Appendix A: Modbus Communication Protocol

1. Application Scope

(1) Applicable series: RS series VFD.

(2) Applicable network: Support Modbus protocol, RTU format, with single-master/multi-slave Communication network of RS485 bus.

The typical RTU message frame format:

Start Bit	Device Address	Function Code	Data	CRC	Stop Bit
T1-T2-T3-T4	8Bit	8Bit	n*8Bit	16Bit	T1-T2-T3-T4

2. Physical Interface

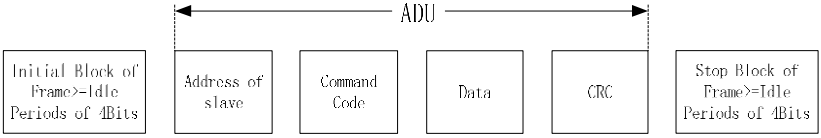
RS485 is asynchronous half-duplex Communication mode. LSB has transmission priority.

Default data format of RS485 terminal: 1-8-N-2，baud rate: 9600bps.

Data format 1-8-N-1, 1-8-O-1, 1-8-E-1, 1-8-N-2, optional baud rates 4800bps, 9600bps, 19200bps, 38400bps, 57600bps and 115200bps.

Shielded twisted-pair cable is recommended Communication cable to reduce external interference.

3. Protocol Format



The parity in ADU (Application Data Unit) is obtained via the CRC16 parity of the 1st three parts of ADU and switch the low bytes and high bytes. Low bytes of CRC parity go first, and high bytes of it follow in the protocol format.

4. Description of Protocol Format

4.1 Address Code

Address of slave VFD. The setting range: 1 ~ 247, 0 is broadcast address.

4.2 Command Code

Command Code	Function
03H	Read parameters and status byte of VFD
06H	Write single function code or control parameter of VFD
08H	Circuit diagnosis and setting
10H	Write multi function code or control parameter of VFD

4.3 Allocation of Register Addresses

name	Description
Function Code (P00.00～U01.99)	High byte function code group number, P00 ～ P31, U00, U01, respectively, corresponding to the high byte address is 00H～1FH, 31H, 32H. Low byte of the group function code number, from 0 to 99 corresponding to the low byte address is 00H～63H. For example: Modify P01.02 function code value, no power-down when storing the corresponding register address (referred to as RAM address) to 0102H. EEPROM is frequently modified, will reduce the life of the EEPROM. If you modify the value of the function code-down storage needs, you can make this function code is the highest position a high address. Note that this address is only to write, not read. For example: Modify P01.02 function code value, and the corresponding need to power down when storing the register address (referred to as EEPROM address) to 8102H.

Function code group	RAM address high byte	EEPROM address high byte
P00	0x00	0x80
P01	0x01	0x81
P02	0x02	0x82
P03	0x03	0x83
P04	0x04	0x84
P05	0x05	0x85
P06	0x06	0x86
P07	0x07	0x87
P08	0x08	0x88
P09	0x09	0x89
P10	0x0A	0x8A
P11	0x0B	0x8B
P12	0x0C	0x8C
P13	0x0D	0x8D
P14	0x0E	0x8E
P15	0x0F	0x8F
P16	0x10	0x90
P17	0x11	0x91
P18	0x12	0x92
P30	0x1E	0x9E
P31	0x1F	0x9F
U00(Read Only)	0x31	--
U01(Read Only)	0x32	--
L00	0x30	0xB0

- **Address and control command functions: (write only)**

Command word address	Command Function
2000H	0001: Forward run 0002: Reverse run 0003: ForwardJOG run 0004: ReverseJOG run 0005: Ramp stop 0006: Coast stop 0007: Fault reset
2001H	Communication setting frequency (0～Fmax (Unit: 0.01Hz))
2002H	PID given range (0 to 1000, 1000 corresponds to 100.0%)
2003H	PID feedback range (0～1000, 1000 corresponds to 100.0%)
2004H	Torque set point (-3000 ～ 3000, 1000 corresponds to 100.0% motor rated current)
2005H	AO1(0 to 1000, 1000 corresponds to 100.0%)
2006H	AO2(0 to 1000, 1000 corresponds to 100.0%)
2007H	DO1 (0 invalid, 1valid)
2008H	DO2 (0 invalid, 1valid)

- **The status and function of the read address Description: (read only)**

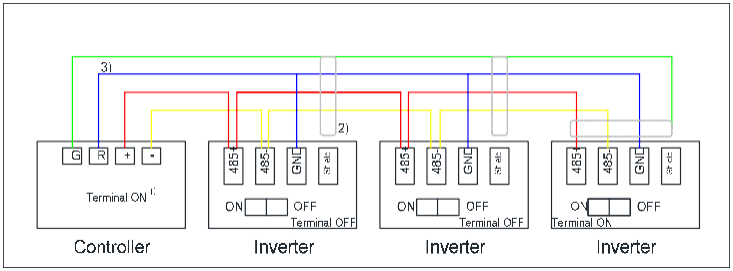
Status word address	functional status word
2100H	0000H: parameter setting 0001H: Run status 0002H: Coast stop 0003H: Fault Status 0004H: Motor auto-tuning
2101H	Bit0: 0 are positive given valid 1 are negative given valid Bit1:0 frequency output forward 1 frequency output reverse Bit2～3: 00 Keypad start-stop 01 Terminal start-stop 10 Communicationstart-stop 11 Reserved Bit4: 0 Factory password is invalid 1 Factory password is valid Bit5: 0 User password is invalid 1 User password is valid Bit6～7: 00 basic function code group 01 user-defined function code group 10 different functions with the factory default code group 11 Others
2102H	VFD current fault code
2103H	VFD current warning code

5. Modbus RTU communication wiring

Connect the fieldbus to the VFD control terminal 485+, 485-, GND .

Configure communication for Modbus RTU bus:

1) Connect the fieldbus cable and the required I/O signals.
2) Use a dip switch to select the terminal resistor.
3) Power on the VFD and set the required parameters. Follow is an example connection:



4) All devices at the end of the fieldbus must turn on the terminal. All other devices must turn off the terminal.
5) Connect the cable shield layers of each VFD together, but do not connect the VFD, connect only the shielding layer to the controller ground terminal.
6) Connect the signal ground (GND) wire to the controller signal ground reference terminal.