# SleepCare Communication Protocol

# V0.6

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# Document history

| Date | Version | Description |
|---|---|---|
| 09/18/2016 | 0.1 | Created. |
| 10/10/2016 | 0.2 | Add “Erase Command”.<br>Add data transmission end flag. |
| 11/21/2016 | 0.3 | Fix.<br>Delete “Device ID”.<br>Add command example. |
| 12/01/2016 | 0.4 | Fix.<br>Add version commands of both Hardware and Firmware. |
| 12/07/2016 | 0.5 | Add commands to obtain size of memory and total number of records. |
| 12/30/2016 | 0.6 | Add commands to set system language.<br>Add demo source link.<br>Add commands to fetch perfusion index records. |

# Introduction

This document is a detailed description of Communication with the SleepCare device.

Any doubts about this document, please consult the technical support of Shanghai Berry Electronic Tech Co., Ltd.

# Transmission

- **BLE(Bluetooth Low Energy).**
- **Services & Characteristics.**

The Bluetooth profile includes a main Communication Service to communicate with other smart terminals.

The Communication Service includes two Characteristics. One is a *notification* characteristic to obtain data from the device, the other one is a *write* characteristic to write command to the device.

- **UUIDs.**

| | |
|---|---|
| Communication Service | "49535343-fe7d-4ae5-8fa9-9fafd205e455" |
| Notification Characteristic | "49535343-1e4d-4bd9-ba61-23c647249616" |
| Write Characteristic | "49535343-8841-43F4-A8D4-ECBE34729BB3" |

# Packet format

| Package Head | Package Length | Package Content | Check Sum |
|---|---|---|---|
| 0x55 0xAA | N | A1,A2,...,An | SUM |

- Package Head: 0x55 0xAA. 2 fixed bytes；
- Package Length: Total bytes exclude “Package Head”,“ N = n + 2, (n is the subscript of An). 1 byte.
- Package Content: Composed by REAL data, more details are described below， n bytes;
- Check Sum: SUM = ~(N+A1+A2+...+An), “~” means NOT (Negation operator), 1 byte;

# Package Content

## Commands (Smart terminals -> SleepCare devices)

To obtain the data you want, send the related command via the *write* characteristic, then the data you want will be send out from the *notification* characteristic.

| Commands | Package Content | | | | | | |
|---|---|---|---|---|---|---|---|
| | Type | Parameters(hex) | | | | | |
| Starting Date & Time | 0x00 | N/A | | | | | |
| Ending Date & Time | 0x01 | N/A | | | | | |
| SpO2 | 0x02 | N/A | | | | | |
| Pulse Rate | 0x03 | N/A | | | | | |
| R-R Interval | 0x04 | N/A | | | | | |
| Accelerometer State | 0x05 | N/A | | | | | |
| Perfusion Index | 0x06 | N/A | | | | | |
| Battery Level | 0x10 | N/A | | | | | |
| Current Date & Time | 0x11 | N/A | | | | | |
| Record State | 0x13 | N/A | | | | | |
| Buzz State | 0x14 | N/A | | | | | |
| Record Count | 0x15 | N/A | | | | | |
| Toggle Record | 0x20 | 00 Stop Recording | | | | | |
| | | 01 Start Recording | | | | | |
| Toggle Buzz | 0x21 | 00 Switch off buzz | | | | | |
| | | 01 Switch on buzz | | | | | |
| Setup Date & Time | 0x22 | Year | Month | Day | Hour | Minute | Second |
| Setup Language | 0x23 | 00 Chinese | | | | | |
| | | 01 English | | | | | |
| Erase Data | 0x30 | N/A | | | | | |
| Firmware Version | 0xE0 | N/A | | | | | |
| Hardware Version | 0xE1 | N/A | | | | | |
| Memory Size | 0xE2 | N/A | | | | | |

**Starting Date & Time.** Get the date and time of the record starts. *(55 aa 03 00 fc)*
**Ending Date & Time.** Get the date and time of the record ends. *(55 aa 03 01 fb)*
**Spo2.** Get SpO2 Level. *(55 aa 03 02 fa)*
**Pulse Rate.** Get pulse rates. *(55 aa 03 03 f9)*

**R-R Interval.** Get Intervals. *(55 aa 03 04 f8)*
**Accelerometer State.** Get Accelerometer State. *(55 aa 03 05 f7)*
**Perfusion Index.** Get perfusion index. *(55 aa 03 06 f6)*

**Battery Level.** Get Battery Level. *(55 aa 03 10 ec)*
**Current Date & Time.** Get the Date and time of the device. *(55 aa 03 11 eb)*
**Record State.** Get the State of Record, during recording or finished. *(55 aa 03 13 e9)*
**Buzz State.** The Buzz is enable or disable. *(55 aa 03 14 e8)*
**Record Count.** Get the total number of records. (*55 aa 03 15 e7)*

**Toggle Record.** Start or stop record. *(start: 55 aa 04 20 01 da stop:55 aa 04 20 00 db)*
**Toggle Buzz.** Enable or disable the Buzz. *(turn on: 55 aa 04 21 01 d9 turn off:55 aa 04 21 00 da)*
**Setup Date & Time.** Setup the date and time of the device. *(55 aa 09 22 10 0b 04 10 02 00 a3)*
**Setup Language.** Setup system language: Chinese or English. *(Chinese: 55 aa 04 23 00 d8, English: 55 aa 04 23 01 d7)*

**Erase Data.** Erase all records,unrecoverable. *(55 aa 03 30 cc)*

**Firmware Version.**Get Firmware version. *(55 aa 03 e0 1c)*
**Hardware Version.**Get Hardware version. *(55 aa 03 e1 1b)*
**Memory Size.**Get the size of memory inside. *(55 aa 03 e2 1a)*

## **Data**( SleepCare devices -> Smart terminals)

The chart below is the data format of the data sending out from the device.

| Data | Package Content | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Type | Parameters(hex) | | | | | | |
| Starting Date & Time | 0x00 | Year | Month | Day | Hour | Minute | Second | |
| Ending Date & Time | 0x01 | Year | Month | Day | Hour | Minute | Second | |
| SpO2 | 0x02 | SpO2(1) | | • • • | | SpO2(n) | | |
| Pulse Rate | 0x03 | PR(1) | | • • • | | PR(n) | | |
| R-R Interval | 0x04 | RR(1)H | RR(1)L | • • • | | RR(n)H | RR(n)L | |
| Accelerometer State | 0x05 | X(1) | Y(1) | Z(1) | • • • | X(n) | Y(n) | Z(n) |
| Perfusion Index | 0x06 | PI(1) | | • • • | | PI(n) | | |
| Battery Level | 0x10 | Level | | | | | | |
| Current Date & Time | 0x11 | Year | Month | Day | Hour | Minute | Second | |
| Record State | 0x13 | 00 not start yet. | | | | | | |
| | | 01 during recording. | | | | | | |
| | | 02 finished. | | | | | | |
| Buzz State | 0x14 | 00 disable. | | | | | | |
| | | 01 enable. | | | | | | |
| Record Count | 0x15 | Count_H | | Count_M | | Count_L | | |
| Erase Response | 0x30 | 00 success. | | | | | | |
| | | 01 fail. | | | | | | |
| Firmware Version | 0xE0 | Less then 16 bytes ASCII string. | | | | | | |
| Hardware Version | 0xE1 | Less then 16 bytes ASCII string. | | | | | | |
| Memory Size | 0xE2 | 04 4M | | | | | | |
| | | 08 8M | | | | | | |

**Starting Date & Time. (0x00)**

6 bytes of date and time.

| Year | Month | Day | Hour | Minute | Second |
|---|---|---|---|---|---|

**Ending Date & Time. (0x01)**

6 bytes of date and time.

| Year | Month | Day | Hour | Minute | Second |
|---|---|---|---|---|---|

**Spo2. (0x02)**

N bytes of SpO2 level. Range:[0-100], Invalid value:0x7f.

| | | |
|---|---|---|
| SpO2(1) | • • • | SpO2(n) |

If n equals zero, indicate that the transmission of SpO2 is over.

**Pulse Rate.(0x03)**

N bytes of pulse rate. Range:[0-250], Invalid value:0xff.

| | | |
|---|---|---|
| PR(1) | • • • | PR(n) |

If n equals zero, indicate that the transmission of pulse rates is over.

**R-R Interval.(0x04)**

2*N bytes of R-R interval. Each interval have two bytes(RRH & RRL).

| | | | | |
|---|---|---|---|---|
| RR(1)H | RR(1)L | • • • | RR(n)H | RR(n)L |

If n equals zero, indicate that the transmission of R-R intervals is over.

**Accelerometer State.(0x05)**

3*N bytes of Accelerometer State. Each state have three bytes of x, y, z.

| | | | | | | |
|---|---|---|---|---|---|---|
| X(1) | Y(1) | Z(1) | • • • | X(n) | Y(n) | Z(n) |

If n equals zero, indicate that the transmission of Accelerometer States is over.

**Perfusion Index.(0x0)**

N bytes of perfusion.

| | | |
|---|---|---|
| PI(1) | • • • | PI(n) |

If n equals zero, indicate that the transmission of perfusion index is over.

**Battery Level.(0x10)**

1 byte of Battery Level. Range[0:100].

**Current Date & Time.(0x11)**

6 bytes of date and time.

| | | | | | |
|---|---|---|---|---|---|
| Year | Month | Day | Hour | Minute | Second |

**Record State.(0x13)**

1 byte of state.

| | |
|---|---|
| 0x00 | not start yet. |
| 0x01 | during recording. |
| 0x02 | finished. |

**Buzz State.(0x14)**

1 byte of state.

| | |
|---|---|
| 0x00 | disable. |
| 0x01 | enable. |

**Record Count.(0x15)**

3 byte for the total number of records.

[*Record Count = (Count_H << 16 ) + (Count_M << 8 ) + Count_L*]

**Erase Response.(0x30)**

1 byte of response.

| | |
|---|---|
| 0x00 | success. |
| 0x01 | fail. |

**Firmware Version.(0xE0)**

Less then 16 bytes ASCII string.

**Hardware Version.(0xE1)**

Less then 16 bytes ASCII string.

**Memory Size.(0xE2)**

One byte for size of memory inside.

| | |
|---|---|
| 04 | 4M |
| 08 | 8M |

# Demo

We provide you a simple demo for your reference, if you have any other issues about this protocol, please consult with the technical support.

Demo Source: https://github.com/zh2x/SleepCareTest