User Manual

(Version 01/2015)

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1 - APPLICATION OVERVIEW

SPH Cycling is an application for cycling, available on Android and iOS platforms, which is addressed to both professional athletes and occasional sportspeople, as well as to athletic trainers and sports physicians. At the beginning, the objective of this development was in fact to create a system that could help anyone improve their sports performance in a structured manner, based on data and methodologies with a strong scientific footprint.

This objective has been achieved thanks to the sensors that are already present in all the smartphones available on the market, which are able to provide specific and accurate measurements, together with procedures specially developed in collaboration with the University of Motor Sciences of Verona (Italy).

The result is a virtual trainer that is able to follow your athletic training step by step from the very first phases until the achievement of the objective that has been predetermined for a large number of different sports.

A particular feature of SportPlusHealth is power training. For several years, athletic trainers in charge of training the best sportspeople in the world have been designing tables based not only on the times and distances to be covered, but also on a scientific and objective measurement of the muscular effort made by athletes. The result is much more precise and efficient training than the one obtained with the classical methods, and which – at the same time – reduces the risk of accidents and disappointing results.

1.1 - Main screen

As soon as you access the app, there is a tachometer with blue and grey buttons, and a map as background. This is the app main screen, from which you can access all the other sections.

The purpose of the buttons located at the bottom of the tachometer is, from left to right:

- *Full screen map*: it displays the same map proposed as tachometer background, but in full screen for more clarity.
- *Graph*∗: it displays, in graphic form, the progress of the essential measurements (altitude, slope, power and speed) obtained in real time during training.
- *Summary*∗: it displays, in table format, all the information related to the session.
- *Type of training*: it suggests a list from which you can select the type of training to be followed. For more information, refer to the specific chapter.

On the top of the screen, there is a menu for accessing the individual sections. Each of them is identified with an icon and a specific colour. They are described in detail in the following chapters.

∗ The graph of the measurements can only be selected while recording a training session.

∗ The summary of the measurements can only be selected while recording a training session.

2 - QUICK GUIDE

To start a new training session, follow these steps:

1. *START THE APP*
   Launch the SPH Cycling app, specific for cycling
2. *ACCESS*
   Access the app as a registered user or as a guest. Take into account that in this second case some functions, such as data synchronization on the server, cannot be used.
3. *START TRAINING/ CHANGE TYPE OF TRAINING*
   At this point, you are on the main screen, with the app ready for a "Free" training session. To start, simply press the green start button. Alternatively, you can press the button by means of which you can select the type of training to be followed.
4. *SELECT THE TYPE OF TRAINING*
   We assume that you have chosen to change the type of training. The screen now shows all the types available, with a short description. Just click on one of the items in the list to select it.
5. *INSERTION OF PARAMETERS*
   Depending on the type of training, you might need to indicate additional parameters (e.g., the distance to be covered for a training session "Distance", the path to be followed, etc.).
6. *START TRAINING*
   Once the selection has been completed, the app goes back to the main screen. From here, you can start the training that has just been selected by pressing the green start button.
7. *PAUSE (optional)*
   During training, you can always make a pause in the recording. This function has been introduced in order for the user to be able to handle any unforeseen situation that may make him/her stop for a certain time.
8. *FINISH TRAINING*
   Some types of training stop automatically once the goal is reached. In any case, you can always finish it manually by pressing the red stop button.

For more information on the types of training that are available, refer to the specific chapter of this manual.

During training, the screen is automatically locked, so as to prevent the user from involuntarily pressing the buttons on the interface. To unlock it, slide the cursor towards the outside of the screen.

Always during training, the screen automatic turn-off is disabled. Therefore, if the screen is not turned off manually, it will always remain on. This option is used in order for the user to be able to constantly monitor the information displayed on the interface. Anyhow, you can enable energy saving from the settings in order to extend the battery life, letting the system turn off the screen after a given inactivity period.

3 - TRAINING SESSIONS

When we talk about training, we refer to a single physical activity session. Different types have been foreseen. All of them can be selected from the application main screen, in order to let users free to train as they wish. The following sections include an introduction for each of these types.

Each training session may use an equipment, which provides additional parameters for processing the data in a more customised manner. For more information, refer to the specific chapter.

A training session can be performed on a path that has been previously created, or downloaded from those shared by the community. Thanks to this, users can have visual navigation along the path, so as to be sure that they are following it correctly, and reference statistics with which to compare their sessions once they are completed. For more information, refer to the specific chapter.

3.1 - Free

This is the simplest type of training, without constraints or parameters to be observed.

It is recommended for new users in order to have a first approach to the app, but it is also suitable for those who simply want to stay in shape minimising the app control.

3.2 - Distance

This type of training constantly monitors the partial distance that has actually been covered, providing information in real time about the achievement of the final goal (and of the partial checkpoints set at 25%, 50%, 75% and 95% of the total). In any case, it does not stop automatically, thus letting the user free to continue the session also once the goal that had been set has been achieved.

It is recommended for those users who are used to train on distance, along a path that may be circular or not.

3.3 - Time

This type of training is very similar to the previous one, but it considers the partial time (net of any pause) that has gone by since the beginning of the training session. Also in this case, information about the achievement of the checkpoints is provided. No automatic stop is foreseen.

It is recommended for those users with limited time available, or those who simply prefer training on time.

3.4 - Calories

This type of training monitors in real time the loss of calories, so that the user continues training until burning the desired number of calories. As for the previous types, information about the achievement of the checkpoints is provided. No automatic stop is foreseen.

It is recommended for those users who – regardless of the training characteristics – are only interested in burning calories in order to lose weight.

3.5 - Circuit

Unlike the previous ones, this type of training must be necessarily performed on a previously created circular path. This is so because, in this case, the information about the achievement of the checkpoints is set according to the number of laps completed.

It is recommended for those users who train on racetracks, or on routes in which the point of departure coincides with the point of arrival.

3.6 - Challenge

The purpose of this type of training is the progressive improvement of performance, which is obtained by challenging a session that has been previously completed (by the same user or by a different user) on the same path on which the training session is to be performed. Information will be periodically provided on the challenge current status (victory, tie or defeat) based on the current position, and the challenge will be automatically concluded once the goal is reached. Should it not be possible to compare both training sessions, usually because the path that has been followed does not match the original one, the challenge result cannot be calculated.

It is recommended for those users who want to constantly improve, and who can derive benefits and motivation from competition.

3.7 - Manual

This type of training foresees the use of a training table inserted manually in the calendar (for more information, refer to the specific chapter), which will therefore consist of a given number of subsessions that succeed from the first one to the last one. During the training session, the user will be kept constantly updated on the current subsession, and will receive audible alarms every time the threshold (if present) is not observed.

The session ends automatically once all its subsessions are completed. In addition, you can indicate to the app that you want to remain on the current subsession even after it has been completed, or that you want to move to the following one beforehand, in order to better adapt the initial training table to the users' requirements in real time.

It is recommended for sportspeople with a specific goal who are willing to manage their structured training sessions (with well-defined time limits).

3.8 - Automatic

This type of training is similar to the previous one, but it uses training tables automatically generated by SportPlusHealth thanks to a system developed in collaboration with teachers from the University of Verona and our athletic trainers.

As well as the Manual type, it is recommended for sportspeople with a specific goal who are willing to manage their structured training sessions (with well-defined time limits).

4 - BLUETOOTH® AND ANT+™ DEVICES CONFIGURATION

The app is compatible with most heart rate monitors, cadence sensors or cycling power meters that are currently available on the market (for the complete list of compatible devices, visit the website1), and which use Bluetooth 2.0, Bluetooth 4.0 or ANT+. Anyway, the actual operation of these devices depends on the smartphone compatibility with these standards. Bear in mind that those Bluetooth receivers that are specific for the 2.0 version cannot manage devices based on the 4.0 version, whereas 4.0 Bluetooth receivers can manage 2.0 devices.

If you always use the same devices for training, you will not need to repeat the connection procedure before each training session (for further details, see the specific chapter), given the fact that the last device that has been used will remain selected for use.

As soon as recording begins, a message will inform that connection has been established between the app and the selected device or devices. In addition, the specific icon on the user interface will change from grey to blue.

4.1 - Bluetooth® 2.0

If the smartphone has the Bluetooth module for the 2.0 version, a wide range of heart rate monitors can be used. Other types of sensors based on this standard are not supported.

4.2 - Bluetooth® 4.0 SMART

If the smartphone has the Bluetooth module for the 4.0 version, it will be possible to use the sensors indicated in the previous paragraph, as well as the heart rate monitors that use this communication standard.

In addition, it is also possible to connect the smartphone to cadence sensors in order to measure pedal cadence and, whenever available, speed (only for combined devices).

4.3 - ANT+™

Some of the latest smartphones also support the ANT+ standard, thanks to which the app can be connected to a wide range of devices for sports, such as heart rate monitors and cadence sensors as well as most cycling power meters that are currently available on the market.

To connect the smartphone to these devices, two alternative modes are available:

- **Direct:** in this case, the smartphone must be fitted with an internal ANT+ module. It will also be necessary to install two support apps: *ANT Radio Service* and *ANT+ Plugins Service*, which are available in the app store.
- **Through dongles:** this solution is possible for all those smartphones that do not have the internal ANT+ module, but which are still able to connect an external module via USB (the *USB Host* function must be available). In addition to the *ANT Radio Service* and *ANT+ Plugins Service* apps, the *ANT USB Service* app shall also be installed, all of which are available in the app store.

[1] http://www.sportplushealth.com

5 - HISTORY OF TRAINING SESSIONS

This section of the app gathers all the training sessions that have been performed in the past, as a file that acts as “historical record” for the user. It is presented as a list ordered from the most recent session to the oldest one, containing basic information in order to easily recognise the individual sessions (name, execution date, path followed, etc.).

Any additional data that may have been shared by another user are added to the abovementioned information. They are properly highlighted in order to distinguish them from the original data, and they can be used as reference during the *Challenge* sessions.

Click on a specific training session to analyse its data in detail. The screen of this section is similar to the app main screen, with a tachometer and a series of blue buttons on the bottom to access each of the functions:

- *Full screen map*: it displays the same map proposed as tachometer background, but in full screen for more clarity.
- *Graph*: it displays in graphic form the progress of the essential measurements (altitude, slope, power and speed) obtained during training.
- *Summary*: it displays in table format all the information related to the session, regarding both the individual measurements and the additional data entered by the user.
- *Playback speed*: it is used to speed up/slow down the playback, which is presented below.
- *Display in Google Earth*: it shows the route that has been covered in the famous app, if it is installed.

The playback is a particular function by means of which the training session can be displayed as if it was currently being performed. To start it, simply press the green play button, which turns into the stop button when playback is active. During the playback, all the screens presented in the previous list are constantly updated in real time.

From the section main screen, a new path can then be generated (for more information, refer to the specific chapter) starting from the route followed during training. Just press the relative button on the top of the screen, specifying afterwards the name and the sharing status (if enabled, it can also be downloaded by other users).

6 - TESTS

Tests are used to assess the athlete's current physical condition, by means of methodologies approved by the scientific community and commonly used by athletic trainers.

On the section main screen, there is a list of the tests conducted that is similar to the history of training sessions. For each test, the details can be displayed in the form of tables or graphs. If necessary, the values entered for the individual samples can be corrected (but only if they have not been closed yet).

Use the specific button on the top of the screen to conduct or enter a new test. Click on the test to access a configuration screen where its specific characteristics are to be defined:

- *Type*: this is the test methodology that will be applied. For more details, refer to the following paragraphs.
- *Modality*: it distinguishes between power test (available only indoor) or speed test (only outdoor).
- *Parameters*: they define the individual intervals, their duration and the associated work loads.
- *Type of pause*: it is the duration of the pause between two consecutive intervals.

The *Execution Modality* allows entering afterwards the measurements recorded during the tests conducted in the past without the support of SportPlusHealth, so as to be able to reuse them. Anyhow, the classical modality is the execution in real time, using the app chronometer and thresholds.

As it will be seen in the following chapter, tests are an essential component for defining the pieces of equipment and, indirectly, for calculating the user's power during a training session. The values entered on the samples should therefore always be accurate and reliable.

To be able to associate the test to an equipment, the test must be closed. This means that the test cannot be modified again, in order to stabilise it so that it can be used in the processing operations that enable the activation of the equipment to which it is connected. This operation can be performed on any test by pressing the specific button available on the details screen. Once the operation has been performed, it can no longer be cancelled.

The available test methodologies are presented in the following paragraphs.

6.1 - Conconi Test

Used to measure the *anaerobic threshold* (i.e. the level of effort at which the lactic acid produced exceeds the level that can be eliminated by the organism, thus making it build up in the blood and in the muscles), this is an *incremental/maximal* test that is conducted with the support of a heart rate monitor.

The user is subjected to increasing work loads, at the end of which the associated heart rate is measured from time to time. If the test is performed correctly, the resulting graph will show a point in which the gradient changes suddenly, which corresponds to the anaerobic threshold that was searched.

Take into account that, given the fact that it is a maximal test, it is not suitable for assessing individuals who are not trained or who have physical problems, as it is potentially dangerous.

6.2 - Mader Test

Used also to measure the *anaerobic threshold* (see the previous paragraph), it is a *rectangular/submaximal* test that requires using a lactic acid measuring device and, if possible, a heart rate monitor.

The user is subjected to constant or increasing work loads, alternated with possible recovery pauses. At the end of each sample, the lactic acid concentration in blood is measured, and also in this case the resulting graph will show a point in which the gradient changes suddenly, which corresponds to the anaerobic threshold that was searched.

7 - EQUIPMENTS

At the beginning of a new training session, where possible, the user is asked to select among his/her equipments the one that will actually be used. The reason for this is that the calculation of some data, mainly calories and power, may be influenced by the specific characteristics of each of such tools.

During the definition of a new equipment, information related to the type of instruments that will be used and their weight is requested. Moreover, in order to be enabled, an indoor test and an outdoor test (both of them closed) performed with the device must be associated with it.

Once an equipment has been completely defined, it will be displayed in stand-by (grey) until the server calculates the necessary parameters and makes them available. Once such parameters have been downloaded during the synchronization, the equipment will become automatically active (blue) and can be used normally.

No more than five equipments can be active simultaneously. In any case, from the specific screen, they can be temporarily enabled/disabled.

An active equipment can also be defined as the default device. In this way, it will not be necessary to repeat its selection every time a new session is to be performed because the association will be automatically made (at any rate, it will remain modifiable in case a different device must be used).

8 - MODELS

Models are the essential components for the *Manual* and *Automatic* types of training. As it will be seen in the following chapter, before being able to create a customised training table, it is necessary to define the models of its sessions, which, in turn, are made up of models of the subsessions involved.

Remember that a model can always be modified, but the changes are not reflected on the previous entities that were created using such model. For example, when the structure of a session model is modified, those sessions that have already been created using such model will not be modified, whereas those that will be created in the future will use the new structure.

8.1 - Subsession models

The main screen shows a list, ordered by name, of the models already created. Click on one of them to display its details, with the possibility of modifying them. On the top of the screen, there is a button to create a new model.

8.2 - Session models

As in the previous paragraph, the main screen lists the models already created, with the possibility of accessing their details. Also in this case, both the model and the subsessions involved can be modified. In the second case, the changes will not affect the original subsession model, but only the interior of the current session model.

9 - CALENDAR

The calendar is the essential component for managing training tables. In fact, from here you can see the list of the training sessions waiting to be performed, with the relative foreseen date. For the sake of convenience, they are subdivided in three sheets:

- *All*: it shows all the training sessions.
- *Manual*: it only shows the training sessions associated to tables created by the user.
- *Automatic*: it only shows the training sessions associated to tables created by SportPlusHealth.

Click on a training session to access its details, including the final list of the subsessions of which it is made up. Only in the case of Manual programmes, is it possible to reschedule a training session by modifying its foreseen execution date.

To execute a session, such session must be selected from the menu described in the third chapter. Please note that there are some constraints in this case:

- A training session cannot be brought forward more than twelve hours with respect to the foreseen beginning;
- A manual training session that has accumulated a three-day delay is automatically removed, disappearing from the list of sessions waiting to be performed;
- An automatic training session that has accumulated a delay of more than four days may lead to a local restructuring of the training table, causing the repetition of the last session that was performed.
- An automatic training session that has accumulated a delay of more than two weeks may lead to a deep restructuring of the training table, causing the repetition from the beginning of the entire table.

10 - SYNCHRONIZATION

The synchronization process is the data exchange between the app and the *SportPlusHealth* server during which they are reciprocally shared and updated. In this way, any operation performed on the website[2] (e.g. the definition of a new training table) will be reproduced on the smartphone, while the data present on the latter (e.g. a new training session) will be made available from the site interface.

Synchronization is completely automated. If a data network is available, launching it from the specific menu item on the main screen and waiting until it is completed will be enough.

If, once the process has ended, not all the devices have been enabled, try again later so as to give our servers time to complete all the necessary data processing operations.

[2] http://www.sportplushealth.com

11 - USER PROFILE

The user profile contains the necessary personal information to identify the user. We can subdivide such information into *personal data*, *physical parameters* and *avatars*. For more details, refer to the following paragraphs.

For the guarantees on the privacy of personal data, refer to the licence that is available the first time the app is opened and on the website3.

11.1 - Personal data

This group includes useful information to identify the account holder, and, if necessary, to cross his/her payment information. Even though they are not essential data, users are asked to provide truthful information.

11.2 - Physical parameters

For the app operation, this is the most interesting part. As a matter of fact, data such as age, weight and height are used while recording a training session or a test in order to obtain information as specific as possible for the individual.

11.3 - Avatars

Avatars are used in the social part of the website as well as to quickly identify the relative account on shared computers.

[3] http://www.sportplushealth.com

12 - SETTINGS

By means of the settings, users can customise the app by selecting, for instance, which data are to be displayed on the tachometer or are to be listened to in the vocal messages that provide information about the progress of the training session, or connect to the application a wide range of external devices such as heart rate monitors, cadence sensors or power meters (for the complete list of the supported devices, visit the website4) in order to obtain better data accuracy.

12.1 - Account information

By clicking on this section you will be directed to a new screen showing the current account level with the relative expiry, and a summary of the advanced functions that are currently available (shown in green).

12.2 - Barometer

If this item is available, it should be activated, thus enabling the reading of the data regarding altitude from the sensor integrated in the device. In this way, more accurate data that will complete the values obtained by the GPS can be retrieved.

Attention: the barometer is not present in all the devices available on the market.

12.3 - Heart rate monitor

If you have heart rate monitors that work using Bluetooth in version 2.0, 4.0 or the ANT+ standard, you can connect them to the application in order to monitor your heart rate during training.

With your smartphone Bluetooth enabled, select the field relative to the BT2.0 heart rate monitor and you will see the list of devices that are currently already paired to the smartphone (if they are available). Whereas if it is disabled, the list will be empty and you should click on “Bluetooth Settings” in order to solve the problem. If the device is still not visible, follow the steps indicated below from the screen that has just been opened:

1. Launch a new search for devices with the specific button;
2. As soon as the heart rate monitor appears, select it and pair it (it might be necessary to enter the PIN code specified in the device guide);
3. Now the abovementioned list will also include this device.

Whereas if both the heart rate monitor and the smartphone being used are compatible with Bluetooth 4.0, press the relative field and you will be able to select it from a list of the devices that are currently connected. Also in this case, you should make sure that the Bluetooth on the smartphone is enabled. The search for new devices to be paired is launched by the “Update” button, whereas the logic is very similar to the one of the previous case.

Finally, if you are using an ANT+ device, two additional apps supplied by the owners of this protocol and available in the app store must be installed (even though they are often already installed):

- *ANT Radio Service*
- *ANT+ Plugins*

[4] http://www.sportplushealth.com

Select the specific field in order to launch the search for the available heart rate monitors, from where the one desired must be selected (it might be necessary to give a name to them). At this point, the device is already paired and can be used.

As it has already been pointed out, the last device that has been used remains stored in the memory so as to enable an easy use in the following training session. Such preference can be eliminated at any time by pressing the specific red button located next to the title.

12.4 - Cadence sensor

If the bicycle is fitted with a cadence sensor, which establishes communication by using Bluetooth 4.0 or ANT+, it can be connected to the application by selecting the relative option.

For the procedure to be followed in order to connect the device, refer to the previous section. If the cadence sensor is not seen by the smartphone, you should pedal a few metres so as to turn on the device and make it visible.

To manage the preferences and eliminate them, refer to the previous section.

12.5 - Wheel diameter

If the cadence sensor is used, in order to be able to obtain accurate speed measurements, the wheel diameter must be entered. This value can be read on the side of the wheel, or directly measured by using a measuring tape. The diameter entered must take into account the total dimensions, including the tyre.

12.6 - Power meter

If the bicycle is fitted with a power meter, which establishes communication by using the ANT+ protocol, it can be connected to the application by selecting the relative option. In this case, the power readings will come from the sensor rather than from our internal calculation system.

For the procedure to be followed in order to connect the device, refer to the previous section. If the power meter is not seen by the smartphone, you should pedal a few metres so as to turn on the device and make it visible.

To manage the preferences and eliminate them, refer to the previous section.

12.7 - Vocal messages

From here, you can turn on or off the vocal messages that provide information about the progress of the training session. You can select the time or the distance between two messages. Therefore, since the beginning of the training session, every *m* minutes or every *n* kilometres (or miles), you will be informed about the time that has elapsed, the distance that has been covered and one more value to be chosen between speed and step.

12.8 - Tachometer display

The tachometer external arch always shows the speed, while in the internal one you can choose between *heart rate* (a heart rate monitor must be connected) and *power* (not available for all account levels).

When following a manual or automatic type of training, depending on the type of subsession that is currently in progress, the choice made by the user might be ignored in order to show the thresholds to be observed.

12.9 - GPS accuracy

The GPS signal is subject to errors. And in case they are excessively high, the data received will be ignored. It is advisable to select the recommended value so as to reduce troubles on the measurements. However, in some smartphones it might be necessary to increase the value in order to avoid eliminating an excessive amount of data.

12.10 - Energy saving

When energy saving is disabled, the screen is always kept on while recording a training session, so that athletes can see their data effortlessly. On the other hand, when this function is enabled, the screen will turn off automatically after a given inactivity period, as it happens for any other Android app.

12.11 - Long countdown

Once the training session has begun, the countdown gives the user the time needed to put the smartphone back and set off. The countdown default duration is ten seconds. But, if necessary, this time can be extended up to one minute.

12.12 - Automatic stop

If you forget to stop recording once the training session has been completed, the app will analyse the internal sensors and the GPS signal and, after a given time, it will interrupt the recording operation on its own, thus avoiding wasting the battery energy.

12.13 - Automatic synchronization

Every time the app is opened, if new data are available on the server or on the smartphone, synchronization can be automatically started. In order to limit the involuntary use of the data network, which is not available on all devices, automatic synchronization takes place only in case of being connected to a Wi-Fi network.

12.14 - Tips & Tricks

This function gives users a series of pop-ups that will be shown every time an app function has to be explained, providing advice on how to act.

12.15 - Last position

For greater personal safety, by enabling this function, your relatives or friends will be able to monitor in real time your position and some training data. Your trainer could also follow the session live, thus optimising physical training.

13 - ACCOUNT LEVELS

There are different types of licences for using the app, some of which are to be paid, which give access to an increasing number of functions. During the app use, the sections that are locked can be easily recognised because of their icon with yellow background indicating the minimum level that is necessary to have access to them.

The following diagram shows the levels that are available with the relative differences. For more information, visit the website5.

[5] http://www.sportplushealth.com

FEATURES	ACCOUNT LEVELS				
	Zero / Guest	Basic	Advance	Professional	Trainer
Audio feedback		√	√	√	√
Automatic and manual session scheduling			√	√	√
Bluetooth and ANT+ sensors	√	√	√	√	√
ANT+ Power meter				√	√
Conconi test			√	√	√
Mader test				√	√
Power computation				√	√
Weather conditions			√	√	√
Synchronization		√	√	√	√
Paths and sessions sharing		√	√	√	√
Supervisor mode			√	√	√
Multiple accounts					√