day, the prompt “calibrate now?” appears.

2. Touch  (Perform new Forced Vital Capacity test). The New patient tab appears.
3. Enter the following patient information:


**Note** Required fields are denoted with an asterisk.

- Patient ID\*. Touch **OK**.
- Birth date\*. Touch **OK**.
- Gender\*. Touch **OK**.
- Last name\*. Touch **OK**.
- First name. Touch **OK**.
- Middle Initial. Touch **OK**.

4. Touch  (Next).
5. Enter the following patient information:

**Note** Required fields are denoted with an asterisk.

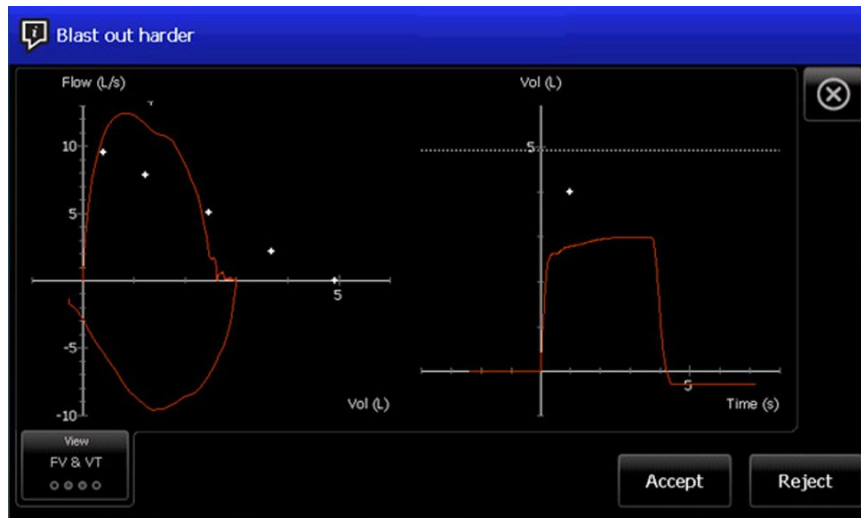
- Race\*. Touch **OK**.
- Height\*. Touch **OK**.
- Weight. Touch **OK**.
- Smoke Years. Touch **OK**.
- Packs/day. Touch **OK**.

- Comments. Touch **OK**.
6. Touch  (Next).
  7. Touch **View** or **Incentive** to select the display information that you want to view during the test.
    - a. **Modify the View settings as desired:**
      - View Flow/Volume. (View FV curve)
      - View Volume/Time. (View VT curve)
      - View Flow/Volume and Volume/Time. (View FV & VT)
      - View Parameters.
    - b. **Modify the screen settings as desired:**
      - Incentive screen
      - Curves screen
  8. When the patient is ready, touch **Start pre #1** to perform the spirometry test.

**Note** Coach the patient through the effort.

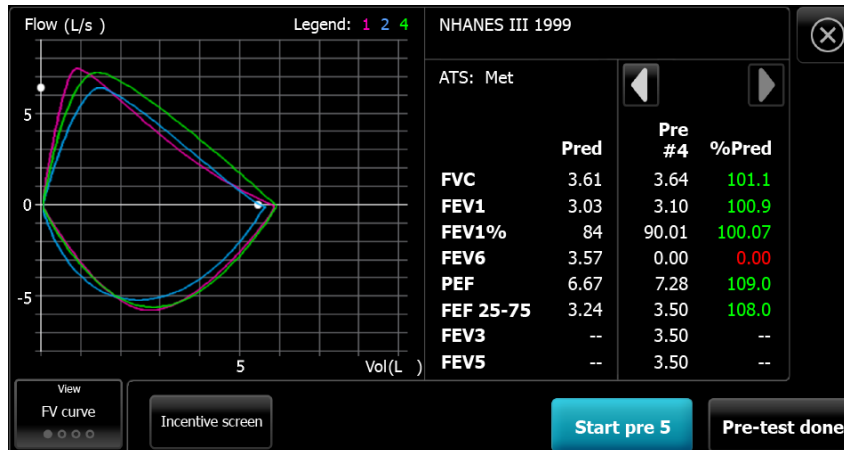
The device stops automatically when air stops moving (that is, when the ATS end-of-test criteria are met).

9. (Optional) touch **Stop** when the test has been completed.
10. Decide whether to accept the effort.

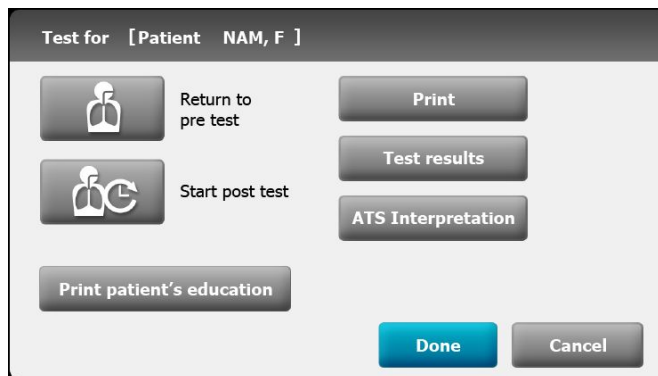


**Note** After each effort, a quality message appears on this screen, such as "Blast out harder", "Don't hesitate," "Blow out longer," or "Good effort."

11. Touch **Accept** to save the pre test and continue or touch **Reject**.  
If the test is accepted or rejected, the next pre-test will increment in number. Even if some efforts were deleted, the test record indicates the patient's total number of efforts.
12. Continue with pre-test efforts, when finished touch **Pre-test done** to accept the pre-tests.



13. Touch **Print** to print the test report, touch **Test results** to preview the test report on the display, or touch **ATS Interpretation** to add or edit ATS interpretations. Touch **Print patient's education** to print patient help sheets. (See *About the patient help sheets* for further detail.) Touch **Start post test** to perform post medication efforts for the current patient, or touch **Return to pre test** to continue with FVC pre-test efforts.



14. Touch **Done** when you have completed the pre-tests.

If the *Auto Save* setting is turned off, touch **Yes** and touch **Save** to save the test. Select one of the following locations:

- Local (internal memory)
- USB mass storage device (Any tests that you save to a USB mass storage device can be retrieved only from a CardioPerfect workstation.)
- Workstation
- Remote file location


## Perform a spirometry test using the Search tab




**CAUTION** Patient data is not saved until the spirometry test is completed.

**Note** The spirometry configuration settings can be changed in the Settings tab. The following settings may appear differently if the default settings have been modified.

**Note** Set the Default patient entry tab to New patient in the Advanced settings.

1. Touch  (Perform new Forced Vital Capacity). The New patient tab appears.
2. Search for patient.
 

The Search tab gives you access to patient data in the Saved tests directory or in a connected database (CardioPerfect workstation or EMR).

  - Touch the **Search** tab.
  - Enter the Patient ID or Last name.
  - Touch **OK**.
  - Touch **Search**.
  - Touch within the patient row.
  - Touch **Select** to review or edit patient information.
  - Touch  (Next) and enter patient height.
  - Touch **OK**.
3. Touch **View** or **Incentive** to select the display information that you want to view during the test.
4. When the patient is ready, touch **Start pre #1** to perform the spirometry test.


**Note** See *Performing a new Forced Vital Capacity spirometry test* for additional details.



## Perform a spirometry test using the Worklist tab when connected to the Worklist server



**CAUTION** Patient data is not saved until the spirometry test is completed.

- Note** The spirometry configuration settings can be changed in the Settings tab. The following settings may appear differently if the default settings have been modified.
- Note** Set the Default patient entry tab to Worklist in the Advanced settings.

1. Touch  (Perform new Forced Vital Capacity).
 


The worklist is downloaded from the EMR server and the Worklist tab appears.
2. Touch within the Patient row.
  - Touch **Select** to review or edit patient information.
  - Touch  (Next).
  - Enter patient height. Touch **OK**.
  - Touch  (Next).
3. Touch **View** or **Incentive** to select the display information that you want to view during the test.
4. When the patient is ready, touch **Start pre #1** to perform the spirometry test.

**Note** See *Performing a new Forced Vital Capacity spirometry test* for additional details.

## Perform a spirometry post test

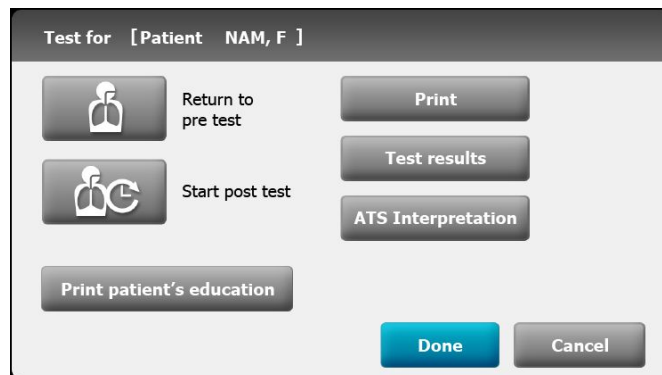
Complete the pre-test efforts. See *Perform a new Forced Vital Capacity spirometry test*.

**Note** Pre- and post-efforts must happen on the same day. The next day tests become available for review only; you can no longer add efforts to them.

1. Touch  (Continue saved test).  
The Spirometry saved tests screen appears.
2. Select a patient from the list of saved tests. Touch within the Patient row.
3. Touch **Continue test**.
4. When the patient is ready, touch **Start post #\_**.

**Note** Coach the patient through the effort.

5. The device stops automatically when air stops moving (that is when the ATS end-of-test criteria are met.)
6. (Optional) Touch **Stop** when the test has completed.
7. Decide whether to accept the effort.
8. Touch **Accept** to save the post test and continue or touch **Reject**.  
If a test is accepted or rejected the next post-test will increment in number. Even if some efforts were deleted, the test record indicates the patient's total number of efforts.
9. Touch **Post-test done** to accept the post-test.
10. Touch **Print** to print the test report, touch **Test results** to preview the test report, or touch **ATS Interpretation** to add or edit ATS interpretations. Touch **Return to post test** to continue performing post medication efforts for the current patient.



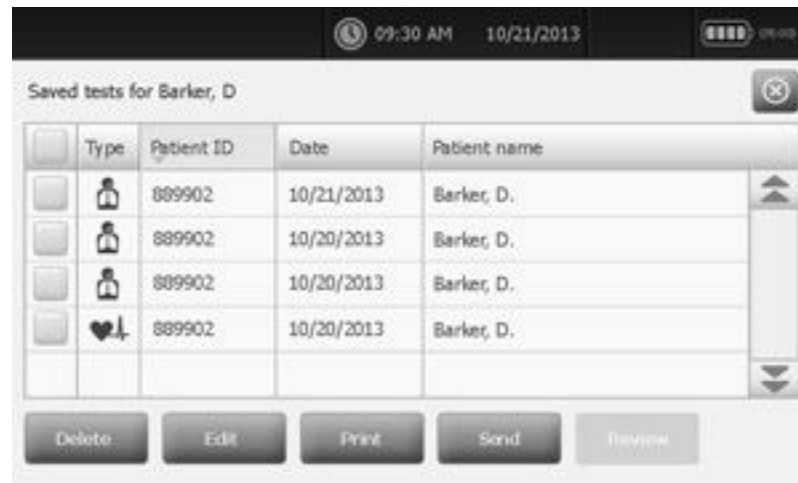
11. Touch **Done** when you have completed the post-tests.
12. Touch **Yes** and touch **Save** to save the test. Select one of the following locations:
  - Local (internal memory)
  - USB mass storage device (Any tests that you save to a USB mass storage device can be retrieved only from a CardioPerfect workstation.)
  - Workstation
  - Remote file location




## Work with a Saved test

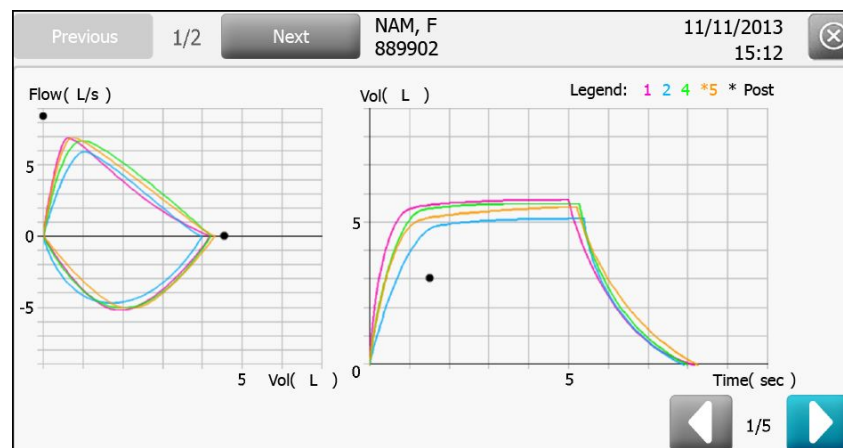
### To view Saved tests:

1. From the Spirometry home tab, touch the **Saved tests** tab. Search for tests by Date, Last name, or Patient ID. Alternatively, you can search for All test types.
2. Enter the Date, or Patient's Last name, or Patient's ID and touch **OK**. Select the Test type.
3. Touch **Search**.
4. Touch the check box next to the desired test to select the test and then touch **Review**.



**Note** Review is not active until a test is selected. Only a single spirometry test can be reviewed at a time.

**Note** Spirometry tests are denoted with a  icon in the Test type column.



View and Print options include test efforts with color-coded legend, parameters with norm profile, efforts summary, and ATS Interpretive results.



# Troubleshooting

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## Symptoms and solutions

### Problem-solving suggestions:

If you try these suggestions and still have problems, contact Welch Allyn.

<b>Symptom</b>	<b>Possible cause</b>	<b>Suggested action</b>
Unable to calibrate	Poor connection between flow transducer and sensor	Check the connection between flow transducer and sensor.
	Damage to flow transducer	Replace the flow transducer if it is damaged.
	Leak during calibration.	Ensure that the connection between the calibration syringe and flow transducer is tight with no leaks.
	Uneven calibration strokes.	Use even strokes in calibration.
	Pressure tubing is kinked	Replace pressure tubing.
No sensor detected	Poor connection between the sensor and the device	Connect to another USB port. Replace the USB cable.
Does not print	Out of paper	Load paper. See the electrocardiograph manual.
	Paper jam	If the paper is jammed, clear it, then reload.
Values are too high (intermittent)	Patient's fingers obstructed the screen on the back of the flow transducer, causing high back pressure and false reading	Retest.
	Patient's lips were not tightly sealed around the flow transducer	Retest.
	Spirometer was calibrated with the wrong size syringe	Recalibrate with a 3-liter syringe. See <i>Performing a calibration</i> .

<b>Symptom</b>	<b>Possible cause</b>	<b>Suggested action</b>
Values are too high (consistently)	Pressure connection is partially obstructed	Remove any foreign substance from the flow transducer or pressure tubing.
Predictive values are blank	The selected norm does not support certain values, and composite norm values are disabled	<p>Re-enter age/birthdate, height, gender, race. (Fill in the fields. All mandatory fields must be filled in before you can proceed.)</p> <hr/> <p>Enable composite norm values. See <i>Viewing or changing the spirometry settings</i>.</p>
The flow sensor has been dropped.	Accident	Recalibrate. See <i>Performing a calibration</i> .
Report does not print parameters or graphs.	Improper parameter settings	Check print settings. See <i>Viewing or changing the spirometry settings</i> .
Patient test values differ from values expected by physician.	Various	<p>If the transducer is contaminated with sputum or secretions, replace it.</p> <hr/> <p>Verify that proper barometric pressure has been entered. See <i>Performing a calibration</i>.</p> <hr/> <p>Verify the patient data.</p> <hr/> <p>Eliminate any leaks in the pressure tubing.</p> <hr/> <p>Retest using a nose clip.</p> <hr/> <p>Replace the sensor if damaged.</p> <hr/> <p>Recalibrate.</p> <hr/> <p>Replace the transducer and retest.</p>



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