Suzhou HuaRui Thermal Control Technology Co., Ltd

Title：The Modbus communication protocol of DC Aircon

NO.	Version	Alteration	Date	Remark
1	A2.0	initially built	2014/9/05	

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General Description

The air conditioner and heat exchanger support the Modbus communication protocol, please refer to http://www.modbus.org for further detail about the protocol.

The controller transmits data through RS485, the transmitting mode is: RTU mode, 8 bit data, no parity, CRC check, and the baud rate is 9600.

The time of waiting timeout is 50ms.

Function Code

The controller supports the following function code

Function Code	Description	Definition
01 (0x01)	Read Coils	This function code reads status from 1 to 2000 contiguous coils in a remote device.
02 (0x02)	Read Discrete Inputs	This function code reads status from 1 to 2000 contiguous discrete inputs in a remote device.
03 (0x03)	Read Holding Registers	This function code reads the contents of a contiguous block of holding registers in a remote device.
04 (0x04)	Read Input Registers	This function code reads from 1 to approx. 125 contiguous input registers in a remote device.
05 (0x05)	Write Single Coil	This function code writes a single output to either ON or OFF in a remote device.
06 (0x06)	Write Single Register	This function code writes a single holding register in a remote device.
16 (0x10)	Write Multiple Register	This function code writes a block of contiguous registers (1 to approx. 120 registers) in a remote device.

Exception Code

The controller supports the following exception code

Error Code	Description	Definition
01 (0x01)	Illegal Function	The function code received in the query is not an allowable action for the controller
02 (0x02)	Illegal Data Address	The data address received in the query is not an allowable address for the controller
03 (0x03)	Illegal Data Value	A value contained in the query data field is not an allowable value for the controller
04 (0x04)	Slave Device Failure	Fail to read or write the register
05 (0x05)	Controller Busy	The master should retransmit the data later when the controller is free
06 (0x06)	Too much data	The received data is more than 255 byte
12 (0x0C)	CRC Check Error	CRC Check Error

Data Type

The data has two types: bit data and word data. The bit data include discrete input data that is read-only and Coil data that is readable and writable. The word data include input register that is read-only and holding register that is readable and writable。

Data List

Data address of the controller register follows Modbus communication protocol, which start from 0 and the maximum address is 65535. But any address is not defined in the controller, if the master request data at undefined address, the controller will return error. The corresponding data as follows:

MODBUS Coil Data Points List

Network Control Property	Read or Write	Data Type	ID	Description
The status of internal fan 1	R	Coil	0	1=Run，0=Stop
The status of internal fan 2	R	Coil	1	1=Run，0=Stop
The status of external fan 1	R	Coil	2	1=Run，0=Stop
The status of external fan 2	R	Coil	3	1=Run，0=Stop
The status of compressor	R	Coil	4	
The status of heater	R	Coil	5	1=Run，0=Stop
The status of optical coupler alarm output 1	R	Coil	6	1=On ，0=Off
The status of optical coupler alarm output 2	R	Coil	7	1=On ，0=Off
The status of optical coupler alarm output 3	R	Coil	8	1=On ，0=Off
The status of optical coupler alarm output 4	R	Coil	9	1=On ，0=Off
The status of optical coupler alarm output 5	R	Coil	10	1=On ，0=Off
The status for main alarm output	R	Coil	11	1=On ，0=Off
The status of system	R/W	Coil	12	1=Run，0=Stop
Reserved	R	Coil	13	
Reserved	R	Coil	14	
Reserved	R	Coil	15	

MODBUS Discrete Input Data Points List

Network Control Property	Read or Write	Data Type	ID	Description
The alarm for internal fan 1	R	Discrete Input	0	1=Alarm ,0=No Alarm
The alarm for internal fan 2	R	Discrete Input	1	1=Alarm ,0=No Alarm
The alarm for external fan 1	R	Discrete Input	2	1=Alarm ,0=No Alarm
The alarm for external fan 2	R	Discrete Input	3	1=Alarm ,0=No Alarm
The alarm for compressor	R	Discrete Input	4	1=Alarm ,0=No Alarm
Reserved	R	Discrete Input	5	
Reserved	R	Discrete Input	6	
The alarm for heater	R	Discrete Input	7	1=Alarm ,0=No Alarm
The over-current alarm for heater	R	Discrete Input	8	1=Alarm ,0=No Alarm
The non-current alarm for heater	R	Discrete Input	9	1=Alarm ,0=No Alarm
The alarm for temperature sensor 1	R	Discrete Input	10	1=Alarm ,0=No Alarm
The alarm for temperature sensor 2	R	Discrete Input	11	1=Alarm ,0=No Alarm
High voltage alarm	R	Discrete Input	12	1=Alarm ,0=No Alarm
Low voltage alarm	R	Discrete Input	13	1=Alarm ,0=No Alarm
The indoor alarm for high temperature	R	Discrete Input	14	1=Alarm ,0=No Alarm
The indoor alarm for low temperature	R	Discrete Input	15	1=Alarm ,0=No Alarm
High pressure alarm for system	R	Discrete Input	16	1=Alarm ,0=No Alarm
Low pressure alarm for system	R	Discrete Input	17	1=Alarm ,0=No Alarm
Reserved	R	Discrete Input	18	0
Reserved	R	Discrete Input	19	0
Reserved	R	Discrete Input	20	0

MODBUS Input Register Data Points List

Network Control Property	Read or Write	Data Type	ID	Description
The revolution of internal fan 1	R	Input Register	0	
The revolution of internal fan 2	R	Input Register	1	
The revolution of external fan 1	R	Input Register	2	
The revolution of external fan 2	R	Input Register	3	
The temperature sampled by sensor 1	R	Input Register	4	Indoor used
The temperature sampled by sensor 2	R	Input Register	5	
Reserved	R	Input Register	6	
Reserved	R	Input Register	7	
Reserved	R	Input Register	8	
Reserved	R	Input Register	9	
The current value of heater	R	Input Register	10	
Self check flag	R	Input Register	11	
Reserved	R	Input Register	12	
Reserved	R	Input Register	13	
Reserved	R	Input Register	14	

MODBUS Holding Register Data Points List

Network Control Property	Read or Write	Data Type	ID	Description	
				Default	Range
The delta top speed for internal fan	R/W	Holding Register	0		
The maximum speed for internal fan	R/W	Holding Register	1		
The minimum speed for internal fan	R/W	Holding Register	2		
The delta temperature point of top speed for internal fan	R/W	Holding Register	3		
The temperature point of maximum speed for internal fan	R/W	Holding Register	4		
The temperature point of minimum speed for internal fan	R/W	Holding Register	5		
The internal fan stop temperature	R/W	Holding Register	6		
The internal fan start return difference temperature	R/W	Holding Register	7		
The pulses number per revolution of internal fan	R/W	Holding Register	8		
The enable bit of internal fan1	R/W	Holding Register	9		
The enable bit of internal fan2	R/W	Holding Register	10		

The delta top speed for external fan	R/W	Holding Register	11		
The maximum speed for external fan	R/W	Holding Register	12		
The minimum speed for external fan	R/W	Holding Register	13		
The delta temperature point of top speed for external fan	R/W	Holding Register	14		
The temperature point of maximum speed for external fan	R/W	Holding Register	15		
The temperature point of minimum speed for external fan	R/W	Holding Register	16		
The external fan stop temperature	R/W	Holding Register	17		
The external fan start return difference temperature	R/W	Holding Register	18		
The pulses number per revolution of external fan	R/W	Holding Register	19		
The enable bit of external fan1	R/W	Holding Register	20		
The enable bit of external fan2	R/W	Holding Register	21		
The temperature of heater start	R/W	Holding Register	22		
The delta temperature of heater	R/W	Holding Register	23		
Heater current high limit	R/W	Holding Register	24		
Heater current low limit	R/W	Holding Register	25		
The enable bit of heater	R/W	Holding Register	26		
The address of system	R/W	Holding Register	27		
High temperature alarm point	R/W	Holding Register	28		
Low temperature alarm point	R/W	Holding Register	29		
Reserved	R/W	Holding Register	30		
Reserved	R/W	Holding Register	31		
Reserved	R/W	Holding Register	32		
The calibration of sensor1 temperature	R/W	Holding Register	33		
The calibration of sensor2 temperature	R/W	Holding Register	34		
The calibration of heater current	R/W	Holding Register	35		
The calibration of DC voltage	R/W	Holding Register	36		
External control enable	R/W	Holding Register	37		
External control option	R/W	Holding Register	38		
The alarm value of high voltage	R/W	Holding Register	39		
The alarm value of low voltage	R/W	Holding Register	40		
The setting temperature	R/W	Holding Register	39		
The sensitivity of setting temperature	R/W	Holding Register	40		

Data explain

1. The unit is equipped with inner and outer fans; the value of the register is the respective value of speed without fault.
2. The unit is equipped with temperature sensors; the value of the register is the respective value of temperature without fault.
   Attention: This data is signed integer form.
   Conversion formula：The value of the actual temperature（℃）=register data÷10。
3. The unit is equipped with heater; the value of the register is the respective value of current value without fault.
   Attention: This data is signed integer form.
   Conversion formula：The value of the actual current value（A）=register data÷10。