# Player Analysis Technology Approval report

## Babolat PLAY Pure Drive

**Test code:** PAT-13-004

**Serial no:** KH312151

**Software version(s):**
Babolat PLAY app: Android 1.0.2; iOS 1.0
Babolat Connect: Windows 20131218; Mac 20131218 (not tested)

**Firmware version(s):** 9.0.24

**Issue date:** 21 January 2014

**Revision date:** 25 July 2016 (firmware update, assimilated products)

**Assimilated products:** Babolat PLAY AeroPro Drive, Babolat PLAY PureAero, Babolat PLAY Pure Drive (v2), Babolat PLAY Pure Drive Lite.

**Objective:** To test and evaluate the Babolat PLAY Pure Drive Player Analysis Technology according to Rule 31 of the 2014 Rules of Tennis.

**Result:** Approved


SUMMARY

Electronic sensors are embedded in the racket to measure its orientation, acceleration and vibration. Data collected by the racket are sent to an auxiliary device, e.g. a smartphone or personal computer (PC), via a wireless (Bluetooth®) or wired connection.

The racket must be synchronised with a user account on the Babolat PLAY server in order to download data using the auxiliary device. The auxiliary device authenticates the racket's association with a user account prior to download.

Coaching information, such as racket swing speed and impact location on the strings, is available on an auxiliary device with active internet connection.

Restrictions on the access by a player to Babolat PLAY Pure Drive components during periods when coaching is and is not allowed are as follows:

| COMPONENT | NO COACHING | COACHING |
|---|---|---|
| Racket | Permitted | Permitted |
| Auxiliary device (e.g. smartphone) | Not permitted | Permitted |

## MAIN COMPONENTS

The main components of the system are described in table 1 and depicted in figure 1.

| COMPONENT | FUNCTION(S) |
|---|---|
| Racket with embedded electronics | Record motion and vibration of the racket, store and transmit data |
| Babolat PLAY app | Communicate and transmit data |
| Babolat Connect software | Transmit data and update racket firmware |
| Babolat PLAY server | Store and process data |
| babolatplay.com website | Communicate data |
| Auxiliary device (e.g. smartphone) | Communicate and transmit data |

Table 1. Description of the components of the Babolat PLAY Pure Drive system.

Figure 1. Components of the Babolat PLAY Pure Drive system: racket (left) and auxiliary device (smartphone).

## DATA CAPTURE AND TRANSMISSION

Electronic sensors (a triaxial gyroscope and triaxial accelerometer) are mounted in the racket handle to measure its orientation and acceleration. A piezoelectric sensor is also attached to the frame to measure its vibration (on impact with the ball).

The racket must be synchronised with a user account on the Babolat PLAY server in order to download data. Synchronisation of the racket can be achieved via:

1. Wireless (Bluetooth®) connection to a smartphone or tablet with the Babolat PLAY app
2. Wired (USB) connection to a personal computer (PC/Mac) with the Babolat Connect software

Initial synchronisation registers (associates) the racket to a unique user account. Data stored on the racket can only be downloaded to the registered user account. The racket can be re-registered to a new user account, but no historic data (from a previous user) can be downloaded as all data on the racket are deleted during re-registration.

Data capture is started by pressing the power button on the butt cap (see figure 2). A slow-flashing blue light is emitted below the button, indicating the racket is ‘on’ (sensors are active). The player can now begin to play with the racket and its motion is recorded. Data capture is stopped by pressing the power button again (the light turns off) or after 10 minutes of inactivity.

Figure 2. Power button (top) and Bluetooth® button on butt cap.

Figure 3. USB connection to the racket.

Data can be transmitted from the racket to an auxiliary device via Bluetooth® wireless connection or USB cable. The Bluetooth® radio is turned on by pressing the Bluetooth® button on the butt cap (see figure 2). A slow-flashing purple light is emitted above the button, indicating that the racket is discoverable (can be paired) to a Bluetooth® enabled auxiliary device. Alternatively, a USB cable can be connected to a micro-USB port housed under the butt cap (see figure 3).

The user must be logged in to their Babolat PLAY account on the auxiliary device connected to the racket, either using the Babolat PLAY app or Babolat Connect software, in order to synchronise the (registered) racket and download the data (encrypted). Therefore, the auxiliary device requires internet access to download data from the racket. Downloading removes the data from the racket and turns it off. This protocol prevents 'streaming' of data from the racket whilst playing, i.e. collecting and downloading data simultaneously.

COMMENTS

The racket must be switched on (at the butt cap) to record data. Data can only be downloaded to the racket's registered user account (on the Babolat PLAY server). The encrypted data transfer can be wireless (Bluetooth®) or wired (USB), but must be to an auxiliary device with an active internet connection. This procedure protects against unauthorised access to the data.

The racket automatically switches off once the download is complete, preventing the ability to 'stream' data (i.e. collect and download data simultaneously).

## DATA PROCESSING AND COMMUNICATION

Access to processed data is via the Babolat PLAY app or babolatplay.com, which both require internet connection for the user to log in to their account.

Information available on the auxiliary device includes: duration of the session, number and classification of shots (i.e. forehand/backhand/serve/smash/volley), 'power' (racket head speed), serve speed (estimate), type of ball spin (flat/topspin/backspin), and ball impact location on the stringbed.

The user can specify their data sharing preferences with the Babolat PLAY community (i.e. other users) in their user account settings: closed (no sharing); restricted (limited data sharing); or open (full data sharing). A player can nominate another Babolat PLAY registered user as a coach, thereby permitting all data to be shared with a specific individual.

COMMENTS

The racket does not have a means to communicate data collected. An auxiliary device with internet access is required to download the data from the racket, and subsequently display the data.

Coaching information is available on the auxiliary device. Therefore, players must not have access to auxiliary devices, e.g. smartphone, tablet, laptop, when coaching is prohibited.

## ADDITIONAL INFORMATION

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