EV200 Definition of Communication Data Address

EV200 series inverter supports Modbus communication protocol. The host computer can realize the control,monitoring and modification of the function parameters of the inverter through the Modbus communication protocol.EV200 communication data can be divided into function code data and non-function code data, the latter includes running commands, running status, running parameters,alarm information, etc.

I.1 EV200 Parameter Data

The parameter data provides important parameters of the AC drive. EV200 have group P and Group A. The parameter data is described as below,Communication addresses of parameter data are defined as follows,

1. When parameter data is read by means of communication

For groups P0 to PF and A0 to AF, the high 16 bits of the communication address indicate the group number and the low 16 bits indicate the parameter number in the group.

Example:

Communication address of P0-16 is F010H, where F0H represents group P0 and 10H is the hexadecimal data format of serial number 16 in the group. Communication address of AC-08 is AC08H, where ACH represents group AC and 08H is the hexadecimal data format of serial number 8 in the group.

2. When parameter data is written by means of communication

For groups P0 to PF, whether the high 8 bits in communication address are 00 to 0F or P0 to PF is decided by whether the high 8 bits are written to EEPROM. The low 8 bits indicate parameter number in the group P0-16: If it need not be written to EEPROM, communication address is 0010H.If it needs to be written to EEPROM, communication address is F010H. For groups A0 to AF, whether the high 8 bits in communication address are 40to 4F or A0 to AF is decided by whether the high 8 bits are written to EEPROM. The low 8 bits indicate parameter number in the group.AC-08. If it need not be written to EEPROM, communication address is 4C08H. If it needs to be written to EEPROM, communication address is AC08H.

I.2 Non-Parameter Data

Status data(read only)	Group d monitoring parameters, AC drive fault information and AC drive running status

1. Status Data

Status data includes group d (monitoring parameters), AC drive fault description and AC drive running status.

●. Group d (monitoring parameters)

The high 16 bits in communication address of d0 to dF is 70 to 7F and the low 8 bits indicate the function code number in the group. For example, the communication address of d0-11 is 700BH.

●. AC drive fault description

When fault description is read via communication, the communication address is 8000H. You can obtain current fault code of the AC drive by reading the address.

●. AC drive running status

When the drive running status is read via communication, the communication address is 3000H. You can obtain current running status information of the AC drive by reading the

address. The running status is defined in the following table.

1: Forward run

2: Reverse run

3: Stop

Communication Address of AC Drive's	Running Status Status Definition
3000H	1: Forward run 2: Reverse run 3: Stop

2. Control Parameters

The control parameters include control command, communication setting values, AO1 control, AO2 control, high-speed pulse (FMP) output control and parameter initialization.

3. Control commands

When P0-02 (command source selection) is set to 2 (serial comms.), you can implement control such as start/stop of the AC drive by using communication address. The control commands are defined in the following table.

Communication Address of AC Drive's Running Status	Status Definition
2000H	1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Coast to stop 6: Decelerate to stop 7: Fault reset

4. Communication reference

Communication setting values include data set via communication such as frequency reference, torque limit, V/F separation voltage, PID reference and PID feedback. Communication address is 1000H. The range is -10000−10000 and corresponding value range is -100.00% to 100.00%.

5. Digital output terminal control

When a Digital output terminal is set for function 20 (Communication setting), Control on DO terminals of the drive is defined in the following table.

Communication Address of Drive Running Status	Status Definition
2001H	BiT0: non BiT1: non BiT2: RELAY1 output control BiT3: RELAY2 output control BiT4: HD0 output control

6.AO1 control, AO2 control, high-speed pulse (FMP) output control

When AO1, AO2 and FMP are set to function 12 (Communication setting), host computer can implement control on AO and high-speed pulse outputs by means of communication addresses. The definition is provided in the following table.

Communication Address		Command Definition
AO1	2002H	0 ~ 7FFF indicates 0% ~ 100%
AO2	2003H	

7.Parameter initialization

This function is required when you need to perform parameter initialization on the drive by using host computer.

If PP-00 (User password) is set to a non-zero value, pass password verification first.

Host computer performs parameter initialization within 30s after password verification is successful.

Communication address of password verification via communication is 1F00H. Directly write correct user password to this address to perform password verification.

Communication address of parameter initialization by means of communication is 1F01H, defined in the following table.

Communication Address of Parameter Initialization	Command Definition
1F01H	1: Restore default settings 2: Clear records 4: Restore user backup parameters 501: Back up current user parameters

Modbus Communication Protocol

The drive provides RS485 communication interface and supports Modbus-RTU communication protocol so that the user can implement centralized control, such as setting running commands and function codes, and reading running status and fault information of the AC drive, by using a PC or PLC.

J.1 Agreement content

This protocol defines content and format of transmitted messages during serial communication, including master polling (or broadcasting) format and master coding method (function code for the action, transmission data, and error check). The slave uses the same structure in response, including action confirmation, data returning and error check. If an error occurs when the slave receives a message, or the slave cannot complete the action required by the master, the slave returns a fault message as a response to the master

Application

The AC drive is connected to a "single-master multi-slave" PC/PLC control network with RS485 Bus.

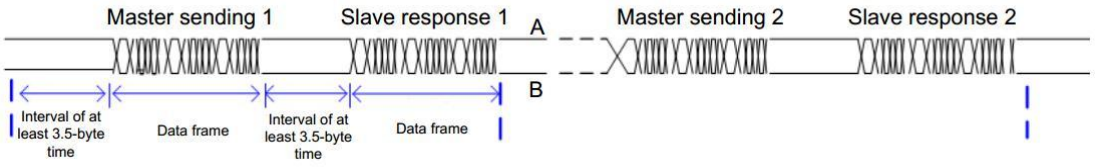
Bus Structure

(1) Topological structure

The system consists of a single master and multiple slaves. In the network, each communication device has a unique slave address. A device is the master (can be a PC, a PLC or an HMI) and initiates communication to perform parameter read or write operations on slaves. The other devices (slaves) provide data to respond to query or operations from the master. At the same moment, either the master or the slave transmits data and the other can only receives data.The address range of the slaves is 1 to 247, and 0 is broadcast address. A slave address must be unique in the network.

(2)Transmission mode

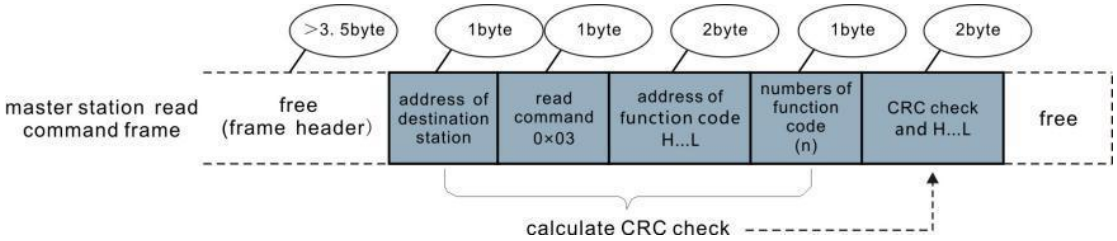
The asynchronous serial and half-duplex transmission mode is used. During asynchronous serial communication, data is sent frame by frame in the form of message. In Modbus-RTd protocol, an interval of at least 3.5-byte time marks the end of the previous message. A new message starts to be sent after this interval.



The communication protocol used by the drive is the Modbus-RTd slave communication protocol, which allows the drive to provide data to respond to "query/command" from the master or execute the action according to "query/command" from the master.
The master can be a PC, an industrial device, or a PLC. The master can communicate with a single slave or send broadcast messages to all slaves. When the master communicates with
a single slave, the slave needs to return a message (response) to "query/command" from the master. For a broadcast message sent by the master, the slaves need not return a response.

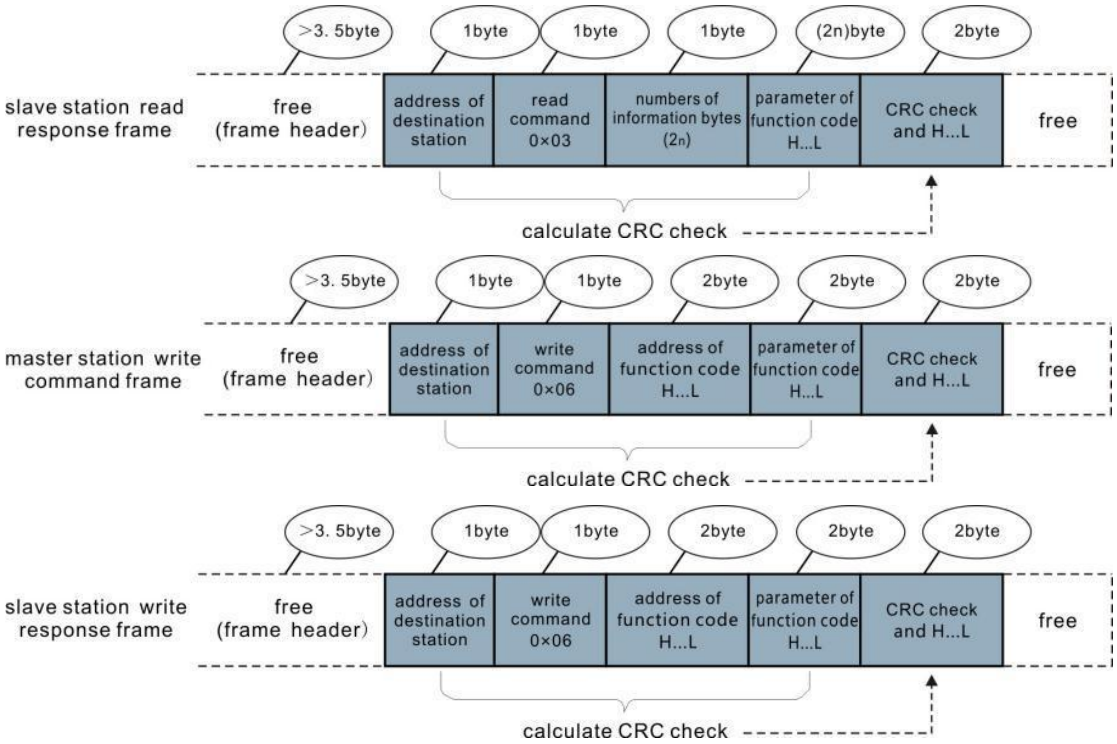
(3) Data Format

The drive supports reading and writing of word-type parameters only. Reading command is 0x03 and writing command is 0x06. It does not support reading and writing of bytes or bits.

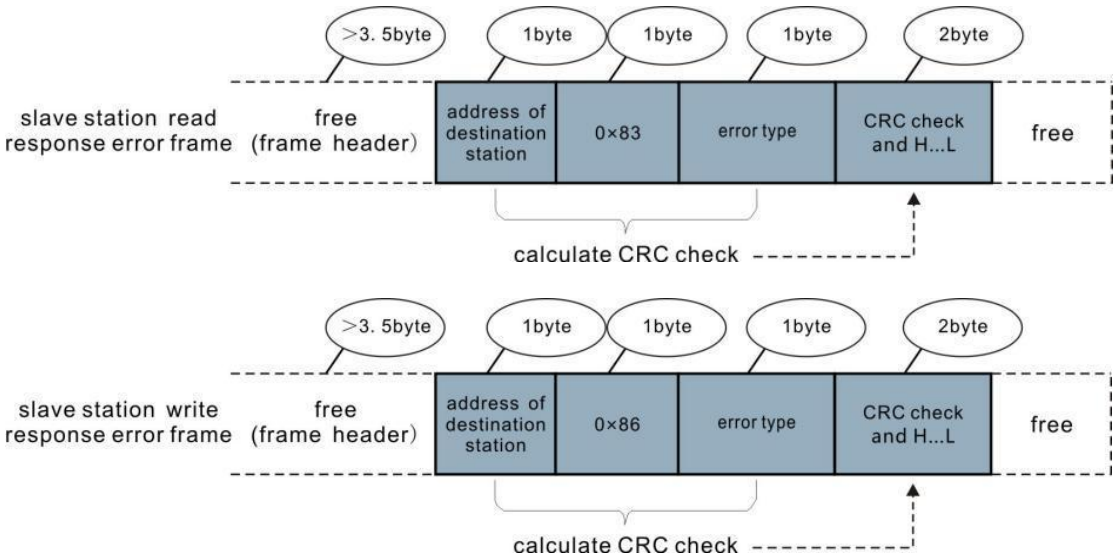


In theory, host computer can read several consecutive parameters (n can reach up to 12) but the last parameter it reads must not jump to the next parameter group. Otherwise, an error occurs

On Response.



If the slave detects a communication frame error or reading/writing failure is caused by other reasons, an error frame will be returned as follows:



The frame format is described in the following table.

Frame header START	Greater than the 3.5-byte transmission idle time
Slave address (ADR)	Communication address : 1 to 247 0: Broadcast address
Command code (CMD)	03:Read slave parameters 06: Write slave parameters
Function code address H	It is the internal parameter address of the AC drive, expressed
Function code address L	in hexadecimal format. The parameters include functional parameters and non-functional parameters (running status and running command). During transmission, low-order bytes follow the high-order bytes.
Number of function codes H	It is the number of function codes read by this frame. If it is 1, it indicates that one function code is read. During transmission, low bytes follow high bytes. In the present protocol, only one function code is read once, an this field is unavailable.
Number of function codes L	
Data H	It is the response data or data to be written. During transmission, low-order bytes follow the high-order bytes.
Data L	
CRC CHK low bytes	It is the detection value (CRC16 verification value). During transmission, low-order bytes follow the high-order bytes.
CRC CHK high bytes	
END	3.5 byte transmission time.

CMD Check

In Modbus-CRC mode, a message includes a CRC-based error-check field. The CRC field checks content of entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC field is calculated by transmitting device, and then added to message. The receiving device recalculates a CRC value after receiving message, and compares the calculated value with the CRC value in the received CRC field. The CRC is first stored to 0xFFFF. Then a procedure is invoked to process the successive 8-bit byte in the message and the value in the register. Only the eight bits in each character are used for the CRC. The start bit, stop bit and the parity bit do not apply to the CRC. During generation of the CRC, each eight-bit character is in exclusive-OR (XOR) with the content in the register. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register then performs XOR with a preset value. If the LSB was a 0, no performed. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is in XOR with the register's current value, and the process repeats for eight more shifts as described above. The final value of the register, after all the bytes of the message have been applied, is the CRC value.The CRC is added to the message from the low-order byte followed by the high-order byte. The CRC simple function is as follows:

```
unsigned int crc_chk_value  (unsigned char*data_value,unsigned char length)
{
unsigned int crc_value=0xFFFF;
int i;
```

```
while（length--）
{
crc_value^=*data_value++;
for（i=0;i<8;i++）
{
if（crc_value&0x0001）
=（crc_value>>1）
}
else
^0xa001;{
{
}
}
}
crc_value=crc_value>>1;
}
return（crc_value）;
}
```

Definition of Communication Parameter Addresses

Read and Written Parameters Function parameters can be read and written (except those which cannot be changed because they are only for the factory use or for monitoring). Parameter group No. and parameter identifying No. are used to express parameter

address.

● High-order bytes: P0 to PF (groups P), A0 to AF (groups A), 70 to 7F (group d)

● Low-order bytes: 00 to FF

For example, to read parameter P3-12, communication address of P3-12 is expressed as 0xF30C

Note

● Group PF: The parameters cannot be read or changed.

● Group d: These parameters can only be read.

Some parameters cannot be modified when the AC drive is running. Some parameter cannot be modified regardless of status of the AC drive. In addition, pay attention to setting range, unit and description of parameters when modifying them.

Parameter Group	Visited Address	Parameter Address in RAM
P0 ~ PE Group	0×F000 ~ 0×FEFF	0×0000 ~ 0×0EFF
A0 ~ AC Group	0×A000 ~ 0×ACFF	0×4000 ~ 0×4CFF
d0 Group	0×7000 ~ 0×70FF	

Notes: Frequent storage to the EEPROM reduces its service life. Therefore, in communication mode, users can change values of certain parameters in RAM rather than storing the setting.

● For groups P parameters, users only need to change high order F of the function code address to 0. For groups A parameters, users only need to change high order A of the function code address to 4.The function code addresses are expressed as follows:

● High-order bytes: 00 to 0F (groups P), 40 to 4F (groups A)

● Low-order bytes: 00 to FF

For example, if function code P3-12 is not stored into EEPROM, the address is expressed

as 030C; if function code A0-05 is not stored into EEPROM, the address is expressed as 4005.

It is an invalid address when being read. Users can also use command code 07H to implement this function.

Stop/RUN Parameters

Para. Address	Description	Address	Description
1000	*Communication setting value (Decimal) -10000~10000	1010	PID setting
1001	Running frequency	1011	PID feedback
1002	Bus voltage	1012	PLC process
1003	Output voltage	1013	Pulse input frequency, unit: 0.01kHz
1004	Output current	1014	Feedback speed, unit: 0.1Hz
1005	Output power	1015	Remaining running time
1006	Output torque	1016	AI1 voltage before correction
1007	Running speed	1017	AI2 voltage before correction
1008	S input indication	1018	AI3 voltage before correction
1009	HDO output indication	1019	Linear speed
100A	AI1 voltage	101A	Current power-on time
100B	AI2 voltage	101B	Current running time
100C	AI3 voltage	101C	Pulse input frequency, unit 1Hz
100D	Counting value input	101D	Communication reference
100E	Length value input	101E	Actual feedback speed
100F	Load speed	101F	Main A frequency reference display
		1020	Auxiliary B frequency reference display

Notes：

Communication setting value indicates percentage: 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.

With regard to frequency, communication reference is a percentage of P0-10 (maximum frequency). With regard to torque, communication reference is a percentage of P2-10 and A2-48 (corresponding to motor 1 and motor 2, respectively).

Control command input to AC drive (write-only):

Command Word Address	Command Word Function
2000	0001: Forward run 0002: Reverse run 0003: Forward jog 0004: Reverse jog 0005: Coast to stop 0006: Decelerate to stop 0007: Fault reset

Read AC drive state (read-only):

Command Word Address	Command Word function
3000	0001: Forward RUN 0002: Reverse RUN 0003: Stop

Parameter lock password check: (If "8888H" is returned, it indicates that password check is passed.)

Password address	Password Content
1F00	*****

DO terminal control (write-only)

Command Address	Command Content
2001	BIT2: RELAY1 control BIT3: RELAY2 control BIT4: HDO control

AO1 control (write-only)

Command Address	Command Content
2002	0 ~ 7FFF indicate 0% ~ 100%

AO2 control (write-only)

Command Address	Command Content
2003	0 ~ 7FFF indicate 0% ~ 100%

Pulse output control (write-only)

Command Address	Command Content
2004	0 ~ 7FFF indicate 0% ~ 100%

AC drive fault description

AC Drive Fault Address	AC Drive Fault Information		
8000	0000: No fault 0001: Reserved 0002:Over current during acceleration, 0003:Over current during deceleration 0004:Over current at constant speed 0005:Over voltage during acceleration 0006: Over voltage during Deceleration 0007: Over voltage at constant speed 0008: Buffer resistor overload 0009: Under voltage 000A: AC drive overload 000B: Motor overload 000C: Power input phase loss	000D:Power output phase loss 000E: IGBT overheat 000F: External fault 0010:Communication fault 0011: Contactor abnormal 0012: Current detection failure 0013: Motor self-learning failure 0014: Encoder/PG card fault 0015:Parameter read and write fault 0016:AC drive hardware fault 0017: Motor short circuited to ground 0018: Reserved 0019: Reserved 001A:Accumulative running time reached	001B: User-defined fault 1 001C: User-defined fault 2 001D:Accumulative power-on time reached 001E: Load lost 001F: PID feedback lost during Running 0028: Fast current limit timeout 0029: Motor switch over error during running 002A: Too large speed deviation 002B: Motor over-speed 002D: Motor overheat 005A: Incorrect setting of PPR of the encoder 005B: Not connecting the encoder 005C: Initial position error 005E: Speed feedback error

Group Pd Communication Parameter Description

This parameter is used to set transmission speed between host computer and AC drive.Note that baud rate of host computer must be the same as that of AC drive.

	Baud rate	Factory default	6005
Pd-00	Set range	Bit: MODdBS Baud rate	
		0: 300BPS	5: 9600BPS
		1: 600BPS	6: 19200BPS
		2: 1200BPS	7: 38400BPS
		3: 2400BPS	8: 57600BPS
		4: 4800BPS	9: 115200BPS

Otherwise, communication shall fail. The higher baud rate is, the faster communication will be.

Pd-01	MODbus Data format	Factory default	0
	Set range	0: No check <8,N,2> 1: Even parity check <8,E,1> 2: Odd parity check <8,O,1> 3: No check, data format <8,N,1>	

Note that data format of host computer must be the same as that of AC drive. Otherwise, communication shall fail.

Pd-02	Local address	Factory default	1
	Set range	1~247，0 Broadcast address	

This parameter is used to set address of AC drive. This address is unique (except broadcast address), which is basis for point-to-point communication between host computer and AC drive. When local address is set to 0 (that is, broadcast address), AC drive can only receive and execute broadcast commands of host computer, but will not respond to host computer.

Pd-03	MODbus Response delay	Factory default	2ms
	Set range	0~20ms	

This parameter sets interval between AC drive completing receiving data and AC drive sending data to host computer. If response delay is shorter than system processing time, system processing time shall prevail. If response delay is longer than system processing time, system sends data to host computer only after response delay is up.

Pd-04	Communication timeout	Factory default	0.0 s
	Set range	0.0 s（invalid）； 0.1~60.0s	

When this parameter is set to 0.0s, system does not detect communication timeout
When AC drive does not receive communication signal within time set in this parameter, it detects communication timeout fault (FU16). . Generally, this parameter is set to 0.0s. In applications with continuous communication, you can use this parameter to monitor communication status.

Pd-05	Modbus protocol selection	Factory default	30
	Setting Range	Bit: MODBUS 0: Non-standard MODBUS protocol 1: Standard MODBUS protocol Ten: Profibus-DP 0: PPO1 format 1: PPO2 format 2: PPO3 format 3: PPO4 format	

Pd-05 = 1: Select the standard Modbus protocol.

Pd-05 = 0: When reading a command, the number of bytes returned by the slave is one byte greater than the standard Modbus protocol. Refer to the "5 Communication Data Structure" section of this protocol.

Pd-06	Communication read current resolution	Factory default	0
	Set range	0: 0.01A; 1: 0.1A	

Used to determine the output unit of the current value when the communication reads the output current.