Pally Smart Smart Scale Specification

Revision: 20130124

PCB board number：HC-BLE01V01

Authors: Jeffrey Peng, Charlie Xia
Ace Sensor Inc.
Version 2: Sept. 12th 2012
Version 3: Jan. 4th 2013
Version 4: Jan. 24th 2013

Pally Smart Scale is a Bluetooth Smart connected scale. It has an embedded TI CC2541 for connection with smartphone or tablets via Bluetooth Low Energy. A free companion iOS app "Smart Weight - Bluetooth Smart Health Scale" can be downloaded from Apple iTune App store at https://itunes.apple.com/app/id608426903

1. Pally Smart Scale

- Features
    1. Store 3000 weight measurements and transmit to smart phone or tablet over Bluetooth 4.0；
    2. Step-on technology. Scale turns on when a person steps on.
    3. Extra large 4.3 inch display with back-light, wide viewing angle
    4. High precision sensors measuring in 0.1 lb / 50 g increments to a capacity of 440 lb / 200 kg. Minimal weight: 11 lb/5kg.
    5. Extra-wide and extra-thick platform with attractive glass surface.
    6. Long battery life: more than 5 years. 4xAA batteries included.
    7. Free Smart Weight iPhone application supporting multiple users with auto reorganization, privacy protection and weight trend graph.

- LCD Display：
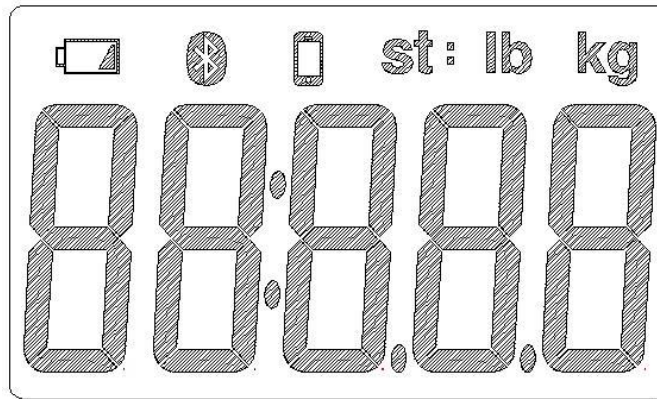
- Functions:
    1. Standard bathroom scale
    2. Weighing range：5kg-200kg
    3. Resolution：50g
    4. Large 4.3 inch display with back-light, wide viewing angle
    5. Weight unit selection switch：lb/kg/st. MCU can change display unit based on commands from BLE module. After auto power off, the unit is turned back to weight unit selection switch setting. Factory default: lb.
    6. Step-on technology. Scale turns on when a person steps on.
    7. When weighing result is acquired, the display flashes the result 3 times. LCD maintains the display for 10 second. If there's no additional action,

scale goes into auto power off.

8. BLE module is always on. Even during auto power-off, data can still be accessed via BLE.

9. Real-time BLE data transmission. Allows measuring data on the scale to be sent over BLE in real-time.

10. Overload display: if weight is over 200kg, display show "oVEr" and "LoAd", each word is displayed for 1 second, repeat 3 times before auto power-off.
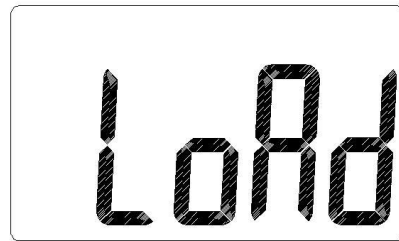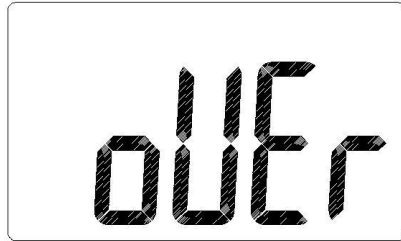
11. When battery run low，the battery sign ▭ on LCD flashes and goes into auto power-off after 5 seconds.

12. MCU on the scale lights up the Bluetooth sign ❈ on LCD based on the command from the BLE module. When a smart phone connects to the scale, the Bluetooth sign is lit up. When there's no connection, the sign is turned off.

13. MCU on the scale scale lights up the smartphone sign ☐ on LCD based on the command from the BLE module. The smartphone sign flashes to request user to pair-up or connect a smart phone to the scale.

14. Power source: DC 6v (4*AA), BLE module voltage: DC 3v.

15. BLE module is always powered on. BLE module power consumption at working mode is 10mA. In sleep mode, power consumption is 1uA.

- Weight display：

Two digits after the decimal point when weight unit is kg.
One digit after the decimal point when weight unit is lb and st:lb.

- Usage

First Use：
1. Launch iPhone app which should find the scale within range.
2. Press the Pairing button at the back of the scale to pair up the iPhone and the scale.
3. The clock and time in the scale will be set or updated.
4. Step on the scale and stand still. The display flashes 3 times to indicate proper weight being measured. The measurement will be display for 10 seconds.
5. The Bluetooth sign lights up if it's connected to an iPhone nearby.
6. Scale display powers off if there's no operation within 10 seconds.


Regular Use:
1. When the scale is not connected to an iPhone, the LCD displays only the weight measurement and the weight unit. The result is sent to the BLE module.

2. When the scale is connected to an iPhone, the Bluetooth sign on the LCD is lit up. Measurements not downloaded before are sent to the iPhone.
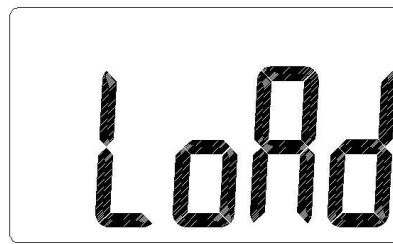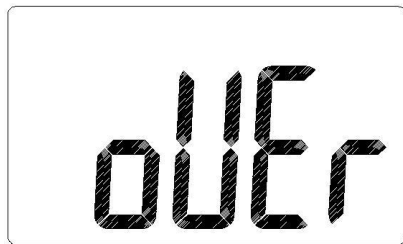
3. If the clock in the scale is not set, the smartphone sign lights up to remind users to pair-up or connect an iPhone with the app.
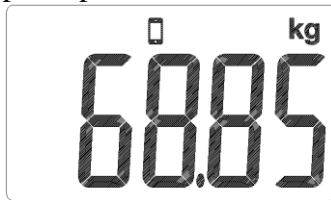
4. When the battery power is low, the battery sign lights up and flashes.

5. When the max weight limit is reached, the LCD display "oVer" and "LoAd" in two screens, 1 second each. Repeat 3 times before powering off.

2. BLE Profile

The BLE scale provides a private profile for authentication, measurement retrieval and notifications. The private profile has two services 0xFAC0 and 0xFBD0.

Service	Characteristics	Type	Property	Security	Description	Value	Comment	Data format
					Real-time weighing service			
	FAC1	uint8	Write		Scale mode setting for the current session. It returns to default after scale sleeps			
FAC0	FAC2	uint16	Notify		Notification of intermediate results	Weight		
	FAC3	byte[6]	Indicate		Final result with time stamp	UTCTime	Weight	
					Measurement record service			
	FBD1	uint32	Read/Write	Auth	UTC time setting	UTCTime	number of seconds since 0 hrs, 0 minutes, 0 seconds, on the 1st of January 2001 UTC	
	FBD2	uint32	Write	Auth	Inquire record start time	UTCTime		
FBD0	FBD3	uint16	Indicate	Auth	Response with the number of records			
	FBD4	uint16	Read/Write	Auth	Transmission speed			
	FBD5	byte[18]	Notify	Auth	Notification of records	3 records	UTCTime	Weight
Meaning of the values								
	Characteristics	Value	Description					
	FAC1	0x00	Store the measurement results					
		0x01	Don't store the results					
		0xF0	Disconnect					
		0xF1	Set display unit to KG					
		0xF2	Set display unit to ST-LB					
		0xF3	Set display unit to LB					

	FAC2		Open notification and wake up the scale
	FBD3	0xBXXX	Pairing state notification。BX is state. B0:Pairing started, B1:Pairing complete, B2:Devices bonded。 XX is result code.00: SUCCESS
		0xFEXX	Attribute writing notification。XX is ATT_ERR_CODE，0x05 is ATT_ERR_INSUFFICIENT_AUTHEN
	FBD4	0xFFFE	Delete all records
		0xFFFB	Delete all pairing