RS485 protocol for heating.txt

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BaudRate   2400
        ByteSize   8 Bit
        StopBits   1
        Parity   None
        ParityCheck   None

Communication Protocol And DataFormat Describe

Declare: Following " 0X " Mean's HEX Values

;;==

1：Data Package protocol as below:

COMMAND + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

8 Bytes in total

;;==

2: CheckSum definition:
Receive: pc->thermostat;
        CheckSum = (command + ID0 + ID1 + Data0 + Data1 + Data2 + Data3) & 0xFF ^ 0xA5 size: 8 Bits

Send: thermostat->pc
        CheckSum = (0x50 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + Data4 + Data5 + Data6 + Data7) & 0xFF ^ 0xA5 size: 8 Bits

;;==

3: COMMAND definition：

Read：PC read data from thermostat
Write：PC transmit data to thermostat

COMMAND is command opcode，size: 8 Bit，commands as below：
command

PC ------->thermostat

[0XA0] --> ：PC read all data from thermostat

[0XA1] --> ：PC transmit some data to thermostat

[0XA2] --> ：Sensor type selecting

[0XA3] --> ：Valve control selecting

[0XA4] --> ：Turn on/off

[0XA5] --> ：Screen lock

[0XA6] --> ：Low temperature protection setting High temperature protection setting

[0XA7] --> ：Deadzone temperature setting

[0XA8] --> ：Temperature calibration

[0XA9] --> ：Temperature setting

[0XAA] --> ：Clock setting

[0XAx] --> ：

Thermostat--------->PC

[0X50] -->：thermostat returns all data to PC

;;===

4: ID0 , ID1 definition ：

ID0,ID1 is thermostat's IP address，Hex range is from 0X0000 ~ 0XFFFF ：

ID0 is low address

ID1 is high address

ID1 ID0=> 0X0000   is broadcast address. All thermostats could receive data but not respond.

ID1 ID0=> 0X0001-0XFFFF   is User address.

;;===

5: Data Package definition ：

Data0 ~ Data3/Data 0~ Data 7(A0 coomand) is command operand ，size is 32 Bit (4 Bytes) /64Bit (8 Bytes)：

;;------------------------------

COMMAND0: 0XA0

Data Package：0XA0 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0	00
Data1	00
Data2	00
Data3	00

For example, IP is 0010, read all data from thermostat, command

A0 10 00 00 00 00 00 15;

;;------------------------------

Response: 0x50 data returns

COMMAND1: 0XA1

Data package：0XA1 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0　　=>　Bit0-Bit1　sensor type

00 -> internal and external sensors

01 -> internal sensor only

10 -> external sensor only

11 -> stand by

Bit2-Bit3 Valve Control Selection

00 -> Valve is controlled by thermostat

01 -> PC open the valve (thermostat can not control)

10 -> PC close the valve (thermostat can not control)

11 -> Standby

Bit4　　turn-on/off

0 -> turn-off

1 -> turn-on

Bit5　　Lock flag

0->unlock

1->lock

Bit6　　low temperature protection flag

0-> need low temperature protection

1-> cancel low temperature protection

Bit7　　high temperature protection flag

0-> need high temperature protection

1-> cancel high temperature protection

Data1 =>　Bit0　　lock mode

0-> Buttons are locked except on/off.

1-> All bottons are locked.

Bit1　　Lock status

0->unlock

1->lock

Bit2　　　stand by

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Bit3   stand by

Bit4~bit7 deadzone temperature(1℃~5℃)

Data2   => calibration temperature(-9℃~9℃)

Data3   => setting temperature(5℃~35℃)
;;------------------------------
For example: IP is 0010, write data to thermostat: temperature control and limit control(internal sensor and external sensor), control the valve by thermostat; turn on/off, open low temperature protection, open high temperature protection, lock, unlock, set deadzone temperature (1℃), calibration temperature (-1 ℃), set temperature (35℃),
command is: A1 10 00 10 10 FF 23 56;

response: 0x50 data returns
;;----------------------------

COMMAND2: 0XA2
Data package：0XA2 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0   => Bit0-Bit1 sensor type
00 -> internal and external sensors
01 -> internal sensor only
10 -> external sensor only
11 -> stand by
Bit2-Bit2 stand by

Data1   => stand by

Data2   => stand by
Data3   => stand by

For example: IP is 0010, change sensor type to external sensor:
command is: A2 10 00 02 00 00 00 11;

response: 0x50 data returns
;;----------------------------

COMMAND3: 0XA6
Data package：0XA3 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

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Data0 => Bit0-Bit1 stand by
      Bit2-Bit3 valve control
          00-> valve is controlled by thermostat
           01-> valve is controlled by PC (thermostat can not control)
          10 -> PC close the valve (thermostat can not control)
          11 -> Standby
     Bit4-Bit7 standby
Data1 => stand by

Data2 => stand by
Data3 => stand by

For example: IP is 0010, valve is controlled by PC,
command is: A3 10 00 08 00 00 00 1E;
For example: IP is 0010, valve is controlled by thermostat,
command is: A3 10 00 00 00 00 00 16;

response: 0x50 data returns
;;-----------------------------

COMMAND4: 0XA4
Data package：0XA4 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0 => Bit0-Bit3 standby
      Bit 4   Turn on/off
      0 -> turn-off
      1 -> turn-on
      Bit 5-Bit 7 standby

Data1 => standby

Data2 => standby

Data3 => standby

For example, IP is 0010, turn off, command is
    A4 10 00 00 00 00 00 11;

For example, IP is 0010, turn on, command is
    A4 10 00 10 00 00 00 61;

;;-----------------------------

response: 0x50 data returns

;;----------------------------

COMMAND5: 0XA5
Data package：0XA5 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0   =>   Bit0-Bit4 standby
                Bit 5   Lock Flag
                0 -> Unlock
                1 -> Lock
                Bit 6-Bit 7 standby

Data1   =>   Bit0   lock mode
                0-> Buttons are locked except on/off.
                1-> All bottons are locked.
                Bit5   Lock
                   0->unlock
                   1->lock
                Bit 2-Bit 7 standby

Data2   =>   standby

Data3   =>   standby

For example, IP is 0010, buttons are locked except on/off, command is
        A5 10 00 00 02 00 00 12;

For example, IP is 0010, all bottons are locked, command is
        A5 10 00 00 00 00 00 10;

;;----------------------------

response: 0x50 data returns

;;----------------------------

COMMAND6: 0XA6
Data package：0XA6 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0   => Bit0-Bit5 standby

Bit6   low temperature protection flag

0-> need low temperature protection

1-> cancel low temperature protection

Bit7   high temperature protection flag

0-> need high temperature protection

1-> cancel high temperature protection

Data1   => low temperature protection(5℃~10℃)

Data2   => high temperature protection(35℃~70℃)

Data3   => standby

For example, IP is 0010, low temperature protection is 5℃, high temperature protection is 45℃, command is

A6 10 00 00 05 2D 00 4D;

For example, IP is 0010,cancel low temperature protection and high temperature protection, command is

A6 10 00 C0 00 00 00 D3;

;;----------------------------

response: 0x50 data returns

;;----------------------------

COMMAND7: 0XA7

Data package：0XA7 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

Data0   => standby

Data1 => Bit0-Bit3 standby

Bit4~bit7 deadzone temperature(1℃~5℃)

Data2   => standby

Data3   => standby

;;----------------------------

For example: IP is 0010, deadzone temperature is 2 ℃

command is: A7 10 00 00 20 00 00 72;

response: 0x50 data returns

COMMAND8: 0XA8

       Data package：0XA8 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

       Data0   =>   standby

       Data1   =>   standby

       Data2   =>   calibration temperature （-9℃~9℃ => 0xF7...9)

       Data3   =>   standby

For example, IP is 0010，calibration temperature is 1℃，command is：
       A8 10 00 00 00 01 00 1C;

For example, IP is 0010，calibration temperature is -1℃，command is：
       A8 10 00 00 00 FF 00 12;

       ;;-----------------------------
       response: 0x50 data returns
       ;;-----------------------------

COMMAND9: 0XA9

       Data package：0XA9 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

       Data0   =>   standby

       Data1   =>   standby

       Data2   =>   standby

       Data3   =>   setting temperature (5℃~35℃)

For example IP is 0010，setting temperature is 32℃，command is：
       A9 10 00 00 00 00 20 7C;

       ;;-----------------------------
       response: 0x50 data returns
       ;;-----------------------------

COMMAND10: 0XAA

        Data package：0XAA + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + CheckSum

        Data0   =>   second (HEX code)

        Data1   =>   minute (HEX code)

        Data2   =>   hour (HEXcode)

        Data3   =>   week (HEXcode)

For example IP is 0010，write time: Wednesday, 03:03, command is
        AA 10 00 00 03 03 03 66   ;
        ;;-----------------------------
        response: 0x50 data returns
        ;;------------------------------

;;===

resposne: 0x50 OK
        Data package：0x50 + ID0 + ID1 + Data0 + Data1 + Data2 + Data3 + Data4 + Data5 + Data6 + Data7 + CheckSum

        Data0   => Bit0-Bit1 sensor type
                00 -> internal and external sensors
                01 -> internal sensor only
                10 -> external sensor only
                11 -> stand by

                Bit2-Bit3 Valve Control Selection
                00 -> Valve is controlled by thermostat
                01 -> PC open the valve (thermostat can not control)
                10 -> PC close the valve (thermostat can not control)
                11 -> Standby

                Bit4   turn-on/off
            0 -> turn-off
            1 -> turn-on

                Bit5   Lock flag
                 0->unlock
                 1->lock

                Bit6   low temperature protection flag

0-> need low temperature protection
1-> cancel low temperature protection

Bit7   high temperature protection flag
0-> need high temperature protection
1-> cancel high temperature protection

Data1 => Bit0   lock mode
0-> Buttons are locked except on/off.
1-> All bottons are locked.

Bit1   Lock status
0->unlock
1->lock

Bit2   Load status
0-> load close
1-> load open

Bit3   Sensor status
0-> sensor normal
1-> sensor error

Bit4~bit7 deadzone temperature(1℃~5℃)

Data2   => calibration temperature(-9℃~9℃)

Data3   => setting temperature(5℃~35℃)

Data4   => low temperature protection (5℃~10℃)

Data5   => high temperature protection (35℃~70℃)

Data6   =>   Room Temperature

Data7   =>   Floor Temperature

;;===
;;===

6: Example of 2 commands：

    PC is master thermosat is slave

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master read data from thermostat：

COMMAND   ==   0XA0   PC read data from thermostat
ID0,ID1   =>   IP

Data0   =>   00
Data1   =>   00
Data2   =>   00
Data3   =>   00
CheckSum

slave respond
COMMAND   ==   0X50   thermostat responds data to PC
ID0,ID1   =>   IP

Data0   =>   Bit0-Bit1   sensor type
                        00 -> internal and external sensor
                        01 -> internal sensor only
                        10 -> external sensor only
                        11 -> standby

                    Bit2-Bit3 Valve Control Selection
                        00 -> Valve is controlled by thermostat
                        01 -> PC open the valve (thermostat can not control)
                        10 -> PC close the valve (thermostat can not control)
                        11 -> Standby

                    Bit4   turn-on/off
                        0 -> turn-off
                        1 -> turn-on

                    Bit5   Standby

                    Bit6   low temperature protection flag
                        0-> need low temperature protection
                        1-> cancel low temperature protection

                    Bit7   high temperature protection flag
                        0-> need high temperature protection
                        1-> cancel high temperature protection

 Data1 =>   Bit0   lock mode
                        0-> Buttons are locked except on/off.
                        1-> All bottons are locked.

Bit1   Lock status
0->unlock
1->lock

Bit2   Load status
0-> load close
1-> load open

Bit3   Sensor status
0-> sensor normal
1-> sensor error

Bit4~bit7 deadzone temperature(1℃~5℃)

Data2   => calibration temperature(-9℃~9℃)

Data3   => setting temperature(5℃~35℃)

Data4   => low temperature protection (5℃~10℃)

Data5   => high temperature protection (35℃~70℃)

Data6   =>   Room Temperature

Data7   =>   Floor Temperature

CheckSum

For example send command：
        A0 10 00 00 00 00 00 15   ;IP is 0010，read all thermostat data
Feedback：
        50 10 00 10 14 FF 23 05 2D 15 1B AD;
thermostat status: turn on, temperature control and limit control(internal sensor and external sensor), control the valve by thermostat, open low temperature protection (5℃), open high temperature protection (45℃), lock, unlock, load open, sensor normal, set deadzone temperature (1℃), calibration temperature (-1 ℃), set temperature (35℃), room temperature 21℃, floor temperature 27℃; command is: A1 10 00 10 10 FF 23 56;

        response: 0x50 data returns

        ----
        master write data to thermostat：

COMMAND   ==   0XA1   PC write data to thermostat

ID0,ID1   =>   IP

Data0   =>   Bit0-Bit1   sensor type
                  00 -> internal and external sensor
                  01 -> internal sensor only
                  10 -> external sensor only
                  11 -> standby

                  Bit2-Bit3 Valve Control Selection
                  00 -> Valve is controlled by thermostat
                  01 -> PC open the valve (thermostat can not control)
                  10 -> PC close the valve (thermostat can not control)
                  11 -> Standby

                  Bit4   turn-on/off
                  0 -> turn-off
                  1 -> turn-on

                  Bit5   Standby

                  Bit6   low temperature protection flag
                  0-> need low temperature protection
                  1-> cancel low temperature protection

                  Bit7   high temperature protection flag
                  0-> need high temperature protection
                  1-> cancel high temperature protection

Data1 =>   Bit0   lock mode
                  0-> Buttons are locked except on/off.
                  1-> All bottons are locked.

                  Bit1   Lock status
                  0->unlock
                  1->lock

                  Bit2   Load status
                  0-> load close
                  1-> load open

                  Bit3   Sensor status

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0-> sensor normal
1-> sensor error

Bit4~bit7 deadzone temperature(1℃~5℃)

Data2   => calibration temperature(-9℃~9℃)

Data3   => setting temperature(5℃~35℃)

CheckSum

slave response
COMMAND   ==   0X50   PC write data to thermostat
ID0,ID1   =>   IP

Data0   =>   Bit0-Bit1   sensor type
                            00 -> internal and external sensor
                            01 -> internal sensor only
                            10 -> external sensor only
                            11 -> standby

                        Bit2-Bit3 Valve Control Selection
                            00 -> Valve is controlled by thermostat
                            01 -> PC open the valve (thermostat can not control)
                            10 -> PC close the valve (thermostat can not control)
                            11 -> Standby

                    Bit4   turn-on/off
                            0 -> turn-off
                            1 -> turn-on

                    Bit5   Standby

                    Bit6   low temperature protection flag
                            0-> need low temperature protection
                            1-> cancel low temperature protection

                    Bit7   high temperature protection flag
                            0-> need high temperature protection
                            1-> cancel high temperature protection

Data1 =>   Bit0   lock mode
                            0-> Buttons are locked except on/off.

1-> All bottons are locked.

Bit1   Lock status
0->unlock
1->lock

Bit2   Load status
0-> load close
1-> load open

Bit3   Sensor status
0-> sensor normal
1-> sensor error

Bit4~bit7 deadzone temperature(1℃~5℃)

Data2   => calibration temperature(-9℃~9℃)

Data3   => setting temperature(5℃~35℃)

Data4   => low temperature protection (5℃~10℃)

Data5   => high temperature protection (35℃~70℃)

Data6   =>   Room Temperature

Data7   =>   Floor Temperature

CheckSum

For example send command：
        A1 10 00 10 10 FF 23 56；IP is 0010，write data to thermostat: temperature control and limit control(internal sensor and external sensor), control the valve by thermostat; turn on/off, open low temperature protection, open high temperature protection, lock, unlock, set deadzone temperature (1℃), calibration temperature (-1 ℃), set temperature (35℃),

Feedback：
        50 10 00 10 14 FF 23 05 2D 14 1B A2;
thermostat status: turn on, temperature control and limit control(internal sensor and external sensor), control the valve by thermostat, open low temperature protection (5℃), open high temperature protection (45℃), lock, unlock, load open, sensor normal, set deadzone temperature (1℃), calibration temperature (-1 ℃), set temperature (35℃), room temperature 21℃, floor temperature 27℃