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ITEM

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1st CREATION DATE

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		DESCRIPTION - OMSCHRIJVING PCB SPECIFICATIONS	
		PART CODE 889000	AD17WW0073

FanCoil Modbus Communication

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1 Over view

This specification is applied for McQuay and DAIKIN Fancoil products.

2 Communication Protocol

2.1 Modbus RTU

This protocol is based on Modbus RTU.

2.2 Physical Layer

Hardware : RS-485, Half Duplex, asynchronous communication
 Speed : 9600bps
 Bits per Bytes : 1start bit, 8data bits (LSB sent first), No parity, 2stopbits
 Error check : CRC-16

2.3 RTU Framing

Silent interval + Address + Function code + Data1,Data2,.. + CRC + Silent interval

Silent interval : 3.5 character times

Address : 8bits

Slave address is assigned address in the range of 1-64.

Adress "0" is used as the broadcast address.

Function code : 8bits

2.4 Framing Error

When the Slave detects the following error, the slave does not reply.

And after silent interval time is elapsed, the slave moves on the received Stage.

Error; CRC, parity, over run,

2.5 Function code

Function Code	Function Name
0 3 hex	Read Holding Registers
0 4 hex	Read input Register
0 6 hex	Preset Single Register
1 0 hex	Preset Multiple Registers

eg1) Read Holding registers from 40010 to 40015 of Slave address 7.

Slave address ; 0x07
 Function Code ; 0x03
 Start address (upper) ; 0x00
 Start address (lower) ; 0x09 (Note: Holding register 40010 equals 0x0009)
 Number of register (upper) ; 0x00
 Number of register (lower) ; 0x06
 Error check ; CRC

eg2) Read Input registers from 30020 to 30030 of Slave address 7.

Slave address	; 0x07
Function Code	; 0x04
Start address (upper)	; 0x00
Start address (lower)	; 0x13 (Note: register 30020 equals 0x0013)
Number of register (upper)	; 0x00
Number of register (lower)	; 0x0B
Error check	; CRC

eg3) Preset single registers from 40015 of Slave address 7.

Slave address	; 0x07
Function Code	; 0x06
Address (upper)	; 0x00
Address (lower)	; 0x0E (Note: Holding register 40015 equals 0x000E)
Data (upper)	; 0x03
Data (lower)	; 0x58 (write data 1000)
Error check	; CRC

eg4) Preset multiple registers from 40001 to 40003 of Slave address 7.

Slave address	; 0x07
Function Code	; 0x10
Start address (upper)	; 0x00
Start address (lower)	; 0x00 (Note: register 40001 equals 0x0000)
Number of register (upper)	; 0x00
Number of register (lower)	; 0x03
Data1 (upper)	; 0x00
Data1 (lower)	; 0x03 (write data 3 at 40001)
Data2 (upper)	; 0x00
Data2 (lower)	; 0x04 (write data 4 at 40002)
Data3 (upper)	; 0x00
Data4 (lower)	; 0x05 (write data 5 at 40003)
Error check	; CRC

3 data

Holding Register	No	Description	Units	Valid Range
40001	bit15	N/A	----	
	~	N/A	----	
	bit10	Sleep Setup	----	0 = Off , 1 = On
	bit9	Filter Sign Reset	----	0 = Non , 1 = Reset
	bit8	Electric Heater	----	0 = Disable , 1 = Enable
	bit7	N/A	----	
	bit6	N/A	----	
	bit5	Lock Key Pad - Fan speed	----	0 = Unlocked , 1 = Locked
	bit4	Lock Key Pad -Mode set	----	0 = Unlocked , 1 = Locked
	bit3	Lock Key Pad -Set point Temperature	----	0 = Unlocked , 1 = Locked
	bit2	Lock Key Pad - On/Off	----	0 = Unlocked , 1 = Locked
bit1	Lock Key Pad - All functions	----	0 = Unlocked , 1 = Locked	
bit0	On/Off	----	0 = Off , 1 = On	
40002		Mode	----	0 = Auto , 1 = Cooling , 2 = Heating ,3 = Fan
40003		Set Point Cooling Temperature	°C/10	
40004		Set Point Heating Temperature	°C/10	
40004	bit15	N/A	----	
	~	N/A	----	
	bit11	Fan speed set	----	0 = N/A , 1 = fixed steps , 0xF = Auto
	bit10			
	bit9			
	bit8			
	bit7	Max Fan speed steps	----	1 - 15
	bit6			
	bit5			
	bit4	Fan speed steps	----	0 - 15 (0 = off) When Fan speed set is "fixed steps", this data is available.
	bit3			
bit2				
bit1				
bit0				
40005	bit15	N/A	----	
	~	N/A	----	
	bit11	Swing frap set	----	0 = N/A , 1 = fixed position , 0xF = On
	bit10			
	bit9			
	bit8			
	bit7	Max Swing frap position	----	1 - 15
	bit6			
	bit5			
	bit4	Swing frap position	----	0 - 15 When Swing frap set is "fixed position", this data is available.
	bit3			
bit2				
bit1				
bit0				
40006		Thermostat Group number	----	0-64
40007	bit13-15	Clock Setup	week	sun=0 , Mon=1 , ,,,,,,
	bit8-12		hour	0 - 23
	bit0-7		min	0 - 59

Input Register	No	Description	Units	Valid Range
30001	bit15	Door Card	----	0 = Invalid , 1 = Valid
	bit14	Leaving Water Temperature sensor1	----	0 = Invalid , 1 = Valid (See Note5)
	bit13	Entering Water Temperature sensor1	----	0 = Invalid , 1 = Valid (See Note5)
	bit12	Leaving Water Temperature sensor2	----	0 = Invalid , 1 = Valid (See Note5)
	bit11	Entering Water Temperature sensor2	----	0 = Invalid , 1 = Valid (See Note5)
	bit10	Humidity	----	0 = Invalid , 1 = Valid
	bit9	Sleep Setup	----	0 = Invalid , 1 = Valid
	bit8	Filter Sign	----	0 = Invalid , 1 = Valid
	bit7	Swing frap	----	0 = Invalid , 1 = Valid
	bit6	Electric Heater	----	0 = Invalid , 1 = Valid
	bit5	N/A	----	0 = Invalid , 1 = Valid
	~	N/A	----	0 = Invalid , 1 = Valid
	bit0	Were Input Register data ready after power supply?	----	0 = not ready , 1 = ready
30002		Min set point - cooling	°C/10	
30003		Max set point - cooling	°C/10	
30004		Min set point - Heating	°C/10	
30005		Max set point - Heating	°C/10	
30006		Max fan speed steps	----	Steps <= 15
30007		Max swing frap positions	----	Positions <= 15
30008		Thermostat group number	----	
30009		Unit Type	----	
30010		Software version	----	
30020	bit15	N/A	----	
	~	N/A	----	
	bit7	Door card	----	0 = Leave, 1 = Insert
	bit6	Sleep setup	----	0 = Off , 1 = On
	bit5	Filter sign	----	0 = Off , 1 = On
	bit4	Condensation water pump	----	0 = Off , 1 = On
	bit3	Electric Heater	----	0 = Off , 1 = On
	bit2	Alarm level (Alarm code - address 30029)	----	0 = No alarm , 1 = fault 2 = problem , 3 = warning
bit1				
bit0	On/Off	----	0 = Off , 1 = On	
30021	bit7-15	Actual Mode	----	0 = N/A , 1 = Cooling , 2 = Heating , 3 = Fan
	bit0-7	Set Mode	----	0 = Auto, 1 = Cooling , 2 = Heating , 3 = Fan
30022		Active temperature setup	°C/10	
30023		Room temperature	°C/10	
30024		Cool control output	%	
30025		Heat control output	%	
30026	bit15	N/A		
	~	N/A		
	bit11			
	bit10	Fan speed set	----	0 = N/A , 1 = fixed steps , 0xF = Auto
	bit9			
	bit8			
	bit7			
	~	N/A-Max fan speed steps	----	1 - 15
	bit4			
	bit3	Fan speed steps	----	0 - 15 (0 = off) When Fan speed set is not "N/A", this data is available.
bit2				
bit1				
bit0				

Input Register	No	Description	Units	Valid Range
30027	bit15	N/A		
	~	N/A		
	bit11	Swing frap set	----	0 = N/A , 1 = fixed position , 0xF = On
	bit10			
	bit9			
	bit8			
	bit7	N/A Max swing frap positions	----	1 - 15
	~			
	bit4			
	bit3	Swing frap position	----	0 - 15 When Swing frap set is "fixed position", this data is available.
bit2				
bit1				
bit0				
30028		Room humidity	%	
30029	bit15	N/A		
	~	N/A		
	bit8	Alarm ID number1	----	0 means N/A.
	bit7			
	bit6			
	bit5	Alarm ID number2	----	0 means N/A.
	bit4			
	bit3			
	bit2	Alarm Level	----	3 : Fault 2 : Problem 1 : warning
bit1				
bit0				
30030	bit7-15	Alarm category code	----	ASCII Code
	bit0-7	Alarm detail code	----	ASCII Code
30031		Entering water temperature1	°C/10	See Note5
30032		Leaving water temperature1	°C/10	See Note5
30033		Entering water temperature2	°C/10	See Note5
30034		Leaving water temperature2	°C/10	See Note5

NOTE1) The temperature data value is expressed by the two's complement.

NOTE2) When the temperature or humidity data value is
 0x7FFF, it means that Fancoil don't have the sensor,
 0x4E20, it means sensor fault (more than upper range),
 0x2710, it means sensor fault (less than lower range),

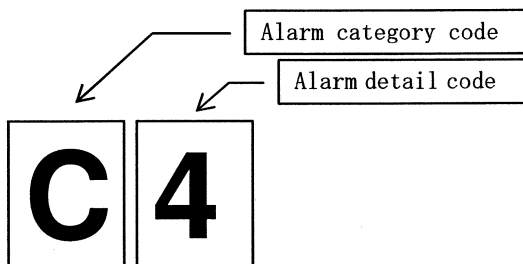
NOTE3) As central remote controller does not have a sort of EEPROM, "Thermostat group number" data need to be stored by each fancoil.

NOTE4) Alarm
 When Alarm Level is "No Alarm"(= 0), Alarm ID1,2 and Alarm code is invalid.

4-1) Alarm Code

The alarm is composed of the alarm code and the alarm level. And Alarm code is composed of alarm category code and alarm detail code. Alarm level should be defined as follows.

e.g) Alarm code "C4"



Alarm Level	Unit state
fault	Unit shutdown or Start aborted
problem	Unit continues to run. But some functions are restricted.
warning	No effect on unit control. In the future, this alarm might cause higher level alarms.

4-2) Alarm ID number

Alarm ID number is used to show where that alarm is occurred.

[Alarm ID number2 - Alarm ID number1 - Alarm Code(category + Detail)]

e.g) Circuit2,Compressor2, Alarm Code=xx, -> 2-2-XX, Fan2 , Alarm Code =L9 -> 0-2-L9

★ Fan Coil alarm code(e.g)

Alarm code	description
80	Inlet water temperature sensor error
81	Outlet water temperature sensor error
A0	External protection
A1	control PCB error or flash memory error
A3	drain water level error
A6	fan motor over current error
AF	humidifier error
AH	clarifier error
C4	heat exchanger temperature sensor error(Entering Water temp sensor)
C5	heat exchanger temperature sensor error(Leaving Water temp sensor)
C9	suction air temperature sensor error
CJ	remote controller air(indoor) temperature sensor error
L3	Main controller IC over temperature error for fan motor drive.
LA	IGBT error
L9	Motor stalled
LC	Communication error between Main controller and fan motor drive.
P1	Phase monitor alarm for fan motor drive.
U2	DC main drive line voltage error for fan motor drive.
U3	Modbus communication error
U5	communication error between remote controller and control PCB
U8	communication error between main and sub remote controller
UA	Dip Switch setting error
UC	communication address duplicate error
UE	D3 communication error
MA	D3 controller combination error

NOTE5) Leaving and Entering Water Temperature sensor1 is for Cool HeatExchanger of 4Pipe fancoil and 2Pipe fancoil HeatExchange. Leaving and Entering Water Temperature sensor2 is only for Hot HeatExchanger of 4Pipe fancoil

NOTE6) Fan speed and Swing frap position

Each fancoils should calculate the steps or positions as follows.

Fan steps = Fan speed steps (40004) / Max Fan speed steps(40004) * Max Fan speed steps(30006)

Swing frap positions = Swing frap positions (40005) / Max swing frap positions (40005) * Max swing frap positions (30007)

Calculations % of Fan speed and Swing frap position is the following.

Fan speed (%) = (Fan speed steps / Max Fan speed steps) * 100

Swing frap position (%) = (Swing frap position / Max swing frap positions) * 100

and

Fan speed steps = 0 means that fan is stopping.

Swing frap position = 0 means that Swing frap position is home position

4 Structure of data area

Structure of data area is below.

- 30001-30010 : Input Register area where fancoil unit configuration data is described.
 30020-30031 : Input Register area where fancoil unit state data is described.
 40001-40007 : Holding Register area where command to fancoil unit is described.

Revision	Date	Change Description
Non	05/25/2010	Release
A	05/26/2010	> Set Point Cooling temperature and Set Point Heating temperature --> Set Point temperature. > described the additional information for temperature data. (negative value is shown by the two's complement)
B	05/27/2010	> Fan speed and swing frap data were changed. > NOTE1,2 were added.
C	06/29/2010	> 3 Structure of data area was added. > Communication address range was changed. (0-127, -> 0-64) > Added example of RTU Framing, > Alarm code was updated.(30020 & 30029)
D	07/21/2010	> Address 30020 bit0 was modified. (valid/invalid -> On/Off) > Valid range limitation was added to address 30006 and 30007. > NOTE2) was updated.(referred to humidity data) > NOTE5) was added for fan speed and swing frap.
E	08/21/2010	> Address 40001 bit3 was modified. (Set Point -> Set Point Temperature) > NOTE2) was modified. (0x7FF -> 0x7FFF) > Alarm code requested by Shenzhen was added. (80,81,L3,L9,LA,LC,P1,U2,UA) > Alarm Level Address was move to another address. > Added Alarm ID Number.
F	09/04/2010	> Added Entering and Leaving water temperature2 data. (address 30001 bit11,12, 30033,30034) > Note2) was modified.(added sensor fault value) > Alarm code was modified. C5 was added and 80,81 was removed.
G	10/20/2010	> Added "Set Mode" in address 30021.
H	10/28/2010	> changed the valid range of 40001 bit8(Electric Heater) from "On/Off " to "Enable/Disable".
I	11/21/2010	> changed the valid range of 40004(Fan speed set) from "0=Off" to "0=N/A". > changed the valid range of 30026(Fan speed set) from "0=Off" to "0=N/A". > The part of NOTE6) that explains the meaning of 0 was deleted.
J	12/01/2010	> Removed the "0=off" from valid range of 40004 and 30026 "Fan speed steps".
K	12/14/2010	> Official release > Added "Max fan speed steps" in address 30026. > Added "Max swing frap positions" in address 30027. > Additional explanation was added in NOTE4) > modified the explanation in NOTE6)