

This protocol is a USB communication mode that sends inquiries, settings and controls to the device through the PC terminal. The instructions are listed in HEX format.

1、 Online command --00

Data format for PC sending :

Instrument Code	Function code
1 Byte	1 Byte
8C	00

PC side sending : 8C 00 // Request online

Data format for Device-side reply :

Instrument Code	Function code	data			
1 Byte	1 Byte	14 Byte			
8C	00	10Byte(mode)		4Byte(serial number)	

Instrument side reply:8C 00 4F 48 53 50 2D 33 35 30 49 52 BE A0 33 01 //Online success

8C 00 //Online failed

Analysis Based on Response Information--Data Content:

The first 10 bytes are device models:After conversion is "OHSP-350IR "

The last 4 bytes are device serial numbers:0133A0BE=20160702

2、 Setting integral time command -- 01

Data format for PC sending :

Instrument Code	Function code	data			
1 Byte	1 Byte	4 Byte			
8C	01	00(L)	01	02	03(H)

PC side sending : 8C 01 34 08 00 00 // Setting Integral Time

Content description of sending information data:

Data is 4 byte constant:00000834=2100(us)

Data format for Device-side reply :

Instrument Code	Function code
1 Byte	1 Byte
8C	01

Instrument side Reply: 25 01 // Setup successfully
Empty / others // Setup failed

3、 Setting integral mode command-- 02

Data format for PC sending :

Instrument Code	Function Code	date
1 Byte	1 Byte	1 Byte
8C	02	00 lock /01 auto

PC side sending : 8C 02 01 // **Setting Integral Mode to auto**

Content description of sending information data:

- **Data is 1 byte : 0x00 is lock, 0x01 is Auto**

Data format for Device-side reply :

Instrument Code	Function Code
1 Byte	1 Byte
8C	02

Instrument side Reply: 8C 02 // Setup successfully
Empty / others // Setup failed

4、 Read sampling state command-03

Data format for PC sending :

Instrument Code	Function Code
1 Byte	1 Byte
8C	03

PC side sending: 8C 03 // **Read Sampling State**

Data format for Device-side reply :

Instrument Code	Function Code	date				
1 Byte	1 Byte	7 Byte				
8C	03	1Byte(test data state)	1Byte (test state)	1Byte (reserve)	1Byte (test mode)	6、 7、 8 bytes reserve
		00(already red)/01(not read)	00(testing)/01(test end)		00(stop)/01(single)/02 (continuous)	

Instrument side Reply : 8C 03 00 01 00 01 2D 33 35 // Return to Data

Analysis Based on Response Information--Data Content:

- **First Byte:00 is data already to read by PC, Auto zeroing after PC read**
- **Second Byte:01 Test End**
- **Third Byte:Reserve**
- **Forth Byte:01 is Single test**

Fifth、 Sixth and seventh byte: reserve, No practical significance

5、 Read sample data command -- 04

Data format for PC sending :

Instrument Code	Function Code
1 Byte	1 Byte
8C	04

PC side sending : 8C 04 // Read Sample Data

Data format for Device-side reply :

Instrument Code	Function Code	date
1 Byte	1 Byte	7388Byte
8C	04	m_SpectADdata[012...]

Instrument side Reply : 8C 04 ... // Return data

Analysis Based on Response Information--Data Content:

- ...:initial data Total 3694Points One point is double bytes.So Total 7388bytes
- Data range:Range of values per point 0--65535

6、 Reading Integral Time Command-- 05

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	05

PC side sending : 8C 05 // Reading Integral Time

Data format for Device-side reply :

frame	Function code	data				
1 Byte	1 Byte	5 Byte			1Byte	
8C	05	40(L)	42	0F	00(H)	00(Lock)/01(Auto)

Instrument side Reply : 8C 05 40 42 0F 00 01 // Return data

Analysis Based on Response Information--Data Content:

- The first five bytes:Integral Time-big-endian is 000F4240 =1000000 (us) = 1 (S)
- The latter byte:Integral Time-01 Auto
- Third byte:Reserve
- Forth byte :01 is single test

7、 Write Wavelength Command-- 0x0A

Data format for PC sending :

Instrument code	Function code	data
1 Byte	1 Byte	sizeof(m_WaveData) Byte
8C	0A	sizeof(m_WaveData)

PC side sending : 8C 0A ... FCS // Setting wave

Content description of sending information data:

- ... : is m_WaveData structure, such as Right List

```

Wavelength position and wavelength parameter
struct WaveData
{
    uint16_t NULL_V;
    uint16_t Reserve; // reserve
    uint32_t Reserve; // reserve
    uint16_t StartPlace; //Initial wavelength
    position 380
    uint16_t MiddlePlace0; //460
    uint16_t MiddlePlace1; //540
    uint16_t MiddlePlace2; //620
    uint16_t MiddlePlace3; //700
    uint16_t EndPlace; //780
    float fWaveStart; //Initial
    wavelength
    float MiddlefWave0; //
    float MiddlefWave1; //
    float MiddlefWave2; //
    float MiddlefWave3; //
    float fWaveEnd; //
    float k0 k1 k2 k3; //wave date
    
```

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	0A

Instrument side Reply : 8C 0A // Setup success
Empty / others // Setup failed

8、 Read Wavelength Command-- 0x 0B

Data format for PC sending :

frame	Function code	checksum
1 Byte	1 Byte	1 Byte
8C	0B	Sum

PC side sending : 8C 0B // Read setting wave

Data format for Device-side reply :

frame	Function code	data
1 Byte	1 Byte	sizeof(m_WaveData)Byte
8C	0B	sizeof(m_WaveData)

Instrument side Reply : 8c 0B...// return to data

Analysis Based on Response Information--Data Content:

- ... :is m_WaveDatastructure, such as Right List.

9、 Reading Spectral Calibration Data Command-- 0x 0C

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	0C

PC side sending : 8C 0C // read spectrum

Data format for Device-side reply :

Instrument code	Function code	data
1 Byte	1 Byte	sizeof(m_SpecCalData)Byte
8C	0C	sizeof(m_SpecCalData)

Instrument side Reply : 8C 0C...// return to data

Analysis Based on Response Information--Data

- ... :ism_SpecCalDatastructure, such as Right List.

```

Spectral Calibration structure Explain
typedef struct SpecCalData
{
    uint16_t      NULL_V;
    uint16_t      TC;          // Standard color
    temperature value
    float fLx;          // Standard lux value
    float stIntegTime;// integral time unitus,>=10
    float SpecKs[SPEC1NMDOT]; // 380-
    1050nm Spectral Calibration Coefficient
}GP_SpecCalData_t;
GP_SpecCalData_t m_SpecCalData;
    
```

10、 Writing Spectral Calibration Data Command-- 0D

Data format for PC sending :

Instrument code	Function code	data
1 Byte	1 Byte	sizeof(m_SpecCalData) Byte
8C	0D	sizeof(m_SpecCalData)

PC side sending : 8C 0D ... // write spectrum data

Content description of sending information data:

- ... :ism_SpecCalDatastructure, such as Right List.

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	0D

Instrument side Reply : 8C 0D // Setup successfully
Empty / others // Setup failed

11、 Start Sampling Command-- 0x0E

Data format for PC sending :

Instrument code	Function code	command
1 Byte	1 Byte	1 Byte
8C	0E	00stop /01 single/02 continuity

PC side sending : 8C 0E 01 // start single test
8C 0E 02 // start continous test

Send Information - Command Description:

- **00 :is stop test**
- **01 :is single test**
- **02:is continous test**

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	0E

Instrument side Reply : 8C 0E // Setup successfully
Empty / others // Setup failed

12、 Stop Sampling Command-- 0x25

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte

8C	25
----	----

PC side sending : 8C 25 // stop test

Send information : 8C 25 equal to 8C 0E 00;

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	25

Instrument side Reply : 8C 25 // Setup successfully
Empty / others // Setup failed

13、 Read Test Result Data Command-- 0x13

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	13

PC side sending : 8C 13 // Read Test Result spectrum data

Data format for Device-side reply :

frame	Function code	data
1 Byte	1 Byte	sizeof(SpecDataInfo_t)Byte
8C	13	sizeof(SpecDataInfo_t)

Instrument side Reply : 8C 13 ... // return to data

Analysis Based on Response Information--Data Content:

- ... :isSpecDataInfo_tstructure, such as Right List.

14、 Read Test Result Correction Data Command-- 0x26

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	26

PC side sending : 8C 26 // Read Test Result Correction data

Data format for Device-side reply :

Instrument code	Function code	data

```

Test Result spectrum Data structure
typedef struct SpecDataInfo
{
    char iType[10]; // type
    uint16_t iVer; // version 1.00.00
    char Mark[24]; // description
    float fLx; // illuminationE(lx)
    float fEfc; // candle lightE(fc)
    float cct; // CCT(K)
    float duv; // Blackbody deviation Duv
    float x,y; // coordinate x,y
    float u,v; // coordinate u,v
    float u2,v2; // coordinate u',v'
    float fSDCM; // Color tolerance SDCM
    float Ra; // CRI Ra
    float Ri[15]; // R1-R15
    float F; // irradiance Ee(W/m2)
    float fSP; // S/P
    float DominantWave; // Dominant wa(nm)
    float Purity; // (%)
    float HlafWidth; // (nm)
    float PeakWave; // (nm)
    float CentreWave; // (nm)
    float CentroidWave; // (nm)
    float fRaito; // (%)
    float fGraito; // (%)
    float fBraito; // (%)
    float X,Y,Z; // X,Y,Z
    float IntegTime0; // us
    float VPeak; //
    float VDark; //
    float VDarkDAC; //
    char TestDate[11]; // 2016-10-11
    char TestTime[9]; // 12:15:01
    float Spect1nmData[671]; // 380-1050nm
    float StartTestWave; //
    float EndTestWave; //
} GP_SpecDataInfo_t;
GP_SpecDataInfo_t SpecDataInfo_t;
    
```

1 Byte	1 Byte	sizeof(m_ResultCorrect)Byte
8C	26	sizeof(m_ResultCorrect)

Instrument side Reply : 8C 26 ... // return to data

Analysis Based on Response Information--Data Content:

- ... :ism_ResultCorrectstructure, such as Right List.

15、 Write Test Result Correction Data Command-- 0x27

Data format for PC sending :

Instrument code	Function code	data
1 Byte	1 Byte	sizeof(m_ResultCorrect) Byte
8C	27	sizeof(m_ResultCorrect)

PC side sending : 8C 27 ... //Write Test Result Correction Data

Content description of sending information data:

- ... :ism_SpecCalDatastructure, such as Right List.

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	27

Instrument side Reply : 8C 27 // Setup successfully
Empty / others // Setup failed

16、 Read Test Setup Data Command-- 0x2A

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	2A

PC side sending : 8C 2A //Read Test Setup Data

```

Test Result Correction
typedef struct ResultCorrect
{
    uint16_t NULL_V;
    uint16_t NULL_V2;
    float fStLx;           //standard value
    float fLx;            // Current value
    float fLxKs;          //correction factor
    float Tc[6];          //
    float dx[5];          //
    float dy[5];          //
    float Dw[6];          //
    float dDw[5];        //
    float dRi[15];        //
}GP_ResultCorrect;

GP_ResultCorrect m_ResultCorrect;
    
```

```

Test setting structure
typedef struct GP_MeasSetting
{
    uint8_t NULL_V;
    uint8_t SaveMode;//auto/manual
    uint16_t SaveTime;//
    uint8_t SaveDataFormat;//
    uint8_t SaveDataFormat_Ohs;//
    uint8_t SaveDataFormat_Csv;//
    uint8_t SaveDataStyle;//
    uint16_t AutoIntegralLimit;//
    uint8_t AverageTime;//
    uint8_t ContrastTestMode;//
    uint8_t MeasFrequency;//
    uint16_t StartTestWave;//
    uint16_t EndTestWave;//
}GP_MeasSet_t;
GP_MeasSet_t Set_MeasSet_t
    
```

Data format for Device-side reply :

Instrument code	Function code	data
1 Byte	1 Byte	sizeof(Set_MeasSet_t)Byte
8C	2A	sizeof(Set_MeasSet_t)

Instrument side Reply : 8C 2A ... //return to data

Analysis Based on Response Information--Data Content:

- ... :iSet_MeasSet_tstructure, such as Right List.

17、 Write test setup data commands-- 0x2B

Data format for PC sending :

Instrument code	Function code	data
1 Byte	1 Byte	sizeof(Set_MeasSet_t) Byte
8C	2B	sizeof(Set_MeasSet_t)

PC side sending : 8C 2B ... //Write test setup data

Content description of sending information data:

- ... :iSet_MeasSet_tstructure, such as Right List.

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	2B

Instrument side Reply : 8C 2B // Setup successfully
Empty / others // Setup failed

18、 Read System Time Data Command-- 0x2C

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte

8C	2C
----	----

PC side sending : 8C 2C //Read System Time Data

Data format for Device-side reply :

frame	Function code	data
1 Byte	1 Byte	16Byte
8C	2C	年(HL)月(HL)日(HL)时(HL)分(HL)秒(HL)保留(HL)

Instrument side Reply : 8C 2C E1 07 0C 00 1C 00 0A 00 01 00 22 00 00 00 // return to data

Analysis Based on Response Information--Data Content:

- **First and second bytes: year-little-endian 07E1=2017(年)**
- **Third and Four Bytes: Month-little-endian 000C=12(月)**
- **Fifth and sixth bytes: day-little-endian 001C=28(日)**
- **Seventh and eighth bytes:time-little-endian 000A=10(时)**
- **Ninth and tenth bytes:minutes-little-endian 0001=01(分)**
- **Eleventh and twelve bytes: seconds-little-endian 0022=34(秒)**
- **Thirteenth and fourteenth bytes: reserved**

19、 Write System Time Data Command— 2D

Data format for PC sending :

frame	Function code	data
1 Byte	1 Byte	16Byte
8C	2D	年(HL)月(HL)日(HL)时(HL)分(HL)秒(HL)保留(HL)

PC side sending : 8C 2D E1 07 0C 00 1C 00 0A 00 01 00 22 00 00 00//Write System Time

Content description of sending information data:

- **First and second bytes: year-little-endian 07E1=2017(年)**
- **Third and Four Bytes: Month-little-endian 000C=12(月)**
- **Fifth and sixth bytes: day-little-endian 001C=28(日)**
- **Seventh and eighth bytes:time-little-endian 000A=10(时)**
- **Ninth and tenth bytes:minutes-little-endian 0001=01(分)**
- **Eleventh and twelve bytes: seconds-little-endian 0022=34(秒)**
- **Thirteenth and fourteenth bytes: reserved**

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	2D

Instrument side Reply : 8C 2D // Setup successfully
Empty / others // Setup failed

20、 Read Battery Information Command— 0xC3

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	C3

PC side sending : 8C C3 // **Read Battery Information**

Data format for Device-side reply :

Instrument code	Function code	data		
1 Byte	1 Byte	5Byte		
8C	C3	voltage(HL)	current(HL)Signed number	Residual percentage(0-100%)

Instrument side Reply : 8C C3 10 78 FF 39 64 //**return to Battery Information**

Analysis Based on Response Information--Data Content:

- **First and second bytes:Voltage-big-endian 1078=4216(mV)**
- **Third and Four Bytes:Current-big-endian FF39=-199(mA)**
- **Fifth bytes:Battery Percentage- 64=100(%)**

21、 Read parameter commands for automatic shutdown— C4

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	C4

PC side sending : 8C C4 // **Read parameter commands for automatic shutdown**

Data format for Device-side reply :

frame	Function code	data	
1 Byte	1 Byte	5Byte	
8C	C4	Atuo shutdown (0 forbid 1 allow)	Shutdown time limit (uint32type)

Instrument side Reply : 8C C4 00 00 00 02 58 //**return to automatic shutdown**

Analysis Based on Response Information--Data Content:

- **First byte:state - 00=forbid auto shutdown**
- **Second, third, fourth, and fifth bytes:time limit-big-endian is 00000258=600 (S)**

22、 Setting parameter commands for automatic shutdown— 0xC5

Data format for PC sending :

frame	Function code	data	
1 Byte	1 Byte	5Byte	
8C	C5	Auto shutdown (0 forbid 1 allow)	Shutdown time limit (uint32type)

PC side sending : 8C C5 00 00 00 02 58 // 发送设置参数

Content description of sending information data:

- **First byte:state-is 00=forbid auto shutdown**
- **Second, third, fourth, and fifth bytes:time limit-big-endian is 00000258=600 (S)**

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	C5

Instrument side Reply : 8C C5 // Setup successfully
 Empty / others // Setup failed

23、 Enter Spectral Calibration Command— 0x19

Data format for PC sending :

Instrument code	Function code
1 Byte	1 Byte
8C	19

PC side sending : 8C 19 // Enter Spectral Calibration

Data format for Device-side reply :

Instrument code	Function code
1 Byte	1 Byte
8C	19

Instrument side Reply : 8C 19 // enter success
 Empty / others // enter failed

24、 Enter Spectral Calibration KEY Command — 0x1A

Data format for PC sending :

Instrument code	Function code	data
1 Byte	1 Byte	1Byte
8C	1A	01 cancel 02 stop 03 save

PC side sending : 8C 1A 01 // Exit Spectral Calibration

PC side sending : 8C 1A 02 // **Calibration/Stop Spectral Calibration**
 PC side sending : 8C 1A 03 // **save data**

Data format for Device-side reply :

frame	Data length		Function code	data	checksum
1 Byte	2 Byte		1 Byte	1 Byte	1 Byte
8C	00(H)	01(L)	1A	00 failed /01 success	Sum

Instrument side Reply : 8C 1A // Setup successfully
 Empty / others // Setup failed