

Demo APP for MicroLifeDeviceSDK (Android)

Table of Contents

Chapter 1	Development Environment
Chapter 2	Entry Point and Bluetooth LE Protocol
Chapter 3	BPM APIs
Chapter 4	User Interface of Demo App
Chapter 5	Functionality of Demo App
	Appendix

Chapter1 Development Environment

1.1 The supported SDK version is as follow:

```
compileSdkVersion 26
buildToolsVersion '26.0.3'

defaultConfig {
    minSdkVersion 19
    targetSdkVersion 26
    versionCode 1
    versionName "1.3"
}
```

1.2 Add the library “sdk-release.arr” into the “libs” directory.

1.3 In the “build.gradle”, add the description as bellows.

```
compile(name:'sdk-release', ext:'aar')
compile(name:'scaleblesdk-v1.4.0', ext:'aar')
```

Chapter2 Entry Point and Bluetooth LE Protocol

The “ChoseActivity” is the entry point of the sample application. The “BPMTestActivity” is dedicated to the device of general Blood Pressure Monitor (Bluetooth LE).

```
<activity
    android:name=".BPMTestActivity"
    android:screenOrientation="portrait"
    android:windowSoftInputMode="stateHidden" />
<activity
    android:name=".WeightTestActivity"
    android:screenOrientation="portrait"
    android:windowSoftInputMode="stateHidden" />
<activity
    android:name=".BtTestActivity"
    android:screenOrientation="portrait" />
<activity
    android:name=".WBPTTestActivity"
    android:screenOrientation="portrait" />
<activity
    android:name=".ChoseActivity"
    android:screenOrientation="portrait">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
<activity android:name=".ConnectionActivity">
```

2.1 Initialize the instance “bpmProtocol”. This is to fulfill Bluetooth LE features and connection sequence.

```
//Initialize the connection SDK
Global.bpmProtocol = BPMPProtocol.getInstance(activity this, is false, is true, Global.sdkid_BPM);
Global.bpmProtocol.setOnConnectStateListener(this);
Global.bpmProtocol.setOnDataResponseListener(this);
Global.bpmProtocol.setOnNotifyStateListener(this);
Global.bpmProtocol.setOnWriteStateListener(this);
```

2.1.1 The “setOnConnectStateListener()” is to get the connection status of device.

2.1.1 The “setOnDataResponseListener()” is to get the response from device.

2.1.2 The “setOnNotifyStateListener()” is to get the data which is response from device.

2.1.3 The “setOnWriteStateListener()” is to get the data which is sent to device.

2.2 The “isEnabledBt()” or “isSupportBluetooth()” is to check if the smartphone’s Bluetooth is enabled or not. The “isSupportBluetooth()” will prompt a warning message to inform user to turn on Bluetooth if it is disabled.

Chapter3 BPM APIs

3.1. Instance of Bluetooth LE Protocol :

3.1.1. Interface :

	public static * Protocol getInstance(Activity aty, boolean isSimulation, boolean isPrintLog, String sdkid)
Definition	Initialize Bluetooth LE Protocol for BPM device
Parameter	Activity aty : name of activity or this boolean isSimulation : is simulator or device boolean isPrintLog : is printing log or not. String sdkid : SDK ID of designated device
	<pre>//Initialize the connection SDK Global.bpmProtocol = BPMProtocol.getInstance (aty: this, isSimulation: false, isPrintLog: true, Global.sdkid);</pre>

3.2. Connection State and Result :

3.2.1. Interface :

	public void setOnConnectStateListener(OnConnectStateListener l)
Definition	The “setOnConnectStateListener()” is to get the connection status of device.

3.2.2. Delegate :

	void onBtStateChanged(boolean isEnabled)
Definition	The “onBtStateChanged()” is to monitor the state of Enabled or Disabled.

	void onScanResult(String mac, String name, int rssi)
Definition	This is to get Bluetooth information of devices which discovered in the vicinity.
Parameter	macAddress: MAC of device name: device name RSSI: RSSI

	void onConnectionState(ConnectState state)
Definition	The “onConnectionState()” is to monitor the status of connection.
Parameter	<pre> public enum ConnectState { ScanFinish, //Scan finish Connected, //Connect success Disconnect, //Disconnect ConnectTimeout, //Connection timeout ScaleWake, //Scale Wake [EBodyProtocol limited] ScaleSleep //Scale Sleep [EBodyProtocol limited] } </pre>

3.3. Device scanning or discovery :

3.3.1. Interface :

	public void startScan(int timeout)
Definition	The “startScan()” is for device scanning or discovery. The result will be shown with the “onScanResult”.
Parameter	int timeout

	public void stopScan()
Definition	Terminate the scanning process.

3.3.2. Delegate :

	void onConnectionState(ConnectState state)
Definition	The “onConnectionState()” is to monitor the status of scanning.
Parameter	<pre> public enum ConnectState { ScanFinish, //Scan finish Connected, //Connect success Disconnect, //Disconnect ConnectTimeout, //Connection timeout ScaleWake, //Scale Wake [EBodyProtocol limited] ScaleSleep //Scale Sleep [EBodyProtocol limited] } </pre>

3.4. Connection :

3.4.1. Interface :

	public void connect(String macAddress)
Definition	Connect to device with MAC address.

Parameter	macAddress: MAC of device
-----------	---------------------------

3.4.2. Delegate :

	void onConnectionState(ConnectState state)
Definition	The “onConnectionState()” is to monitor the status of connection.
Parameter	<pre> public enum ConnectState { ScanFinish, //Scan finish Connected, //Connect success Disconnect, //Disconnect ConnectTimeout, //Connection timeout ScaleWake, //Scale Wake [EBodyProtocol limited] ScaleSleep //Scale Sleep [EBodyProtocol limited] } </pre>

3.5. Bonding :

3.5.1. Interface :

	public void bond(String macAddress)
Definition	Binding specified device by MAC
Parameter	macAddress: MAC of device

3.5.2. Delegate :

	void onConnectionState(ConnectState state)
Definition	The “onConnectionState()” is to monitor the status of connection.
Parameter	<pre> public enum ConnectState { ScanFinish, //Scan finish Connected, //Connect success Disconnect, //Disconnect ConnectTimeout, //Connection timeout ScaleWake, //Scale Wake [EBodyProtocol limited] ScaleSleep //Scale Sleep [EBodyProtocol limited] } </pre>

3.6. Disconnection :

3.6.1. Interface :

	public void disconnect()
Definition	Disconnect device.

3.6.2. Delegate :

	void onConnectionState(ConnectState state)
Definition	The “onConnectionState()” is to monitor the status of disconnection.
Parameter	<pre> public enum ConnectState { ScanFinish, //Scan finish Connected, //Connect success Disconnect, //Disconnect ConnectTimeout, //Connection timeout ScaleWake, //Scale Wake [EBodyProtocol limited] ScaleSleep //Scale Sleep [EBodyProtocol limited] } </pre>

3.7. Read all history data from BPM and synchronization :

3.7.1. Interface :

	void readHistoryOrCurrDataAndSyncTiming()
Definition	Read all history data from the BPM and synchronization

3.7.2. Delegate :

	void onResponseReadHistory(DRecord dRecord)
Parameter	DRecord : History Measurement Data Model CurrentAndData : data.currentData & data.MData Model

3.8. Clear all history data from BPM :

3.8.1. Interface :

	void clearAllHistorys()
Definition	Clear all history data from BPM

3.8.2. Delegate :

	void onResponseClearHistory(boolean isSuccess)
Parameter	isSuccess : True of False

3.9. Disconnect the Bluetooth with BPM :

3.9.1. Interface :

	public void disconnectBPM()
Definition	Disconnect the Bluetooth with BPM

3.9.2. Delegate :

	void onConnectionState(ConnectState state)
Definition	The “onConnectionState()” is to monitor the status of connection with WBP device.
Parameter	<pre> public enum ConnectState { ScanFinish, //Scan finish Connected, //Connect success Disconnect, //Disconnect ConnectTimeout, //Connection timeout ScaleWake, //Scale Wake [EBodyProtocol limited] ScaleSleep //Scale Sleep [EBodyProtocol limited] } </pre>

3.10. Read last one data from BPM :

3.10.1. Interface :

	void readLastData()
Definition	Write device Time to BPM

3.10.2. Delegate :

	void onResponseReadLastData (CurrentAndMData dRecord, int historyMeasurementNumber, int userNumber, int MAMState, boolean isNoData)
Parameter	<p>CurrentAndMData dRecord: last 1 data</p> <p>historyMeasuremeNumber : History Measurement Number.</p> <p>The rande of Memory Set = 0 ~ 255</p> <p>userNumber: User Number: User1 = 1, User2 = 2, Guest = 3</p> <p>MAMState: MAM state: 0=MAM disable, 1=Weight off, 2=Weight on, 3=Light off, 4=Light on.</p> <p>isNoData: True or False</p>

3.11. Write a new user ID & Age to BPM :

3.11.1. Interface :

	<code>public void writeUserData(String ID, int age)</code>
Definition	Write a new user ID & Age to BPM
Parameter	ID : User ID with 11 bytes (maximal) Age : User age from 18 to 80.

3.11.2. Delegate :

	<code>void onResponseWriteUser(boolean isSuccess)</code>
Parameter	isSuccess : True or False

3.12. Clear last one data of BPM :

3.12.1. Interface :

	<code>public void clearLastData()</code>
Definition	Clear last one data of BPM

3.12.2. Delegate :

	<code>void onResponseClearLastData(boolean isSuccess)</code>
Parameter	isSuccess : True or False

3.13. Read user ID and version data from BPM :

3.13.1. Interface :

	<code>public void readUserAndVersionData()</code>
Definition	Read user ID and version data from BPM.

3.13.2. Delegate :

	<code>void onResponse readUserAndVersionData(User user, VersionData versionData)</code>
Parameter	User : User Info VersionData : Device Info

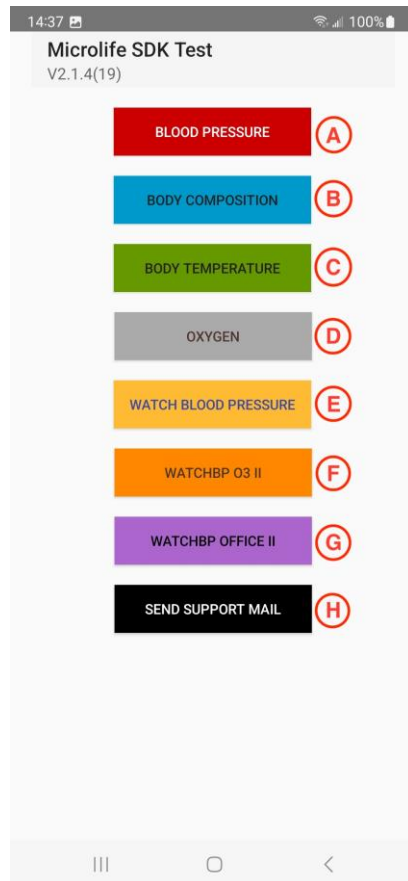
Chapter4 User Interface of Demo App

4.1. Version:

4.1.1. Demo App version as V2.1.4, the (19) is build count.

4.2. Getting Started :

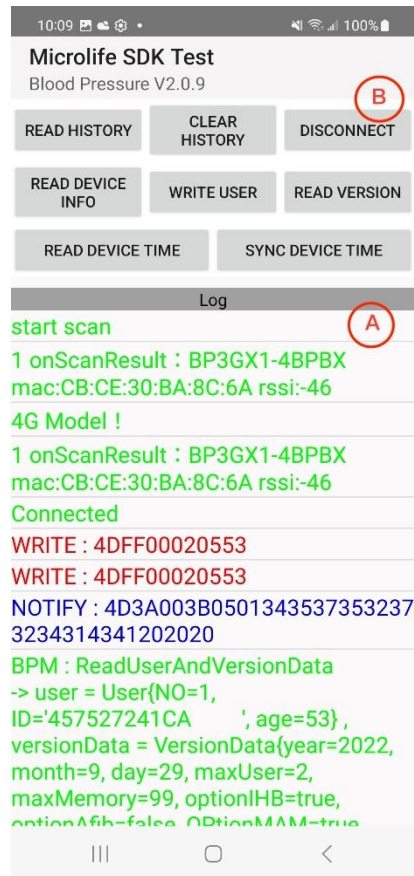
Start the app and then select the button “Blood Pressure ” / “A” to communicate with the designate device BPM.



4.3. Operation Sequence :

- 4.3.1. The scanning (discovery) is automatically run to discover devices in the vicinity.
- 4.3.2. If a device is bonded, it will be connected accordingly. If not, the “bindingDevice” can be used to run bonding process.

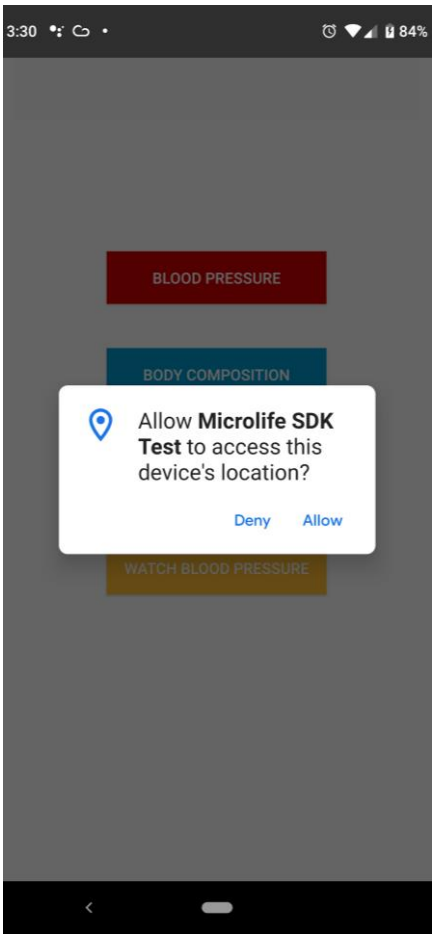
4.4. Operating Interface and Sequence :



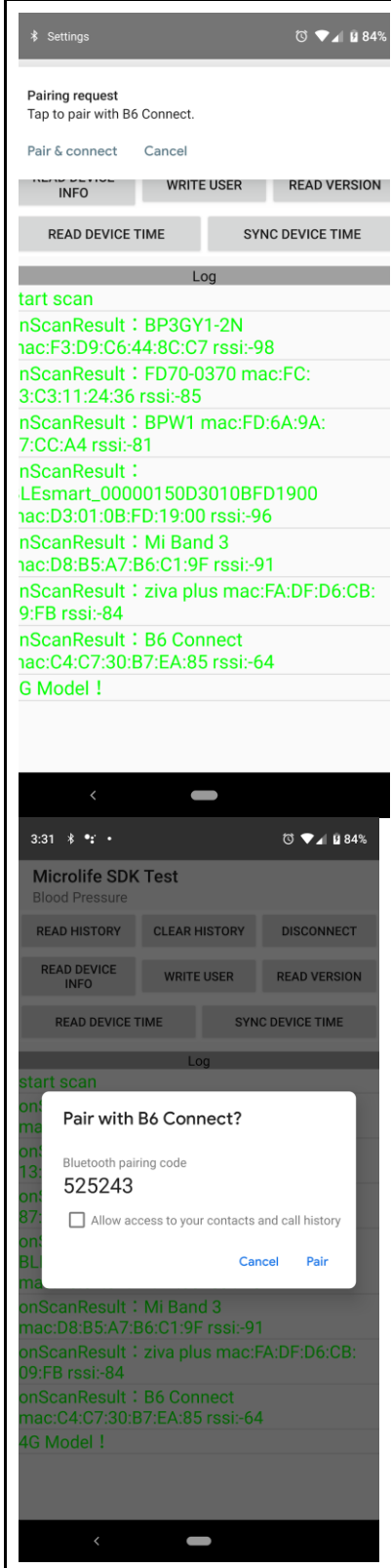
- 4.4.1. Region A : The log window is used to display information about communication handshake between App and device.
- 4.4.2. Region B : This part is to communicate with the device BPM by different functions / commands such as data transferring, synchronization and so on.
- 4.4.3. Refer to “BPMTestActivity” from the demo application (sample code) to get more detailed.

Chapter5 Functionality of Demo App


5.1. Bluetooth authorization :

 A screenshot of an Android application interface. At the top, the status bar shows the time 3:30, signal strength, Wi-Fi, and 84% battery. The app's main screen has a grey background with three buttons: 'BLOOD PRESSURE' (dark red), 'BODY COMPOSITION' (teal), and 'WATCH BLOOD PRESSURE' (olive green). A white location permission dialog is centered on the screen, asking 'Allow Microlife SDK Test to access this device's location?' with 'Deny' and 'Allow' options. The bottom of the screen shows the Android navigation bar with back, home, and recent apps icons.	<p>1. Request for Bluetooth permission.</p>
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5.2. Pairing / Bonding :

 <p>The top screenshot shows the 'Settings' screen of the MicroLife SDK Test app. It displays a 'Pairing request' for 'B6 Connect' with a 'Pair & connect' button. Below this are buttons for 'READ DEVICE INFO', 'WRITE USER', 'READ VERSION', 'READ DEVICE TIME', and 'SYNC DEVICE TIME'. A 'Log' button is also present. The log shows several scan results, including 'nScanResult : BP3GY1-2N', 'nScanResult : FD70-0370 mac:FC:3:C3:11:24:36 rssi:-85', 'nScanResult : BPW1 mac:FD:6A:9A:7:CC:A4 rssi:-81', 'nScanResult : LEsmart_00000150D3010BFD1900', 'nScanResult : Mi Band 3', 'nScanResult : ziva plus mac:FA:DF:D6:CB:9:FB rssi:-84', and 'nScanResult : B6 Connect mac:C4:C7:30:B7:EA:85 rssi:-64'. The bottom screenshot shows the same app with a 'Pair with B6 Connect?' dialog box overlaying the scan results. The dialog box displays the Bluetooth pairing code '525243' and an option to allow access to contacts and call history. The background scan results are partially visible through the dialog box.</p>	<ol style="list-style-type: none"> 1. There is a message to confirm the pairing bonding procedure between device and cellphone if they haven't bonded yet. 2. Once the procedure is done, choose any function/ command to do communication with BPM device. 3. The green part is from "onScanResult".
--	---


5.3. Command: Write a new user ID to BPM

	<ol style="list-style-type: none"> 1. The command “WRITE USER” is to write a new user ID to BPM. 2. The log “WRITE : write user” and “Write : userID:753479663WZ” are indicated that the App sends a command with an user ID. The ID is made up of ASCII code. 3. The log “BPM:WriteUser -> isSuccess = true” means that the writing/ sending procedure is successful. 4. The red part is the command and communication protocol that is sent to device. The blue part is notification with the raw data from BPM via Bluetooth.
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5.4. Command: Read user ID and version data from BPM

<div> <div> <div>Microlife SDK Test</div> <div>Blood Pressure V1.9.3</div> </div> <div> <div>READ HISTORY</div> <div>CLEAR HISTORY</div> <div>DISCONNECT</div> </div> <div> <div>READ DEVICE INFO</div> <div>WRITE USER</div> <div>READ VERSION</div> </div> <div> <div>READ LAST DATA</div> <div>CLEAR LAST DATA</div> </div> </div> <div> <div>Log</div> <div> start scan onScanResult : A6 BT mac:18:7A:93:02:DA:11 rssi:-50 3G Model ! onScanResult : A6 BT mac:18:7A:93:02:DA:11 rssi:-50 Connected WRITE : 4DFF00020553 WRITE : 4DFF00020553 NOTIFY : 4D3100190501333037393139303338564B005247 BPM : ReadUserAndVersionData -> user = User{NO=1, ID='307919038VK', age=0} , versionData = VersionData{year=2018, month=3, day=14, maxUser=2, maxMemory=99, optionIHB=false, optionAfib=true, OptionMAM=true, optionAmbientT=false, optionTubeless=false, optionDeviceID=false, deviceBatteryVoltage=5.9, FWName='RG1'} NOTIFY : 3112030E0263063BA9 </div> </div>	<ol style="list-style-type: none"> 1. The command “Read user ID and version data” is to get user ID and device information as below. 2. The log “BPM : ReadUserAndVersionData -> user = User{NO=1, ID='307919038VK', age=0} VersionData : VersionData{year=2018, month=3, day=14, maxUser=2, maxMemory=99, optionIHB=false, optionAfib=true, optionMAM=true, optionAmbientT=false, optionTubeless=false, optionDeviceID=false, deviceBatteryVoltage=5.9, FWName='RG1'}” is included ID, Age and Device information (Battery voltage, Firmware version and so on).
--	---

5.5. Command: Read history data from BPM

	<ol style="list-style-type: none"> 1. The button “READ HISTORY” is to get history data. 2. The red part is the command and communication protocol that is sent to device. The blue part is notification with the raw data from BPM via Bluetooth. The green part is the result after decoding with the raw data. 3. The log “BPM : ReadHistory -> DRecord{mode=0, noOfCurrentMeasurement=3, historyMeasuremeNumber=11, userNumber=1, MAMState=4, currentData=[null, null, null], MData=[CurrentAndMData{systole=118, dia=77, hr=75, day=19, hour=17, month=1, minute=36, MAM=0, arr=false, year=2021, cuffokr=2, IHB=false, AFib=false, isFor3G=true, resultCode=0,... }]}” is included BP readings. 4. Each BP reading has its own measurement date & time, systolic, diastolic and pulse. For instance, the above-mentioned reading is DateTime 2021/1/19, Sys 118, Dia 77, Pulse 75.
--	--

Microlife SDK Test Blood Pressure V1.9.3		
READ HISTORY	CLEAR HISTORY	DISCONNECT
READ DEVICE INFO	WRITE USER	READ VERSION
READ LAST DATA	CLEAR LAST DATA	
Log		
<pre>resultCode=0, usual=false, diagnostic=false, AM=false, PM=false, deviceMode=49}, CurrentAndMData{systole=116, dia=75, hr=73, day=15, hour=11, month=4, minute=38, MAM=0, arr=false, year=2021, cuffokr=2, IHB=false, AFib=false, isFor3G=true, resultCode=0, usual=false, diagnostic=false, AM=false, PM=false, deviceMode=49}, CurrentAndMData{systole=123, dia=71, hr=71, day=18, hour=15, month=5, minute=59, MAM=0, arr=false, year=2021, cuffokr=2, IHB=false, AFib=false, isFor3G=true, resultCode=0, usual=false, diagnostic=false, AM=false, PM=false, deviceMode=49}, CurrentAndMData{systole=123, dia=73, hr=70, day=18, hour=16, month=5, minute=4, MAM=3, arr=true, year=2021, cuffokr=2, IHB=false, AFib=false, isFor3G=true, resultCode=0, usual=false, diagnostic=false, AM=false, PM=false, deviceMode=49}}, measureMode=false}</pre>		
NOTIFY : 4B26157B4747524F3B157B4946525004D560		

5.6. Command: Disconnect the Bluetooth



1. The button “DISCONNECT” is to terminate the connection of Bluetooth.

2. The “DISCONNECT” sends a disconnected command to BPM, and then the disconnection will be executed by BPM.

Appendix

CurrentAndMData Structure / Parameter				
Property	Device	Type	Value	Description
AA=0	WBP	Integer	0, 1	Anti-artifact Detected
ABPM=0	WBP	Integer	0, 1	Ambulatory Blood Pressure Monitoring
AFib=false	3G/4G	Boolean	false , true	Atrial Fibrillation Detection
AM=false	WBP	Boolean	false , true	Data measured at night with diagnostic mode (e.g., 4:00~12:00)
CPP=0	WBP	Integer	0 ~ 255	Central Pulse Pressure
CSBP=0	WBP	Integer	0 ~ 255	Carotid Systolic Blood Pressure
IHB=false	3G/4G	Boolean	false , true	Irregular Heartbeat Detection
LB=0	WBP	Integer	0, 1	Low Battery
MAM=0	3G/4G	Integer	0 ~ 3	Microlife Averse Mode
MAP=0	WBP	Integer	0 ~ 255	Mean Arterial Pressure
MCBP=0	WBP	Integer	0 ~ 65535	Mean Central Blood Pressure
PM=false	WBP	Boolean	false , true	Data measured in the morning with diagnostic mode (e.g., 18:00~24:00)
PVR=0	WBP	Integer	0 ~ 65535	Pulse Variation Rate
SM=0,	WBP	Integer	0, 1	Start of a Manual Measurement
arr=false	3G/4G	Boolean	false , true	Detection of PAD or Afib
condition=0	WBP	Integer	0 ~ 24	Condition

Cuffokr=0	3G/4G	Integer	0, 1	Whether the wristband is tight: 3G detection mode: 2 - No detection, 4G detection mode: 0 - No tightness, 1 - There is tightness
day=7	WBP, 3G/4G	Integer	0 ~ 31	Date
deviceMode=58	WBP, 3G/4G	Integer	0x31 3G BPM, 0x3A 4G BPM, 0X51 WBP HomeA	Device type
dia=69	WBP, 3G/4G	Integer	0 ~ 255	Diastolic
diagnostic=false	WBP	Boolean	false , true	Data measured in diagnostic mode
errorCode=0	WBP	Integer	0 ~ 255	Error Code
hour=10	WBP, 3G/4G	Integer	0 ~ 24	Hour
hr=82	WBP, 3G/4G	Integer	0 ~ 255	Pulse
indexYear=0	WBP	Integer	0 ~ 99	offset Year
isFor3G=false	3G/4G	Boolean	false , true	is for 3G
minute=12	WBP, 3G/4G	Integer	0 ~ 59	Minute
month=2,	WBP, 3G/4G	Integer	1 ~ 12	Month
resultCode=0	WBP	Integer	0x01, 0x02, 0x03, 0x05, 0x42, 0x50, 0x51, 0x52	Result Code
systole=114	WBP, 3G/4G	Integer	0 ~ 255	Systolic
usual=false	WBP	Boolean	false , true	Data measured in usual mode
year=2024	WBP, 3G/4G	Integer	WBP: 2000~ 2050, 3G/ 4G: 2000 ~ 2048	Year