1. **FORMAT DATA FROM LOGGER TO GATEWAY.**
2. **Real time data.**

Data logger send data setting to Gateway (Interval send data).

* ***Packet 1 (53 bytes)***

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xD0 | 1 byte |
| Package | 4 bytes (low- high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| …. | …. |
| Data CH1 19 | 1 byte |
| Data CH2 19 | 1 byte |

* ***Packet 2 (53 bytes)***

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xD1 | 1 byte |
| Package | 4 bytes (low - high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| …. | …. |
| Data CH1 19 | 1 byte |
| Data CH2 19 | 1 byte |

* ***Packet 3 (53 bytes)***

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xD2 | 1 byte |
| Package | 4 bytes (low - high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| …. | …. |
| Data CH1 19 | 1 byte |
| Data CH2 19 | 1 byte |

1. **Send miss data.**

* ***Packet 1 (53 bytes)***

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xA0 | 1 byte |
| Package | 4 bytes (low- high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| …. | …. |
| Data CH1 19 | 1 byte |
| Data CH2 19 | 1 byte |

* ***Packet 2 (53 bytes)***

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xA1 | 1 byte |
| Package | 4 bytes (low - high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| …. | …. |
| Data CH1 19 | 1 byte |
| Data CH2 19 | 1 byte |

* ***Packet 3 (53 bytes)***

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xA2 | 1 byte |
| Package | 4 bytes (low- high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| …. | …. |
| Data CH1 19 | 1 byte |
| Data CH2 19 | 1 byte |

* **Note for Real time data and miss data:**
* When the data logger send only 1 data: The server will recive 3 data, please remove 2 end data.
* When the data logger send 2 data: The servser will receive 3 data, please remove 1 end data.
* Example 1: Duration 22 day, 12 hours and Interval 1 minute, Interval send lora 1 minute.

Number of data receive= Interval send lora /Interval = 1. However, the server will receive 3 data, the sevser must remove 2 end data.

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xA1 | 1 byte |
| Package | 2 bytes (low, high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte => Remove |
| Data CH2 1 | 1 byte => Remove |
| Data CH1 2 | 1 byte => Remove |
| Data CH2 2 | 1 byte => Remove |

* Example 2: Duration 11 day, 6 hours and Interval 30 senconds, Interval send lora 1 minute.

Number of data receive= Interval send lora /Interval = 2. However, the server will receive 3 data, the sevser must remove 1 end data.

|  |  |
| --- | --- |
| Serial number | 6 bytes |
| 0xA1 | 1 byte |
| Package | 2 bytes (low, high) |
| Data CH1 0 | 2 bytes (low, high) |
| Data CH2 0 | 2 bytes (low, high) |
| Data CH1 1 | 1 byte |
| Data CH2 1 | 1 byte |
| Data CH1 2 | 1 byte => Remove |
| Data CH2 2 | 1 byte => Remove |

1. **Setting data (Send to gateway).**

Data logger send 3 packet data setting to Gateway. Data logger only send to gateway one time.

* ***Packet 1 (52 bytes).***

|  |  |  |
| --- | --- | --- |
| Serial Number | 6 bytes | |
| “S1” | 2 bytes | |
| Device (1 byte) | 0x11:  Channel 1: Room temperature.  Channel 2: Humidity. | |
| 0x22:  Channel 1: LN2  Channel 2: Humidity. | |
| 0x33:  Channel 1: RTD2  Channel 2: Humidity | |
| 0x44:  Channel 1: Room Temperature  Channel 2: LN2. | |
| 0x55:  Channel 1: Room temperature.  Channel 2: RTD2. | |
| 0x66:  Channel 1: Thermal couple.  Channel 2: Humidity. | |
| 0x77:  Channel 1: Room temperature  Channel 2: Thermal couple. | |
| Unit | 1 byte | 0xAC: ℃ |
| 0xAF: o F |
| Continue memory, stop key | 1 byte | 0x00: Continue disable, stop key: enable |
| 0x01: Continue disable, stop key: disable |
| 0x02: Continue enable, stop key: enable |
| 0x03: Continue enable, stop key: disable |
| Start time (second, minute, hour, date, month, year) | 6 bytes | |
| Stop time (second, minute, hour, date, month, year) | 6 bytes | |
| Run time (second, minute, hour, day byte low, day byte high) | 5 bytes | |
| Status Logger | 1 byte | 0xFF: no setting & no run |
| 0x11: setting & no run |
| 0x44: running |
| 0xAA: stop |
| Setting time (second, minute, hour, date, month, year) | 6 bytes | |
| Start delay (min) | 1 byte | |
| Duration day | 2 bytes | Duration day (byte low) |
| Duration day (byte high) |
| Duration hour | 1 byte | Duration hour |
| Interval hour | 1 byte | |
| Interval minute | 1 byte | |
| Interval second | 1 byte | |
| High alarm limit (temperature) | 2 bytes | Byte low |
| Byte high |
| Low alarm limit (temperature) | 2 bytes | Byte low |
| Byte high |
| High alarm limit (humidity) | 2 bytes | Byte low |
| Byte high |
| Low alarm limit (humidity) | 2 bytes | Byte low |
| Byte high |
| Firmware version | 2 bytes | |

* ***Packet 2 (49 bytes)***

|  |  |
| --- | --- |
| Serial Number | 6 bytes |
| “S2” | 2 bytes |
| Device (1 byte). | 0x11:  Channel 1: Room temperature.  Channel 2: Humidity. |
| 0x22:  Channel 1: LN2  Channel 2: Humidity. |
| 0x33:  Channel 1: RTD2  Channel 2: Humidity |
| 0x44:  Channel 1: Room Temperature  Channel 2: LN2. |
| 0x55:  Channel 1: Room temperature.  Channel 2: RTD2. |
| 0x66:  Channel 1: Thermal couple.  Channel 2: Humidity. |
| 0x77:  Channel 1: Room temperature  Channel 2: Thermal couple. |
| Time zone | 40 bytes |

* ***Packet 3 (32 bytes)***

|  |  |
| --- | --- |
| Serial Number | 6 bytes |
| “S3” | 2 bytes |
| Device (1 byte). | 0x11:  Channel 1: Room temperature.  Channel 2: Humidity. |
| 0x22:  Channel 1: LN2  Channel 2: Humidity. |
| 0x33:  Channel 1: RTD2  Channel 2: Humidity |
| 0x44:  Channel 1: Room Temperature  Channel 2: LN2. |
| 0x55:  Channel 1: Room temperature.  Channel 2: RTD2. |
| 0x66:  Channel 1: Thermal couple.  Channel 2: Humidity. |
| 0x77:  Channel 1: Room temperature  Channel 2: Thermal couple. |
| Description | 20 bytes |
| Interval send lora day | 1 byte |
| Interval send lora hour | 1 byte |
| Interval send lora minute | 1 byte |

1. **Alarm data (50 bytes).**

Data logger send alarm data to Gateway when the logger get alarm.

|  |  |
| --- | --- |
| Serial Number | 6 bytes |
| ‘AL’ | 2 bytes |
| Device (1 byte). | 0x11:  Channel 1: Room temperature.  Channel 2: Humidity. |
| 0x22:  Channel 1: LN2  Channel 2: Humidity. |
| 0x33:  Channel 1: RTD2  Channel 2: Humidity |
| 0x44:  Channel 1: Room Temperature  Channel 2: LN2. |
| 0x55:  Channel 1: Room temperature.  Channel 2: RTD2. |
| 0x66:  Channel 1: Thermal couple.  Channel 2: Humidity. |
| 0x77:  Channel 1: Room temperature  Channel 2: Thermal couple. |
| Start time (second, minute, hour, date, month, year) | 6 bytes |
| Stop time (second, minute, hour, date, month, year) | 6 bytes |
| Run time (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Total time alarm temperature (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Time low alarm temperature (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Total time alarm humidity (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Time low alarm humidity (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Channel 1 temperature alarm | 2 bytes (byte low, byte high) |
| Channel 2 temperature alarm | 2 bytes (byte low, byte high) |

1. **End logger (50 bytes).**

* Data logger send end logger to Gateway when the logger is stop.

|  |  |
| --- | --- |
| Serial Number | 6 bytes |
| ‘EN’ | 2 bytes |
| Device (1 byte). | 0x11:  Channel 1: Room temperature.  Channel 2: Humidity. |
| 0x22:  Channel 1: LN2  Channel 2: Humidity. |
| 0x33:  Channel 1: RTD2  Channel 2: Humidity |
| 0x44:  Channel 1: Room Temperature  Channel 2: LN2. |
| 0x55:  Channel 1: Room temperature.  Channel 2: RTD2. |
| 0x66:  Channel 1: Thermal couple.  Channel 2: Humidity. |
| 0x77:  Channel 1: Room temperature  Channel 2: Thermal couple. |
| Start time (second, minute, hour, date, month, year) | 6 bytes |
| Stop time (second, minute, hour, date, month, year) | 6 bytes |
| Run time (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Total time alarm temperature (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Time low alarm temperature (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Total time alarm humidity (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Time low alarm humidity (second, minute, hour, day byte low, day byte high) | 5 bytes |
| Channel 1 temperature alarm | 2 bytes (byte low, byte high) |
| Channel 2 temperature alarm | 2 bytes (byte low, byte high) |

1. **Send the data logger time.**

|  |  |
| --- | --- |
| Command | "RT" |
| Data logger time ( 6 Bytes) | SECONDS BYTE (FORMAT: Decimal) |
| MINUTES BYTE (FORMAT: Decimal) |
| HOURS BYTE (FORMAT: Decimal) |
| DATE BYTE (FORMAT: Decimal) |
| MONTH BYTE (FORMAT: Decimal) |
| YEAR BYTE (FORMAT: Decimal) |

**7. Poll the gateway.**

|  |  |
| --- | --- |
| Serial Number | 6 bytes |
| Command | “CHECK” |

**8. Warning.**

|  |  |
| --- | --- |
| Serial Number | 6 bytes |
| Command | “WA” |
| Warning Status | 0x01: RTD probe error. |

1. **FORMAT DATA FROM GATEWAY TO DATA LOGGER.**

* ***Setting data logger from gateway.***

|  |  |
| --- | --- |
| Command | "SE" |
| Unit (1 Byte) | 0xAC: o C, 0xAF: o F |
| Continue memory, stop key (1 Byte) | 0x03: continue memory: enable, stop key: disable |
| 0x02: continue memory: enable, stop key: enable |
| 0x01: continue memory: disable, stop key: disable |
| 0x00: continue memory: disable, stop key: enable |
| HIGH ALARM LIMIT (2 BYTES) NTC | HIGH ALARM LIMIT (BYTE LOW) |
| HIGH ALARM LIMIT (BYTE HIGH) |
| LOW ALARM LIMIT (2 BYTES) NTC | LOW ALARM LIMIT (BYTE LOW) |
| LOW ALARM LIMIT (BYTE HIGH) |
| HIGH ALARM LIMIT (2 BYTES) RTD | HIGH ALARM LIMIT (BYTE LOW) |
| HIGH ALARM LIMIT (BYTE HIGH) |
| LOW ALARM LIMIT (2 BYTES) RTD | LOW ALARM LIMIT (BYTE LOW) |
| LOW ALARM LIMIT (BYTE HIGH) |
| Duration day (2 BYTES) | Duration day (byte low) (Decimal) |
| Duration day (byte high) (Decimal) |
| Duration hour (1 BYTE) | (Decimal) |
| Interval hour (1 BYTE) | (Decimal) |
| Interval min (1 BYTE) | (Decimal) |
| Interval sec (1 BYTE) | (Decimal) |
| Auto start status (1 Byte). | 0xAE: Enable, 0xAD: Disable |
| Auto start time ( 6 Bytes) | SECONDS BYTE (FORMAT: Decimal) |
| MINUTES BYTE (FORMAT: Decimal) |
| HOURS BYTE (FORMAT: Decimal) |
| DATE BYTE (FORMAT: Decimal) |
| MONTH BYTE (FORMAT: Decimal) |
| YEAR BYTE (FORMAT: Decimal) |
| Interval send lora data day (1 Byte) | (Decimal) |
| Interval send lora data hour (1 Byte) | (Decimal) |
| Interval send lora data minute (1 Byte) | (Decimal) |
| Delay start (1 Byte). | Decimal |

* ***Get the data logger time.***

|  |  |
| --- | --- |
| Command | "RT" |

* Wait to receive the data logger time.( A. FORMAT DATA FROM LOGGER TO GATEWAY, 6. Send the data logger time.)