

# **SleepCare Communication Protocol**

**V0.7**

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## Document history

Date	Version	Description
09/18/2016	0.1	Created.
10/10/2016	0.2	Add "Erase Command". Add data transmission end flag.
11/21/2016	0.3	Fix. Delete "Device ID". Add command example.
12/01/2016	0.4	Fix. 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. Add demo source link. Add commands to fetch perfusion index records.
09/01/2017	0.7	Add command to get the device ID. Add multiple data unified command sent.

## 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:  $SUM = \sim(N+A1+A2+...+An)$ , " $\sim$ " 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					
Batch	0x0F	Param1			Param2		
Battery Level	0x10	N/A					
Current Date & Time	0x11	N/A					
Device ID	0x12	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. [\(55 aa 03 06 f6\)](#)

**Batch.** Get Data.

Param1

BIT0 :

1 : Get SpO2 Level

BIT1 :

1 : Get Pulse Rate

BIT2 :

1 :Get R-R Interval  
BIT3 :  
1 :Get Accelerometer State  
BIT4 :  
1 : Get Perfusion Index  
BIT7~BIT5 : reserved  
Param2 : reserved  
e.g. (55 aa 05 0f 1f 00 ac)

**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)

**Device ID.** Get Device ID. (55 aa 03 12 ea)

**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	
Device ID	0x12	ID    Range[0:99].						
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
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**Ending Date & Time. (0x01)**

6 bytes of date and time.

Year	Month	Day	Hour	Minute	Second
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**SpO2. (0x02)**

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

SpO2(1)	• • •	SpO2(n)
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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)
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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
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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)
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If n equals zero, indicate that the transmission of Accelerometer States is over.

**Perfusion Index.(0x06)**

N bytes of perfusion.

PI(1)	• • •	PI(n)
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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
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**Device ID.(0x12)**

1 byte of Device ID. Range[0:99].

**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.
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0x01	enable.
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**Record Count.(0x15)**

3 byte for the total number of records.

$[Record\ Count = (Count\_H \ll 16) + (Count\_M \ll 8) + Count\_L]$

**Erase Response.(0x30)**

1 byte of response.

0x00	success.
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0x01	fail.
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**Firmware Version.(0xE0)**

Less than 16 bytes ASCII string.

**Hardware Version.(0xE1)**

Less than 16 bytes ASCII string.

**Memory Size.(0xE2)**

One byte for size of memory inside.

04	4M
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08	8M
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## 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>