Application Note 23

Testing with the bellavista Verification App on CITREX H5

analyser

the art of measuring

IMT Analytics released the CITREX H5, the latest testing device in the ventilation industry, in March of 2017. Its Android operating system set a new benchmark for usability and visualisation. The versatile user interface and its powerful processor support the user in testing different devices and analysing data.
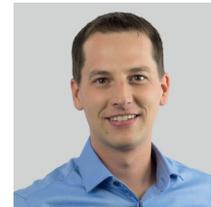
The ability to run apps on the CITREX H5 simplifies the verification testing of medical devices. With the first App available, the Biomedical Engineer now has a powerful tool to test the bellavista ventilator.

Editorial

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bellavista ventilator

The bellavista ventilator family consists of three different ventilators, the bellavista 1000, bellavista 1000e and bellavista neo. All three fully featured ventilators were designed for the requirements of intensive care patients. In demanding and complex work situations the user is supported with powerful ventilator tools and an easy to use user interface. The combination of an internal battery, with up to six hours of operating time, and a turbine simplify safe in-house patient transportation. Like all mechanical ventilators, the bellavista series ventilators need preventive maintenance once a year. One part of that maintenance is the performance verification testing.

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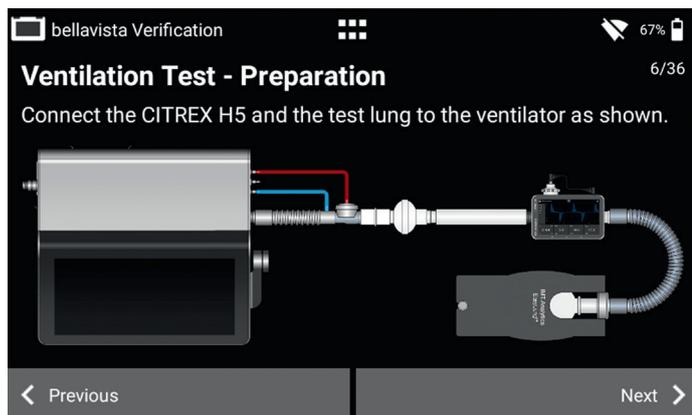
App overview

The "bellavista Verification App" fulfils the needs of every Biomedical Engineer working with our ventilators. IMT Analytics designed the app to support and simplify the complete verification process and to reduce human error. The testing can be performed quickly and accurately with the step-by-step process supported by text and images. At the end of the verification process a PDF report is generated and stored. The reports can be viewed directly on the device and exported via USB.
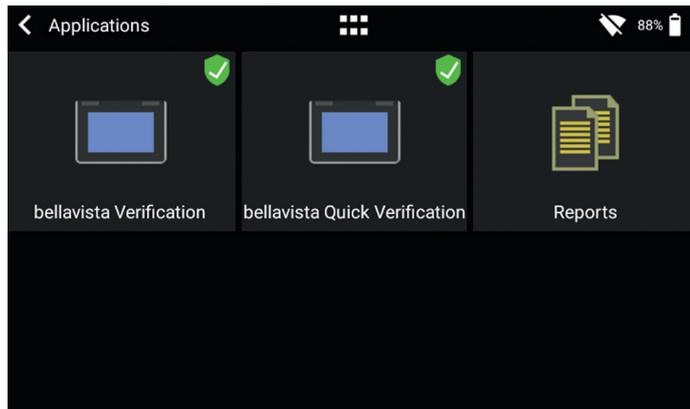
Overview of the apps and reports

Preparation

Each time the app starts a zero offset calibration must be performed. This guarantees the best possible measurement results. An oxygen sensor calibration is optional and only has to be carried out if necessary. Before taking a measurement for a test step; the tubing setup, circuit test, and ventilator settings adjustments must be performed. All of these steps are supported by images and some of them can be enlarged by tapping on them.

Setup the tubing for the measurement

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Test steps

After preparing the device and starting ventilation, the CITREX H5 is ready to measure. Automatic measurements are divided into four columns, "Parameter", "Measured", "Expected" and "Result". The actual value of each parameter is shown in the "Measured" column. The "Expected" values are the tolerance range according to the requirements of the service manual. If the measured value is within the range, the result shows a green checkmark. Otherwise, the result shows a red X. As soon as the values are stable, the user can press "Next" to store the actual value for the report and move to the next screen. It is possible to tap next if the measurement is out of range to continue testing.

bellavista Verification			
Ventilation Test - 21% O2			8/36
Wait until parameters are stable. Tap next.			
Parameter	**Measured**	**Expected**	**Result**
P_{Peak}	17.3 mbar	23 .. 28 mbar	✗
PEEP	5.0 mbar	4 .. 6 mbar	✓
Rate	14.0 b/min	14 .. 16 b/min	✓
O_2	21.0 %	19 .. 23 %	✓
‹ Previous			Next ›

Some tests require a verification of parameters or action on the bellavista screen. In this case, the app displays check boxes which the user checks to confirm the action was performed. Tapping next stores the results for the test report and move to the next screen.

bellavista Verification		
Ventilation Test - 21% O2		9/36
Verify the parameters on the ventilator are in range and confirm.		
Parameter	**Expected**	**Result**
P_{Peak}	23 .. 28 mbar	☑
PEEP	4 .. 6 mbar	☑
Rate	14 .. 16 b/min	☐
FiO		☐
‹ Previous		Next ›

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Advanced ventilation test

The advanced ventilation test is optional. If the switch next to the title is off all pages from this test step are skipped. The default setting is on off. The test consists of preparation, measurement and check boxes.
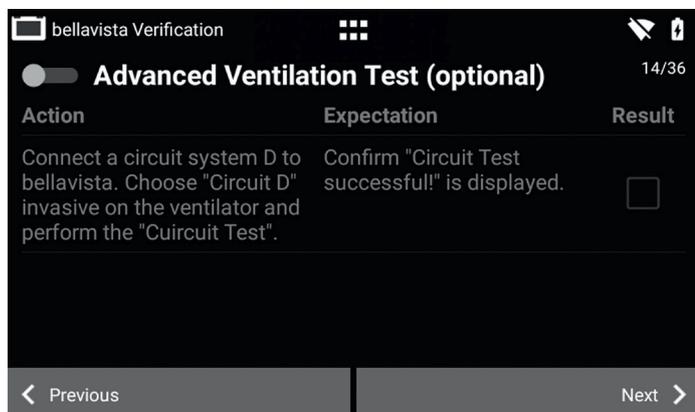

Advanced ventilation test with on/off switch

General Information

The CITREX H5 collects various information. All the information is used to generate a test report. The information about the bellavista ventilator, such as serial number, operating hours, model and customer information, must be emtered manually.

The information about the Test Center is prefilled if they are stored in the CITREX H5 settings. The company information and the Operator/Tester can be edited. The tester can sign the report on the multi-touch display. Tapping "Finalize" generates a PDF report which cannot be modified.

Information about the Test Center

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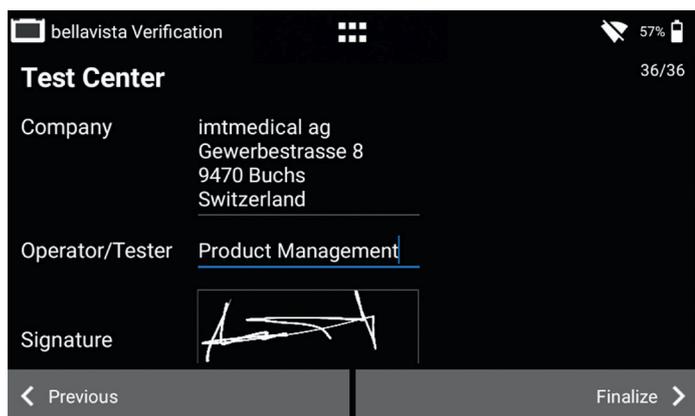
Test reports

All test reports generated with the CITREX H5 are stored on the device. Each receives a unique number in its file name. In the section "Reports" under "Applications" it is possible to view the reports on the screen of the CITREX H5. To export selected, or all, PDF test reports connect a USB thumb drive and choose the menu icon in the Reports section.

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bellavista Verification - Report

Test Equipment		
Device	IMT Analytics AG CITREX H5	
Serial Number	BB10002	
Calibration Date	02.03.2017	

Test Object		
Customer	Hospital XYZ	
Department	ICU	
Type	imtmedical bellavista 1000e	
Serial Number	MB102235	
Operating Hours	12`352 h	

Test Results

Oxygen Supply Check	✓
Circuit C Test	✓

Ventilation Test

Parameter	Measured		Expected			Result
P_{peak}	24.7	mbar	14	... 20	mbar	✗
PEEP	5.2	mbar	4	... 6	mbar	✓
Rate	15.2		11	... 13		✓
FiO_2	21.2	%	19	... 23	%	✓

Sample test report

« *The Biomedical Engineer now has a powerful tool to test the bellavista ventilator* »

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