

# EMG Reports Application User's Guide

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**TABLE OF CONTENTS**

**1 IMPORTANT INFORMATION ..... 1**

1.1 Intended Use..... 1

1.2 Technical Service and Support..... 1

1.3 Android Device Requirements ..... 1

**2 APPLICATION OVERVIEW ..... 2**

**4 HOME SCREEN..... 3**

4.1 Sensor List ..... 3

4.2 MVC Configuration ..... 3

4.3 File Browser ..... 3

4.4 Application Settings ..... 3

4.5 RMS ..... 3

4.6 Cyclic ..... 3

4.7 Customized ..... 3

**5 SENSOR LIST ..... 4**

5.1 Identify..... 4

5.2 Sensor Info ..... 5

**6 APPLICATION SETTINGS ..... 6**

6.1 About ..... 6

6.2 Data Storage ..... 6

6.3 Cache..... 6

6.4 Always Rename Data Files ..... 6

6.5 Show Summary ..... 6

6.6 RMS Threshold..... 6

6.7 Accelerometer Threshold ..... 6

6.8 Language..... 6

**7 FILE BROWSER..... 7**

7.1 Navigation Bar..... 7

7.2 Exporting Data ..... 8

**8 RMS PLOT MODE .....9**

8.1 Gestures ..... 9

8.2 MVC..... 9

**9 EMG RMS CYCLIC MODE.....10**

9.1 Gestures ..... 10

9.2 Plot Sources..... 10

9.3 MVC Normalization ..... 10

**10 EMG RMS + ACC CYCLIC MODE .....11**

10.1 Gestures ..... 11

10.2 Plot Sources..... 11

10.3 MVC Normalization ..... 11

**11 CUSTOMIZED SUMMARY TEMPLATE .....12**

11.1 Customized Summary Setup ..... 12

11.1.1 Trigger Setup ..... 12

11.1.2 Trigger Detail..... 12

11.1.3 Channels..... 12

11.1.4 Body map (Optional) ..... 13

11.1.5 Status..... 13

11.2 Customized Template Plot..... 14

**12 MAXIMUM VOLUNTARY CONTRACTION .....15**

12.1 MVC Settings Dialog..... 15

12.2 Saving the MVC Value ..... 15

**13 EMG RMS SUMMARY .....16**

13.1 Time Range Viewer ..... 16

13.2 PDF ..... 16

**14 CYCLIC SUMMARY .....17**

14.1 EMG RMS Cyclic Summary ..... 17

14.2 EMG RMS + Acc Cyclic Summary..... 17

14.3 Customized Template Summary ..... 17

**15 APPENDIX I: SENSOR MODES..... 18**



# 1 Important Information

## 1.1 Intended Use

The EMG Reports Application for Android Tablets is a software application to be used with the Trigno Wireless Biofeedback System. The function of the EMG Reports App is to provide visual biofeedback from the Trigno System. The EMG Reports App is designed to work exclusively with the Trigno Biofeedback System and is not intended to be used in diagnostic or safety-critical applications.

The Trigno™ Wireless Biofeedback System is a battery-powered biofeedback device that enables researchers and clinicians to acquire EMG and related signals from subjects for biofeedback and research purposes. They are intended for relaxation training and muscle reeducation. Interpretation of the EMG and supporting signals by a qualified individual is required.



Please refer to the Trigno Wireless Biofeedback System User Guide for additional important information.

## 1.2 Technical Service and Support

For information and assistance, please visit:

[www.delsys.com](http://www.delsys.com)

Contact us:

E-mail: [support@delsys.com](mailto:support@delsys.com)

Telephone: (508) 545 8200

## 1.3 Android Device Requirements

- Android 6.0 and above.
- Bluetooth 4.1 and above.
- Recommended Tablet:
  - Samsung Galaxy Tab S2
  - 8-inch screen, 32 GB, WI-FI
  - (SM-T713NZKEXAR)

## **2 Application Overview**

The EMG Reports App is an Android Tablet application created by Delsys to allow data acquisition, real-time biofeedback, and operation of the Trigno™ Wireless Biofeedback System via a mobile device. The EMG Reports App is designed to provide a user-friendly biofeedback experience by communicating with sensors directly using the Bluetooth communication protocol.

This guide provides an overview of the application features and instructs the user on how to interact with the application and the Trigno hardware.

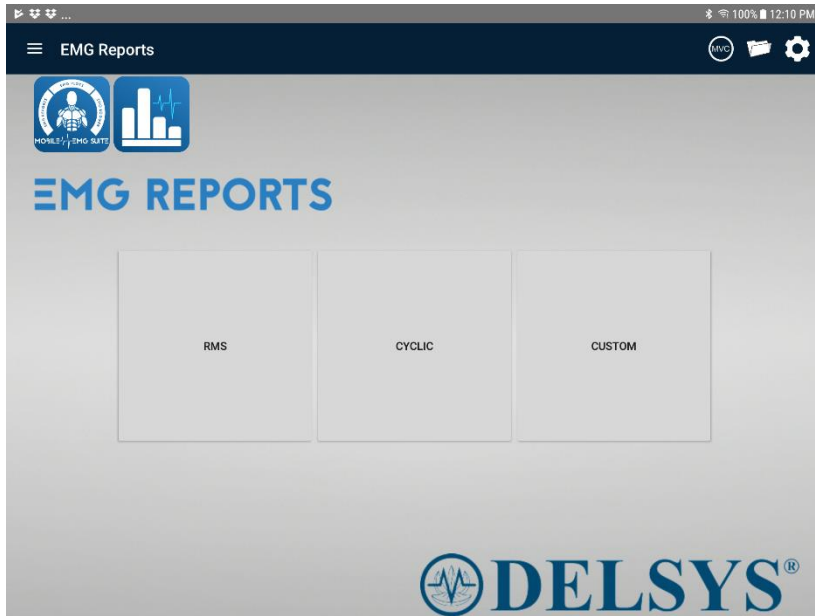


Figure 1: EMG Reports Home Page

## 4 Home Screen

### 4.1 Sensor List

Click to access sensor list, and to re-scan for sensors.

### 4.2 MVC Configuration

Only usable in feedback modes, use to access the MVC configuration dialog and to enable/disable MVC indicators for EMG channels.

### 4.3 File Browser

Click to open the file browser. See sessions and collected data files and delete or export files.

### 4.4 Application Settings

Click to open the applications settings page.

### 4.5 RMS

Display RMS feedback as Time Series plots.

### 4.6 Cyclic

Display Cyclic feedback as Time Series plots.

### 4.7 Customized

Users can create their own customized summary report template.

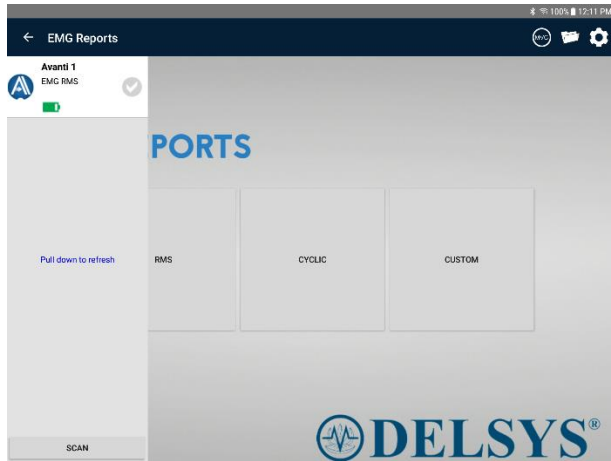


Figure 2: Sensor List on the Homepage

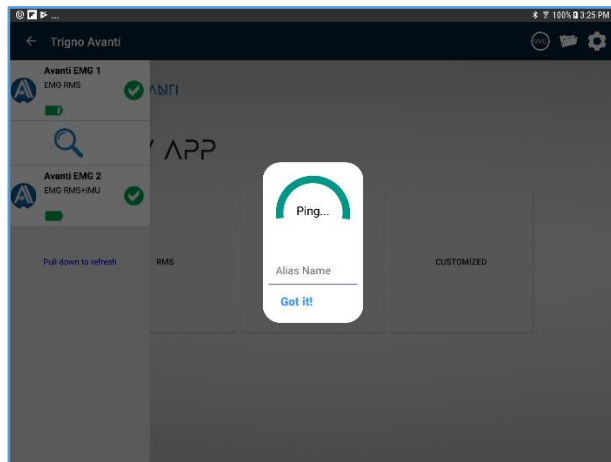


Figure 3: Sensor Identify

## 5 Sensor List

Swipe in from the left edge on any screen of the EMG Reports to display the sensor list. Pull down on the sensor list to rescan for sensors.

The sensor list will auto populate with sensors nearby, and by default will name the sensors as "Avanti EMG n". Sensors can be renamed from either the Identify dialog, or the Sensor Settings dialog.

The following icons are used within the app to launch certain features and dialogs:



Launch the Identify dialog to blink the sensor's LED white for identification purposes

### 5.1 Identify

Click the Identify Icon to trigger the sensor LED to blink white repeatedly for sensor identification purposes. Renaming of the sensor is also possible on this screen by clicking the sensor name. Click "Got it!" to exit this dialog.





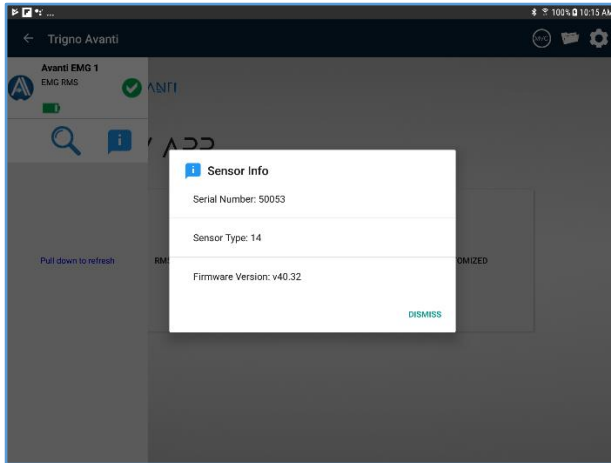


Figure 4: Sensor Info

## 5.2 Sensor Info

Press the "I" button to get sensor Info.

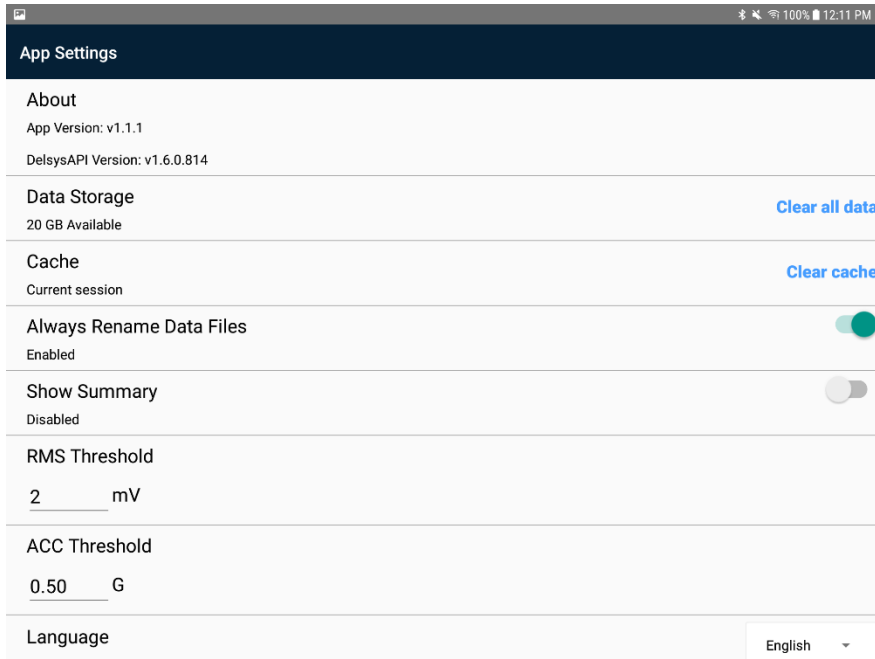


Figure 5: EMG Reports Settings

## 6 Application Settings

### 6.1 About

Displays the version number of the EMG Reports and the version numbers of components used to build the app.

### 6.2 Data Storage

Displays the amount of storage available on the tablet. Use the “Clear All Data” button to permanently delete all data files.

### 6.3 Cache

Click “Clear Cache” to remove all stored settings and alias names.

### 6.4 Always Rename Data Files

Enable or disable the prompt at the end of feedback for the user to rename the data file. If disabled, files will be automatically named “RunN.shpf”, where “N” is the current run number.

### 6.5 Show Summary

Enable or disable the prompt at the end of feedback for the user to view the data file.

### 6.6 RMS Threshold

Set the RMS threshold value for cyclic plot template.

### 6.7 Accelerometer Threshold

Set the accelerometer threshold value for cyclic plot template.

### 6.8 Language

User can change language preference.

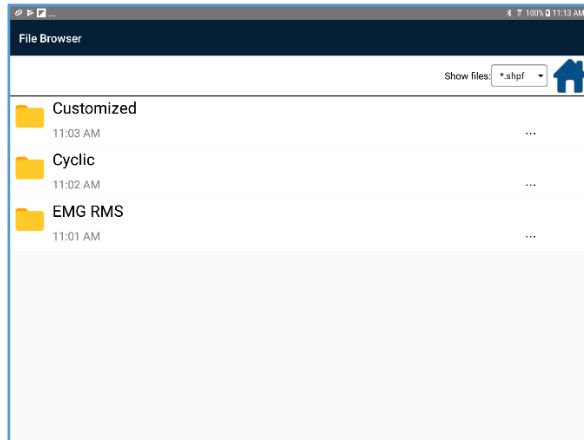


Figure 6: Example of multiple folders in file browser.

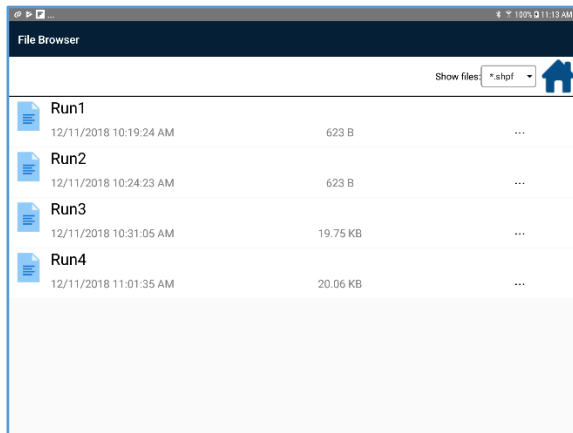


Figure 7: Example of data files in file browser.

## 7 File Browser

The file browser allows the user to create folders for managing their data collection sessions, and to export data via various file sharing services.

To select a file or folder, long press on the file or folder row.

### 7.1 Navigation Bar

The following operations are performed using the navigation bar at the top of the File Browser page:



Return to home directory (root).



Delete currently selected file or folder.



Click to rename a file.



Click to export the file/folder to as zipped file.



Click to view the data file.



Click to export shpf file to xlsx file.

## 7.2 Exporting Data

Select a file and click on the Share button to export. Files and folders are compressed before sending. Next, select an export method from the Android System dialog. Files are saved as .shpf and can be converted to .hpf files using the Delsys File Utility on a Windows PC.

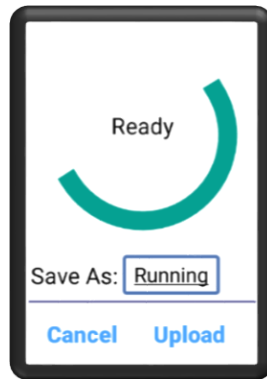




Figure 8: RMS Plot Mode

## 8 RMS Plot Mode

The RMS plot mode feedback display shows Trigno Sensor data as time series line charts.

### 8.1 Gestures

Pinch to zoom to change the scale.

One finger pan gesture on the plot area to pan the y-axis.

### 8.2 MVC

MVC can be enabled in plot mode, for EMG channels. When enabled, the y-axis switch to percentage of real-time value over MVC value.



Figure 9: EMG RMS Cyclic Mode

## 9 EMG RMS Cyclic Mode

EMG RMS Cyclic Mode, mode displays the RMS of one or more EMG channel as time series and calculate the period peak and mean value triggered by RMS over threshold.

### 9.1 Gestures

Pinch to zoom to change the scale.

One finger pan gesture on the plot area to pan the y-axis.

### 9.2 Plot Sources

Use the Channels dropdown list button on top right of the plot area to switch the source channel for the plot.

### 9.3 MVC Normalization

MVC can be enabled in plot mode, for EMG channels. When enabled, the y-axis switch to percentage of real-time value over MVC value.



Figure 10: EMG RMS + ACC Cyclic Mode

## 10 EMG RMS + ACC Cyclic Mode

EMG RMS + ACC Cyclic Mode, mode requires 2 sensors, of which one sensor's Acc channel will act as trigger, displays the RMS of one or more EMG channel as time series and calculate the period peak and mean value triggered by Acc over threshold.

### 10.1 Gestures

Pinch to zoom to change the scale.

One finger pan gesture on the plot area to pan the y-axis.

### 10.2 Plot Sources

Use the Channels dropdown list button on top right of the plot area to switch the source channel for the plot.

### 10.3 MVC Normalization

MVC can be enabled in plot mode, for EMG channels. When enabled, the y-axis switch to percentage of real-time value over MVC value.

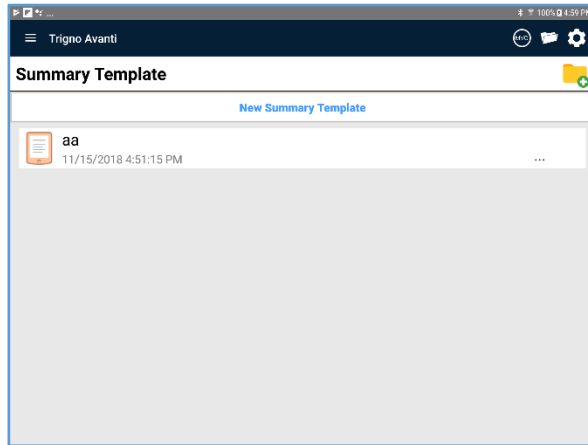


Figure 11: Summary Template Page

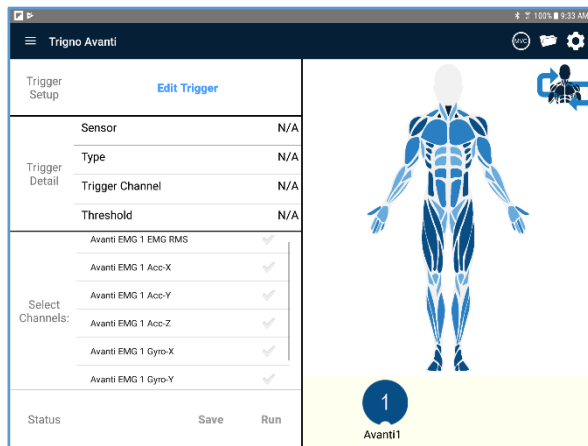


Figure 12: Summary Template Setup

## 11 Customized Summary Template

Customized summary mode allows users to create their own template.

Click “New Summary Template” button to create a new template, or choose an existing template and begin collection. Delete a summary template by clicking the “...” button and choosing to delete.

### 11.1 Customized Summary Setup

In the Customized Summary Setup page, the trigger setup can be edited and the collection channels can be selected. Additionally, sensor can be dragged on the body map.

#### 11.1.1 Trigger Setup

- 1) Select trigger sensor – choose which sensor contains the channel to be used to mark the cycles.
- 2) Select trigger type – choose which type of cycle detection to perform.
- 3) Select trigger channel – choose which channel to use for cycle detection.
- 4) Input threshold – choose the raw threshold value.

#### 11.1.2 Trigger Detail

Displays the triggering setup.

#### 11.1.3 Channels

Select which channels to collect and calculate cycle averaged data from.



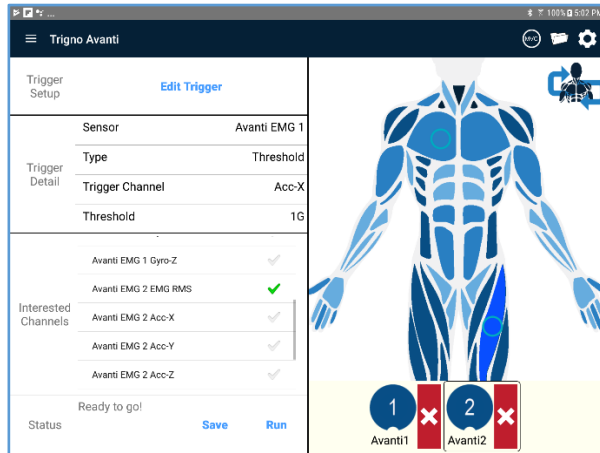


Figure 13: Sensor placement on body map

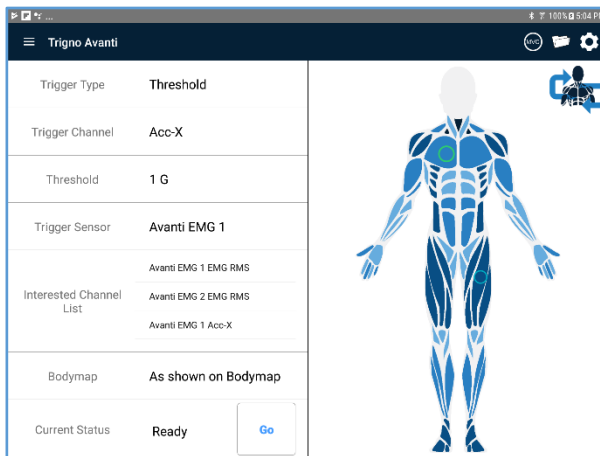


Figure 14: Summary Template Preview

#### 11.1.4 Body map (Optional)

Optionally place sensor on the body map. Click the circle placed on body map to identify the sensor (white LED blink).

- 1) Gestures  
Pinch to zoom in or out on the body map.  
Drag with one finger to pan the image.
- 2) Ping  
Click circle as sensor representation locating on body map, sensor identify dialog will appear.
- 3) Anterior/Posterior Flip  
Tap the “Flip” button to toggle between Anterior and Posterior body map images.

#### 11.1.5 Status

Status section shows if template is complete, and ready to stream data.

When template is ready, user can choose “Save” to save the template, or “Run” to begin data collection.



Figure 15: Summary Template Plot

## 11.2 Customized Template Plot

Entering plot/collect mode displays the real-time feedback of selected channels as time series data and calculates the period peak and mean values within the cycles marked by the trigger channel.

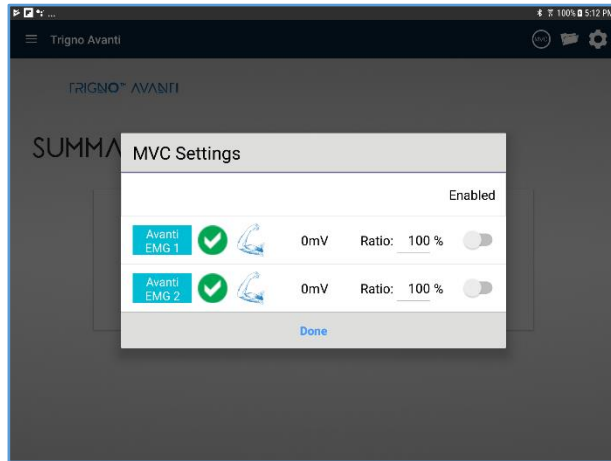


Figure 16: Maximum Voluntary Contraction Setting Dialog

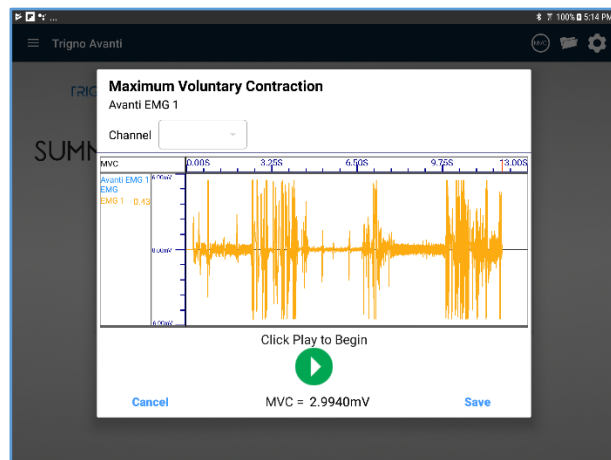


Figure 17: Maximum Voluntary Contraction Collection Dialog

## 12 Maximum Voluntary Contraction

This dialog allows the user to collect a maximum voluntary contraction (MVC) value from a given sensor. When collecting, EMG data are being streamed at 2000Hz, and the maximum RMS value is stored as the MVC value at the end of collection.

### 12.1 MVC Settings Dialog

MVC Settings Dialog allow user to enable/disable MVC value in plot mode for EMG channels. When enabled, the y-axis switch to percentage of real-time value over MVC value

### 12.2 Saving the MVC Value

At the end of collection, the calculated MVC value is displayed at the bottom of the dialog.

Click cancel to abort the collection without saving the new value.

Click the Play button to collect the MVC again.

Click Save to exit and save the new MVC value.

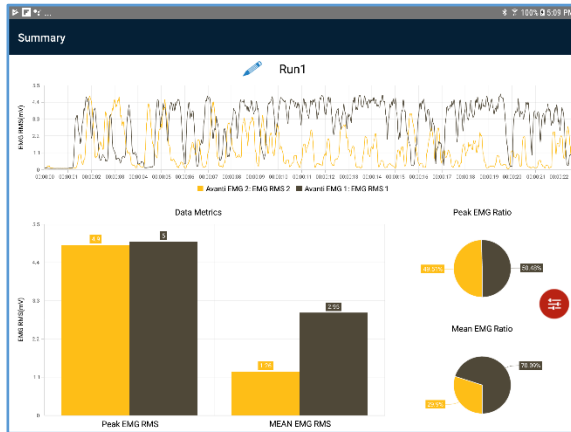


Figure 18: EMG RMS Summary

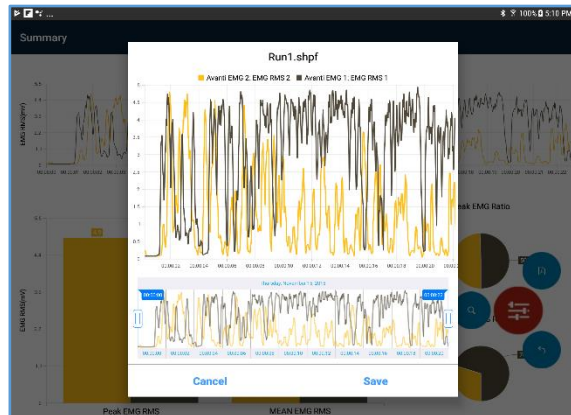


Figure 19: EMG RMS Summary Range Viewer

## 13 EMG RMS Summary

Review an EMG RMS data collection.

### 13.1 Time Range Viewer

Expand the red spinner and click the zoom button to display the Time Range Viewer. Choose a new time interval to recalculate and display the current data metrics over the selected interval only.

### 13.2 PDF

Expand the red spinner and click the PDF button to export the summary as a PDF.



Figure 20: Cyclic Summary with different trigger



Figure 21: Cyclic Summary with identical trigger

## 14 Cyclic Summary

Review a cyclic data collection.

### 14.1 EMG RMS Cyclic Summary

Each EMG RMS channel acts as its own trigger; a cycle is determined to be a period of EMG onset calculated via the threshold value in the app settings page.

### 14.2 EMG RMS + Acc Cyclic Summary

One EMG RMS channel of one sensor is the target, Acc-X Channel of the other sensor serves as over threshold trigger (ACC Threshold) in app setting page.

EMG RMS data are averaged over a cycle marked by the accelerometer channel selected in the triggering setup and gated via the threshold value in the app settings page.

### 14.3 Customized Template Summary

The custom trigger channel acts a cycle marker for all selected channels.

## 15 Appendix I: Sensor Modes

Mode Name	Channels	Sample Rate	Details
EMG	EMG	1000Hz	
EMG RMS	EMG RMS	333.3Hz	125ms Window Width, 122ms overlap
IMU	ACC <sub>x</sub> ACC <sub>y</sub> ACC <sub>z</sub>	133.3Hz	
	GYRO <sub>x</sub> GYRO <sub>y</sub> GYRO <sub>z</sub>	133.3Hz	
	MAG <sub>x</sub> MAG <sub>y</sub> MAG <sub>z</sub>	66.7Hz	
EMG + IMU	EMG	1000Hz	
	ACC <sub>x</sub> ACC <sub>y</sub> ACC <sub>z</sub>	133.3Hz	
	GYRO <sub>x</sub> GYRO <sub>y</sub> GYRO <sub>z</sub>	133.3Hz	
	MAG <sub>x</sub> MAG <sub>y</sub> MAG <sub>z</sub>	66.7Hz	

EMG RMS + IMU	EMG RMS	333.3Hz	125ms Window Width, 122ms overlap
	ACC <sub>x</sub> ACC <sub>y</sub> ACC <sub>z</sub>	133.3Hz	
	GYRO <sub>x</sub> GYRO <sub>y</sub> GYRO <sub>z</sub>	133.3Hz	
Orientation	MAG <sub>x</sub> MAG <sub>y</sub> MAG <sub>z</sub>	66.7Hz	
	QUAT <sub>w</sub> QUAT <sub>x</sub> QUAT <sub>y</sub> QUAT <sub>z</sub>	66.7Hz	If Pitch/Roll/Yaw is enabled as orientation output type, these four channels are replaced with Pitch, Roll, and Yaw (3 channels)
EMG + Orientation	EMG	1000Hz	
	QUAT <sub>w</sub> QUAT <sub>x</sub> QUAT <sub>y</sub> QUAT <sub>z</sub>	66.7Hz	If Pitch/Roll/Yaw is enabled as orientation output type, these four channels are replaced with Pitch, Roll, and Yaw (3 channels)
EMG RMS + Orientation	EMG RMS	333.3Hz	125ms Window Width, 122ms overlap
	QUAT <sub>w</sub> QUAT <sub>x</sub> QUAT <sub>y</sub> QUAT <sub>z</sub>	66.7Hz	If Pitch/Roll/Yaw is enabled as orientation output type, these four channels are replaced with Pitch, Roll, and Yaw (3 channels)