Communication： Modbus

Data Transmitted via UART	
Baud rate：9600bps	
Transmission：RTU	
Start：LSB first	
Start bit：1	
Date bit：8	
Verification：None	
Stop bit：1	

Software & Hardware

1.Standard Modbud-RTU, RS485 master cable, Master-slave half duplex asychronous serial communication;

2.Default communication setting : 9600-8-N-1; Low bit first, big edian in front, little edian afterwards;

3.Master port :External controller ; Modbus slave: Frequency converter ; Default slave address : 0xAA; (0xA0 ~ 0xBF adjustable)

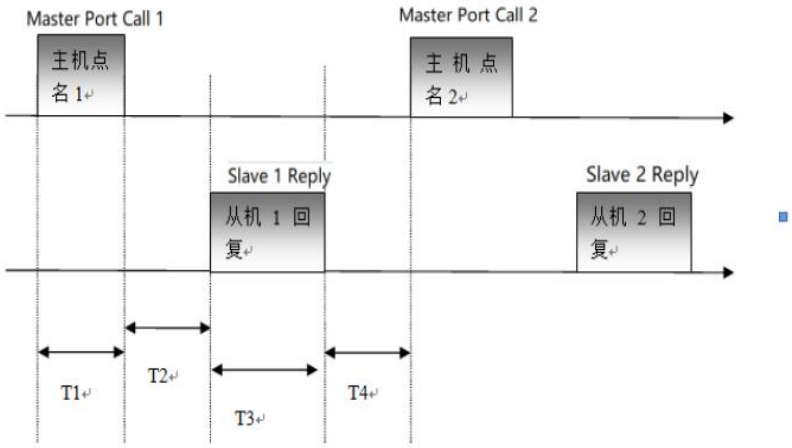
4.This protocal supports the following 2 Modbus function codes for Modus holding register
1). Function code 03H: Read multiple holding registers
2). Function code 10H: Write multiple holding registers

5. If Modbus slave can't connect to correct data for 15 seconds, communication error will be reported (not open considering compability), once correct data received,error will be eliminated

Communication Timing Procedure

1. Master port calls at a regular interval, interval:1000ms [Calculation of duration: Master port callT1+Slave reply wait time T2+ Slave replytime T3)+T4]

2. Timing as follows :



3.Conditions：

1). Response time of Modbus slave (T2): Upon receipt of name frame from master port, Modbus slave has to send outfirst byte of response frame within 50ms

2). Sending time from master port (T4) :Upon receipt of last byte from reply frame, wait at least 50ms before sendingout next data.

3). Timing is accounted by 1ms, maximum deviation is 1ms, a deviation of +/-1ms is acceptable by above mentionedtiming conditions

Function Code

0x03

Description: Register reading

Note: Master control board register reading, broadcast is not supported.

Function code: 0x03 (user grade)

Table 8 Request Frame

Address	Function Code	Start Address	Number of data	CRC Verification Code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes

Table 9 Response Frame

Address	Function Code	Number of Byte	Valid Data	CRC Verification Code
1 Byte	1 Byte	1 Byte	n Bytes	2 Bytes
Note: Address, function code , start address, Data of response frame same as request frame				

0x10

Description: Register Writing (Write multiple registers)

Note: Write master board data into register, support broadcasting.

Function code: 0x10 (user grade)

Table 10 Request Frame

Address	Function Code	Start Address	Number of Data	Number of Byte	Valid Data	CRC Verification Code
1 Byte	1 Byte	2 Bytes	2 Bytes	1 Byte	n Bytes	2 Bytes

Table 11 Response Frame

Address	Function Code	Start Address	Number of data	CRC Verification Code
1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Note: Address, function code , start address, Data of response frame same as request frame				

Note

1.Transmission format for "Start address","Data/Quantity" and "Valid Data is the same, 8 big edian first,then 8 little edians.
E.g.: To transmit 0x1234, Transmit 0x12 first, then 34

2. Transmission format for CRC verification code is: 8 little edians first, then 8 big edians
E.g.:To transmit 0xAA55, Transmit 0x55 first, then 0xAA

Definition	Spec Address	Attribution	Function	Data Type	Function Description	
Commands on the Master Board	3001	W	Running capacity setting	INT16	0: OFF；30-120： Running capacity	
	3002	W	Flow rate setting (lpm gpm)	INT16	Valid data see Flow Rate Appendix	
	3003	W	Flow rate setting (US gpm)	INT16	Valid data see Flow Rate Appendix	
	3004	W	Flow rate setting (L/min)	INT16	Valid data see Flow Rate Appendix	
	3005	W	Flow rate setting (m3/h)	INT16	Valid data see Flow Rate Appendix	
	Spec address priority: 3005>3004>3003>3002>3001. It is recommended that each data frame contains only one instruction message.					
Master Board Data Reading	2001	R	Error Code	INT16	Bit0	Pressure sensor failure
					Bit1	Communication Error
					Bit2	No water protection
					Bit3	RTC time reading error
					Bit4	Display Board EEPROM reading failure
					Bit5	Circuit board error
					Bit6	Motor power overload
					Bit7	PFC protection
					Bit8	DC abnormal voltage
					Bit9	AC current sampling circuit failure
					Bit10	Phase-deficient protection
					Bit11	Master driver board error
					Bit12	Heat sink sensor error
					Bit13	Heat sink over heat
					Bit14	Output over current
					Bit15	Abnormal input voltage
	2002	R	Frequency Inverter Running state	INT16	Bit0	Pool pump "ON"
					Bit1-bit15	Reserved
	2003	R	Running capacity	INT16	True value	
	2004	R	Power	INT16	True value	
	2005	R	Flow rate	INT16	True value	
	2006	R	Pressure value	INT16	True value	hPa
	2007	R	Power consumption	INT16	True value	kW/h, value is expanded by 1,000 times when sending
	2008	R	Mode code	INT16		20/25/30/40
	2009	R	Software version	INT16	True value	
	3001	R	Running capacity setting	INT16		30-120: means valid date
	3002	R	Flow rate setting (lmp gpm)	INT16		Valid data see Flow Rate Appendix
	3003	R	Flow rate setting (US gpm)	INT16		Valid data see Flow Rate Appendix
	3004	R	Flow rate setting (L/min)	INT16		Valid data see Flow Rate Appendix
	3005	R	Flow rate setting (m3/h)	INT16		Valid data see Flow Rate Appendix

Flow Rate Appendix

Valid Flow Rate of 0.75kW model			
m³/h	L/min	Imp gpm	us gpm
20	320	70	85
19	300	65	80
18	280	60	75
17	260	55	70
16	240	50	65
15	220	45	60
14	200	40	55
13	180	35	50
12	160	30	45
11	140	25	40
10	120	20	35
9	100	15	30
8	80		25
7			20
6			
5			

Valid Flow Rate of 1.05kW model			
m³/h	L/min	Imp gpm	us gpm
25	420	95	110
24	400	90	105
23	380	85	100
22	360	80	95
21	340	75	90
20	320	70	85
19	300	65	80
18	280	60	75
17	260	55	70
16	240	50	65
15	220	45	60
14	200	40	55
13	180	35	50
12	160	30	45
11	140	25	40
10	120	20	35
9	100	15	30
8	80		25
7			20
6			
5			

Valid Flow Rate of 1.4kW model			
m³/h	L/min	Imp gpm	us gpm
30	520	120	135
29	500	115	130
28	480	110	125
27	460	105	120
26	440	100	115
25	420	95	110
24	400	90	105
23	380	85	100
22	360	80	95
21	340	75	90
20	320	70	85
19	300	65	80
18	280	60	75
17	260	55	70
16	240	50	65
15	220	45	60
14	200	40	55
13	180	35	50
12	160	30	45
11	140	25	40
10	120	20	35
9	100	15	30
8	80		25
7			20
6			
5			

Valid Flow Rate of 1.75kW model			
m³/h	L/min	Imp gpm	us gpm
35	620	145	160
34	600	140	155
33	580	135	150
32	560	130	145
31	540	125	140
30	520	120	135
29	500	115	130
28	480	110	125
27	460	105	120
26	440	100	115
25	420	95	110
24	400	90	105
23	380	85	100
22	360	80	95
21	340	75	90
20	320	70	85
19	300	65	80
18	280	60	75
17	260	55	70
16	240	50	65
15	220	45	60
14	200	40	55
13	180	35	50
12	160	30	45
11	140		40
10			35
9			
8			