GE Consumer & Industrial
Power Protection

ModBus

Communications Protocol for VAT200 AC Drive Series

GE imagination at work

VAT200 AC Drive Series

ModBus Communication Protocol

INSTRUCTION MANUAL

NOTICE

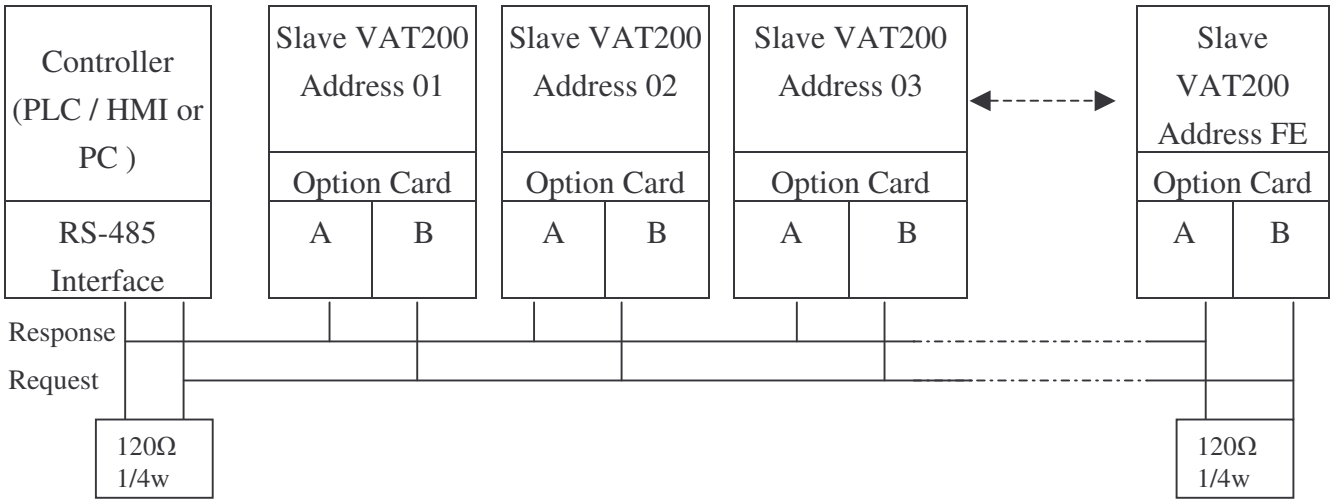
1. Read both this and instruction manuals of VAT200 before using the unit
2. Observe the warnings, cautions and other matters described in this manual.
3. Make sure that this manual is delivered to the final user.
4. The content of this manual can be changed without notice

1. Communication Data Frame

VAT200 series inverter can be communication controlled by the PC or other controller with the communication protocol, Modbus ASCII Mode & Mode RTU, RS485 or RS232.

Frame length maximum 80 bytes

1.1 Hardware Installation



It is necessary to connect the terminal impedance (120Ω, 1/4W) at both ends of the communication wire.

1.2 Data Frame for ASCII Mode

STX(3AH)	Start Byte = 3AH
Address Hi	Communication Address:
Address Lo	2-digit ASCII Code
Function Hi	Function Code (command):
Function Lo	2-digit ASCII Code
Command Start Address	
Command Start Address	Command Start byte:
Command Start Address	4-digit ASCII Code
Command Start Address	
Data length	
Data length	The length of the command:
Data length	4-digit ASCII Code
Data length	
LRC Check Hi	LRC Check Code:
LRC Check Lo	2-digit ASCII Code
END Hi	End Byte:
END Lo	END Hi = CR(0DH) , END Li = LF(0AH)

Data frame For RTU Mode

MASTER (PLC etc.) send request to SLAVE, whereas SLAVE response to MASTER. The signal receiving is illustrated here.
The data length is varied with the command (Function).

SLAVE Address
Function Code
DATA
CRC CHECK
Signal Interval

** The interval should be maintained at 10ms between command signal and request.

1.3 Slave Address

00H : Broadcast to all the drivers
01H : to the No. 01 Driver
0FH : to the No.15 Driver
10H : to the No.16 Driver
and so on...., Max to No. 254(FEH)

1.4 Function Code

03H : Read the register contents
06H : Write a WORD to register
08H : Loop test
10H : Write several data to register (complex number register write)

2.CMS (Checksum and time-out definition)

2.1 LRC

ex. ADDRESS 01H
FUNCTION 03H
COMMAND 01H
00H
DATA LENGTH 0AH

0FH---------- true complement
Checksum = F1H
CS(H) = 46H (ASCII)
CS(L) = 31H (ASCII)

2.2 CRC CHECK:

CRC check code is from Slave Address to end of the data. The calculation method is illustrated as follow:

(1) Load a 16-bit register with FFFF hex (all1's). Call this the CRC register.

(2) Exclusive OR the first 8-bit byte of the message with the low-order byte of the 16-bit CRC register, putting the result in the CRC register.

(3) Shift the CRC register one bit to the right (toward the LSB), Zero-filling the MSB, Extract and examines the LSB.

(4) (If the LSB was 0): Repeat Steps (3) (another shift) (If the LSB was 1): Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001).

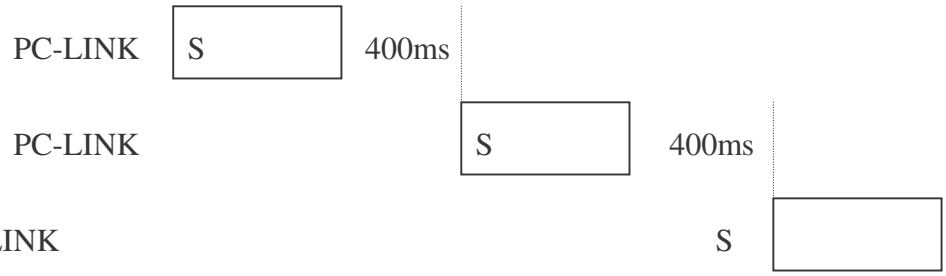
(5) Repeat Steps (3) and (4) until 8 shifts been performed. When this is done, a complete 8-bit byte will be processed.

(6) Repeat Steps (2) through (5) for next 8-bit byte of the message, Continue doing this until all bytes have been processed. The final content of the CRC register is the CRC value. Placing the CRC into the message: When the 16-bit CRC (2 8-bit bytes) is transmitted in the message, the low-order byte will be transmitted first, followed by the high-order byte, For example, if the CRC value is 1241 hex, the CRC-16 Upper put the 41h, the CRC-16 Lower put the 12h.

- **CRC calculation application program**

```
UWORD ch_sum ( UBYTE long , UBYTE *rxdbuff ) {
      BYTE i = 0;
      UWORD wkg = 0xFFFF;
      while ( long-- ) {
        wkg ^= rxdbuff++;
        for ( i = 0 ; i < 8; i++ ) {
            if ( wkg & 0x0001 ) {
              wkg = ( wkg >> 1 ) ^ 0xa001;
            }
            else {
              wkg = wkg >> 1;
            }
        }
      }
    return( wkg );
}
```

2.3 TIME-OUT (400ms) & RETRY (max. : 2 times)



(When INV (PLC) time-out or detect checksum error, or INV(PLC) response exception code = checksum error, PC-LINK retry maximum two times, and if two times after still error, then display "ERR6")

3. Command START ADDRESS

Function	Function Description	Command Start Address	Data length (WORD)
03	Ladder page1 read	200H	0AH
	Ladder page2 read	20AH	0AH
	Ladder page3 read	214H	0AH
	Ladder page4 read	21EH	0AH
	Ladder page5 read	228H	0AH
	Timer1 Function read	264H	05H
	Timer2 Function read	269H	05H
	Timer3 Function read	26EH	05H
	Timer4 Function read	273H	05H
	Timer5 Function read	278H	05H
	Timer6 Function read	27DH	05H
	Timer7 Function read	282H	05H
	Timer8 Function read	287H	05H
	Counter1 Function read	28CH	04H
	Counter2 Function read	290H	04H
	Counter3 Function read	294H	04H
	Counter4 Function read	298H	04H
	Encoder1 Function read	2ACH	05H
	Encoder2 Function read	2B1H	05H
	Encoder3 Function read	2B6H	05H
	Encoder4 Function read	2BBH	05H
	Analog1 Function read	2C0H	03H
	Analog2 Function read	2C3H	03H
	Analog3 Function read	2C6H	03H
	Analog4 Function read	2C9H	03H
	Control function read	2CCH	06H
	Contro2 function read	2D2H	06H
	Contro3 function read	2D8H	06H
	Contro4 function read	2DEH	06H
	Contro5 function read	2E4H	06H
	Contro6 function read	2EAH	06H
	Contro7 function read	2F0H	06H
	Contro8 function read	2F6H	06H
	All Coil status read	2FCH~303H	08H

Function	Function Description	Command Start Address	Data length (WORD)
10	Ladder page1 write	200H	0AH
	Ladder page2 write	20AH	0AH
	Ladder page3 write	214H	0AH
	Ladder page4 write	21EH	0AH
	Ladder page5 write	228H	0AH
	Timer1 Function write	264H	04H
	Timer2 Function write	269H	04H
	Timer3 Function write	26EH	04H
	Timer4 Function write	273H	04H
	Timer5 Function write	278H	04H
	Timer6 Function write	27DH	04H
	Timer7 Function write	282H	04H
	Timer8 Function write	287H	04H
	Counter1 Function write	28CH	03H
	Counter2 Function write	290H	03H
	Counter3 Function write	294H	03H
	Counter4 Function write	298H	03H
	Encoder1 Function write	2ACH	04H
	Encoder2 Function write	2B1H	04H
	Encoder3 Function write	2B6H	04H
	Encoder4 Function write	2BBH	04H
	Analog1 Function write	2C0H	03H
	Analog2 Function write	2C3H	03H
	Analog3 Function write	2C6H	03H
	Analog4 Function write	2C9H	03H
	Control function write	2CCH	06H
	Contro2 function write	2D2H	06H
	Contro3 function write	2D8H	06H
	Contro4 function write	2DEH	06H
	Contro5 function write	2E4H	06H
	Contro6 function write	2EAH	06H
	Contro7 function write	2F0H	06H
	Contro8 function write	2F6H	06H
06	Coil status write	2FCH	01H
	RUN & Stop(PLC)	330H	1
	All memory clear (Clear PLC Memory)	331H	1
	PASSWORD	332H	1

Note: 'Write Ladder page write' and 'Clear all memory' are not available under PLC running mode.

4. Exception Code

ASCII Mode

STX	':'
Address	'0'
	'1'
Function	'8'
	'6'
Exception code	'5'
	'1'
LRC Check	'2'
	'8'
END	'CR'
	'LF'

RTU Mode

SLAVE Address		02H
Function		83H
Exception code		52H
CRC-16	High	C0H
	Low	CDH

Under communication linking, the driver responses the Exception Code and send Function Code AND 80H to main system if there is error happened.

Exception Code	Description
51	Function Code Error
52	Register Encoding Error
53	Data Quantity Error
54	DATA Setting Error
55	Write Mode Error

5. Command Start Address Description

5.1 Ladder (*) page read

ASCII Mode

PC → INV (PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
30H	
30H	
30H	Data Length
30H	
30H	
41H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV (PLC)→PC

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
31H	Data length (Byte)
34H	
Send out the data from PLC[0]~PLC[19], total 40 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
03H	Function Code
02H	* Register Number
00H	
00H	Data length
0AH	
	CRC High order digits
	CRC Low order digits

INV(PLC)→PC

01H	Address
03H	Function Code
14H	Data length
Sent out the data from PLC[0]~PLC[19], total 20 Byte	
?	CRC High order digits
?	CRC Low order digits

5.2 Function block read

5.2.1 Timer function block read

ASCII Mode

PC →INV (PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
36H	
34H	
30H	Data Length
30H	
30H	
35H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV (PLC)→PC

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	Data length (Byte)
41H	
*Send out the data from PLC[200]~PLC[209], total 20 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV (PLC)

01H	Address
03H	Function Code
02H	*Register Code
64H	
00H	Data Length
05H	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
0AH	Data Length
*Send out the data from PLC[200]~PLC[209], total 10 Byte	
?	CRC High order digit
?	CRC Low order digit

5.2.2 Counter function block read

ASCII Mode

PC →INV (PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
38H	
43H	
30H	Data Length
30H	
30H	
34H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV (PLC) →PC

3AH	STX
30H	STX Address
31H	
30H	
33H	
30H	Data Length (Byte)
38H	
*send out the data from PLC[280]~PLC[287], total 16 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
03H	Function Code
02H	*Register Code
8CH	
00H	Data Length
04H	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
08H	Data Length
*Send out the data from PLC[280]~PLC[287], total 8 Byte	
?	CRC High order digit
?	CRC Low order digit

5.2.3 Encoder function block read

ASCII Mode

PC →INV(PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
41H	
43H	
30H	Data Length
30H	
30H	
35H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	Data Length (Byte)
41H	
*Send out the data from PLC[344]~PLC[353], total 20 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
03H	Function Code
02H	*Register Code
ACH	
00H	Data Length
05H	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
0AH	Data Length
*Send out the data from PLC[344]~PLC[353], total 10 Byte	
?	CRC High order digit
?	CRC Low order digit

5.2.4 Analog function block read

ASCII Mode

PC → INV(PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
43H	
30H	
30H	Data Length
30H	
30H	
33H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	Data Length (Byte)
36H	
*Send out the data from PLC[384]~PLC[389], total 12 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
03H	Function Code
02H	*Register Code
C0H	
00H	Data Length
03H	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
06H	Data Length
**Send out the data from PLC[384]~PLC[389], total 12 Byte	
?	CRC High order digit
?	CRC Low order digit

5.2.5 Control function block read

ASCII Mode

PC→ INV(PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
43H	
43H	
30H	Data Length
30H	
30H	
36H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	Data Length (Byte)
43H	
*Send out the data from PLC[408]~PLC[419], total 24 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
03H	Function Code
02H	*Register Code
CCH	
00H	Data Length
06H	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
0CH	Data Length
**Send out the data from PLC[408]~PLC[419], total 12 Byte	
?	CRC High order digit
?	CRC Low order digit

5.2.6 Coil status read

ASCII Mode

PC →INV (PLC)

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
46H	
43H	
30H	Data Length
30H	
30H	
38H	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	STX
30H	Address
31H	
30H	Function Code
33H	
31H	Data Length (Byte)
30H	
*Send out the data from PLC[504]~PLC[519], total 32 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
03H	Function Code
02H	*Register Code
FCH	
00H	Data Length
08H	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
10H	Data Length
*Send out the data from PLC[504]~PLC[519], total 16 Byte	
?	CRC High order digit
?	CRC Low order digit

5.3 Ladder page write

ASCII Mode

PC → INV(PLC)

3AH	STX
30H	Address
31H	
31H	Function Code
30H	
30H	*Register Number
32H	
30H	
30H	
30H	Data Length (Byte)
30H	
30H	
41H	
31H	DATA
34H	
*Send out the data from PLC[0]~PLC[19], total 40 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Number
32H	
30H	
30H	
30H	Data Length
30H	
30H	
41H	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
10H	Function Code
02H	*Register Code
00H	
00H	Data Length
0AH	
14H	DATA
*end out the data from PLC[0]~PLC[19], total 20 Byte	
	CRC High order digit
	CRC Low order digit

INV(PLC)→PC

01H	Address
03H	Function Code
02H	* Register Code
00H	
00H	Data Length
0AH	
?	CRC High order digit
?	CRC Low order digit

5.4 Function block write

5.4.1 Timer function block write

ASCII Mode

PC →INV(PLC)

3AH	STX
30H	Address
31H	
31H	Function Code
30H	
30H	*Register Number
32H	
36H	
34H	
30H	Data Length (Byte)
30H	
30H	
34H	
30H	DATA
38H	
*Send out the data from PLC[200]~PLC[207], total 16 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	
30H	Address
31H	
31H	Function Code
30H	
30H	* Register Number
32H	
36H	
34H	
30H	Data Length
30H	
30H	
34H	
?	CHECK SUM,
?	
0DH	END
0AH	END
0AH	END

RTU Mode

PC → INV (PLC)

01H	Address
10H	Function Code
02H	*Register Code
64H	
00H	Data Length
04H	
08H	DATA
*Send out the data from PLC[200]~PLC[207], total 8 Byte	
?	CRC High order digits
?	CRC Low order digits

INV(PLC)→PC

01H	Address
10H	Function Code
02H	*Register Code
64H	
00H	Data Length
04H	
?	CRC High order digits
?	CRC Low order digits

5.4.2 Counter function block write

ASCII Mode

PC → INV(PLC)

3AH	STX
30H	Address
31H	
31H	Function Code
30H	
30H	*Register Code
32H	
38H	
43H	
30H	Data Length (Byte)
30H	
30H	
33H	
30H	DATA
36H	
*Send out the data from PLC[280]~PLC[285], total 12 byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Code
32H	
38H	
43H	
30H	Data Length
30H	
30H	
33H	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
10H	Function Code
02H	*Register Code
8CH	
00H	Data Length
03H	
06H	DATA
*Send out the data from PLC[280]~PLC[285], total 6 Byte	
?	CRC High order digits
?	CRC Low order digits

INV(PLC)→PC

01H	Address
10H	Function Code
02H	*Register Code
8CH	
00H	Data Length
03H	
?	CRC High order digits
?	CRC Low order digits

5.4.3 Encoder function block write

ASCII Mode

PC →INV(PLC)

3AH	STX
30H	Address
31H	
31H	Function Code
30H	
30H	*Register Code
32H	
41H	
43H	
30H	Data Length (Byte)
30H	
30H	
34H	
30H	DATA
38H	
*Send out the data from PLC[344]~PLC[353], total 16 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Code
32H	
41H	
43H	
30H	Data Length
30H	
30H	
34H	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
10H	Function Code
02H	*Register Code
ACH	
00H	Data Length
04H	
08H	DATA
* Send out the data from PLC[344]~PLC[353], total 8 Byte	
?	CRC High order digits
?	CRC Low order digits

INV(PLC)→PC

01H	Address
10H	Function Code
02H	*Register Code
ACH	
00H	Data Length
04H	
?	CRC High order digits
?	CRC Low order digits

5.4.4 Analog function block write

ASCII Mode

PC→ INV(PLC)

3AH	STX
30H	Address
31H	
31H	Function Code
30H	
30H	*Register Code
32H	
43H	
30H	
30H	Data Length (Byte)
30H	
30H	
33H	
30H	DATA
36H	
* Send out the data from PLC[384]~PLC[389], total 12 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Code
32H	
43H	
30H	
30H	Data Length
30H	
30H	
33H	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
10H	Function Code
02H	*Register Code
C0H	
00H	Data Length
03H	
06H	DATA
* Send out the data from PLC[384]~PLC[389], total 12 Byte	
?	CRC High order digits
?	CRC Low order digits

INV(PLC)→PC

01H	Address
10H	Function Code
02H	*Register Code
C0H	
00H	Data Length
03H	
?	CRC High order digits
?	CRC Low order digits

5.4.5 Control function block write

ASCII Mode

PC→ INV(PLC)

3AH	STX
30H	Address
31H	
31H	Function Code
30H	
30H	*Register Code
32H	
43H	
43H	
30H	Data Length (Byte)
30H	
30H	
36H	
30H	DATA
43H	
* Send out the data from PLC[408]~PLC[419], total 24 Byte	
?	CHECK SUM,
?	
0DH	END
0AH	END

INV(PLC) →PC

3AH	
30H	Address
31H	
30H	Function Code
33H	
30H	*Register Code
32H	
43H	
43H	
30H	Data Length
30H	
30H	
36H	
?	CHECK SUM,
?	
0DH	END
0AH	END

RTU Mode

PC → INV(PLC)

01H	Address
10H	Function Code
02H	*Register Code
CCH	
00H	Data Length
06H	
0CH	DATA
*Send out the data from PLC[408]~PLC[419], total 12 Byte	
?	CRC High order digits
?	CRC Low order digits

INV(PLC)→PC

01H	Address
10H	Function Code
02H	*Register Code
CCH	
00H	Data Length
03H	
?	CRC High order digits
?	CRC Low order digits

5.4.6 Coil status write

ASCII Mode

PC→ INV(PLC)		INV(PLC→PC	
3AH	STX	3AH	STX
30H	Address	30H	Address
31H		31H	
30H	Function Code	30H	Function Code
36H		36H	
30H	* Register Code	30H	* Register Code
32H		32H	
46H		46H	
43H		43H	
*Data to be written to	16-Bit data comprising of 4 ASCII codes	*Data to be written to	16-Bit data comprising of 4 ASCII codes
*Data to be written to		*Data to be written to	
*Data to be written to		*Data to be written to	
*Data to be written to		*Data to be written to	
?	CHECK SUM	?	CHECK SUM
?		?	
0DH	END	0DH	END
0AH	END	0AH	END

RTU Mode

01H	Address	01H	Address
06H	Function Code	06H	Function Code
02H	Register Code	02H	Register Code
FCH		FCH	
*Data to be written to	16-Bit data	*Data to be written to	16-Bit data
*Data to be written to		*Data to be written to	
?	CRC High order digits	?	CRC High order digits
?	CRC Low order digits	?	CRC Low order digits

note:

Write to Coil	Start code
INPUT	02FDH
TIMER	02FEH
COUNTER	02FFH
Aux. coil	0300H
Control coil	0301H
ANALOG	0302H
ENCODER	0302H
OUTPUT	0303H

5.5 Inverter Control

5.5.1 Command DATA (Readable and Writable)

Register Code		Bit	Content
0100H	Ready-to-use		
0101H	Operation Signal	0	Operation Command 1 : Run 0 : Stop
		1	Reverse Command 1 : Reverse 0 : Forward
		2	External Fault 1 : Fault (EFO)
		3	Fault Reset 1 : Reset
		4	Log Command 1 : Log
		5	Multi function Command S1 1 :"ON" (Define 5-00 Function)
		6	Multi function Command S2 1 :"ON" (Define 5-01 Function)
		7	Multi function Command S3 1 :"ON"(Define 5-02 Function)
		8	Multi function Command S4 1 :"ON"(Define 5-03 Function)
		9	Multi function Command S5 1 :"ON"(Define 5-04 Function)
		A	Multi function Command S6 1 :"ON"(Define 5-05 Function)
		B	Multi function Command AIN 1 :"ON"(Define 5-06 Function)
		C	Multi function Command 1 1 : R1A "ON" (Define 8-02 Function)
		D	Multi function Command 2 1 : R2A "ON" (Define 8-03 Function)
		E-F	(unused)
0102H		Frequency Command	
0103~011FH		Ready-to-use	

(Note) The unused Bit is defined as 0, the spare register is not available for writing Data.

5.5.2 Supervision Data (Only for reading)

Register code		Bit	Content
0120H	State Signal	0	Operation State 1 : Run 0 : Stop
		1	Direction State 1 : Reverse 0 : Forward
		2	Inverter operation prepare state 1 : ready 0 : unready
		3	Abnormal 1 : Abnormal
		4	DATA setting error 1 : Error
		5-F	(unused)

(Note) Please define the unused Bit as 0.

Register code	Content					
0121H	Error content	00	The inverter is normal			
		01	Program abnormal(CPF)	24	Under voltage during running (LV-C)	
		02	EEPROM abnormal (EPR)	25 ~ 28 (unused)		
		03	Over voltage (OV)	29	(Err8)	
		04	Under voltage(LV)	30	Stop at 0 Hz(STP0)	
		05	Inverter over heat (OH)	31	Direct start disable (STP1)	
		06 ~ 09 (unused)		32	Control panel emergency stop (STP2)	
		10	Over current during decelerating (OC-D)	33	Emergency stop (E.S)	
		11	Over current during accelerating (OC-A)	34	External BB(bb)	
		12	Over current at constant speed (OC-C)	35	Auto testing error(ATER)	
		13	Over voltage at constant speed / decelerating (OV-C)	36	PID feedback signal loss(PDER)	
		14	Inverter over heat at constant speed (OH-C)	37	Communication error(EFO)	
		15	Inverter over speed (OVSP)	38	Encoder signal loss (ECER) *1	
		16	CPU interrupted (CTER)	39	Analog converting error(Err4)	
		17	(OC_S)	40	Parameter locked(LOC)	
		18~19 (Unused)		41	Keypad operation error (Err1)	
		20	Over current at stop(OC)	42	Parameter setting error (Err2)	
		21	Motor over load (OL1)	43	Modifying the parameter in communication(Err5)	
		22	Inverter over load (OL2)	44	Communication failure (Err6)	
		23	Over torque detected (OL3)	45	Parameter setting error (Err7)	
0122H	Sequent input value	0	Terminal S1 1 : OFF			
		1	Terminal S2 1 : OFF			
		2	Terminal S3 1 : OFF			
		3	Terminal S4 1 : OFF			
		4	Terminal S5 1 : OFF			
		5	Terminal S6 1 : OFF			
		6	Terminal AIN 1 : OFF			
		7-9	(unused)			
	Terminal output	A	Multifunction output 1(RELAY1) (1 : R1A ON 0 : R1A OFF)			
		B	Multifunction output 2(RELAY2) (1 : R2A ON 0 : R2A OFF)			
		C~F	(Unused)			
0123H	Frequency command					
0124H	Output frequency					
0125H	Output voltage command (1/1V)					
0126H	Output DC voltage command (1/1V)					

(Note) Please define the unused Bit as 0.

Register Code	Content
0127H	Output current (10/1A)
0128H	Reserved
0129H	Output torque
012AH	PID Feedback value (100% / Max output frequency, 10/1%)
012BH	PID input value (100% / Max output frequency, 10/1% , sign attached)
012CH	TM2 AIN input value (1024 / 10V) *1
012DH	TM2 AV2 input value (1024 / 10V) *1
012EH-012FH	Ready-to-use

(Note:) The ready-to-use register is not available for the data write.

5.5.3 Read the data in the holding register [03H]

Continuously read the data in the register from the specified address.

(e.g.) Read the frequency command from the SLAVE 1, inverter VAT200.

ASCII Mode

Command Signal

3AH	STX
30H	SLAVE Address
31H	
30H	Function Code
33H	
30H	Start to encode
31H	
32H	
33H	
30H	Data
30H	
30H	
31H	
?	LRC CHECK
?	
0DH	END
0AH	

Respond signal (Normally)

3AH	STX
30H	SLAVE Address
31H	
30H	Function Code
33H	
30H	DATA Quantity
32H	
31H	Initial holding register
37H	
37H	
30H	
?	LRC CHECK
?	
0DH	END
0AH	

Respond signal (Error)

3AH	STX
30H	SLAVE Address
32H	
38H	Function Code
33H	
35H	Exception Code
32H	
0DH	END
0AH	

RTU Mode

Command Signal

SLAVE Address		01 H
Function Code		03H
Start to encode	High	01H
	Low	23H
Data quantity	High	00H
	Low	01H
CRC-16	High	74H
	Low	3CH

Respond signal (Normally)

SLAVE Address		01H
Function Code		03H
DATA		02H
Initial holding register	High	17H
	Low	70H
CRC-16	High	AFH
	Low	82H

Respond signal (Error)

SLAVE Address		02H
Function Code		83H
Exception Code		52H
CRC-16	High	C0H
	Low	CDH

5.5.4 LOOP BACK CHECK [08H]

The check code checking the transmission of the signal between MASTER and SLAVE could be discretionary.

ASCII Mode

Command Signal

3AH	STX
30H	SLAVE Address
31H	
30H	Function Code
38H	
30H	Check Code
30H	
30H	
30H	
41H	DATA
35H	
33H	
37H	
?	LRC CHECK
?	
0DH	END
0AH	

Respond signal (Normally)

3AH	STX
30H	SLAVE Address
31H	
30H	Function Code
38H	
30H	Check Code
30H	
30H	
30H	
41H	DATA
35H	
33H	
37H	
?	LRC CHECK
?	
0DH 0AH	END

Respond signal (Error)

3AH	STX
30H	SLAVE Address
31H	
38H	Function Code
38H	
32H	Exception Code
30H	
?	LRC CHEC
?	
0DH	END
0AH	

RTU Mode

Command Signal

SLAVE Address		01 H
Function Code		08H
Check Code	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Respond signal (Normally)

SLAVE Address		01H
Function Code		08H
Check Code	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Respond signal (Error)

SLAVE Address		01H
Function Code		88H
Exception Code		20H
CRC-16	High	47H
	Low	D8H

5.5.5Write to the holding register [06H]

Write the specified data to the holding register from the defined address.
(e.g.) write the frequency command 60.0Hz from PLC to SLAVE 1, inverter VAT200.

ASCII Mode

Command Signal

3AH	STX
30H	SLAVE Address
31H	
30H	Function Code
36H	
30H	Start to encode
31H	
30H	
32H	
31H	DATA
37H	
37H	
30H	
?	LRC CHECK
?	
0DH	END
0AH	

Respond signal (Normally)

3AH	STX
30H	SLAVE Address
31H	
30H	Function Code
36H	
30H	Start to encode
31H	
30H	
32H	
31H	DATA
37H	
37H	
30H	
?	LRC CHECK
?	
0DH 0AH	END

Respond signal (Error)

3AH	STX
30H	SLAVE Address
31H	
38H	Function Code
36H	
35H	Exception Code
32H	
?	LRC CHECK
?	
0DH	END
0AH	

RTU Mode

Command Signal

SLAVE Address		01 H
Function Code		06H
Start to encode	High	01H
	Low	02H
Data Quantity	High	17H
	Low	70H
CRC-16	High	27H
	Low	E2H

Respond signal (Normally)

SLAVE Address		01H
Function Code		06H
Start to encode	High	01H
	Low	02H
Data Quantity	High	17H
	Low	70H
CRC-16	High	27H
	Low	E2H

Respond signal (Error)

SLAVE Address		01H
Function Code		86H
Exception Code		52H
CRC-16	High	C3H
	Low	9DH

5.5.6 Write complex Number holding register [10H]

From the defined code, write the respective specified data to the holding registers.
e.g. Input the frequency command 'Running forward at 60.0Hz' into the SLAVE 1 V2 from PLC.

ASCII Mode

Command Signal

3AH	STX
30H	SLAVE Address
31H	
31H	Function Code
30H	
30H	Start coding
31H	
30H	
31H	
30H	Data quantity
30H	
30H	
32H	
30H	DATA *
34H	
30H	Primary DATA
30H	
30H	
31H	
31H	Secondary DATA
37H	
37H	
30H	
?	LRC CHECK
?	
0DH	END
0AH	

Respond signal (Normally)

3AH	STX
30H	SLAVE Address
31H	
31H	Function Code
30H	
30H	Start coding
31H	
30H	
31H	
30H	Data quantity
30H	
30H	
32H	
?	LRC CHECK
?	
0DH	END
0AH	

Respond signal (Error)

3AH	STX
30H	SLAVE Address
31H	
39H	Function Code
30H	
35H	Exception Code
32H	
?	LRC CHECK
?	
0DH	END
0AH	

* DATA Quantity is equal to the Number multiply 2.

RTU Mode

Command Signal

SLAVE Address		01 H
Function Code		10H
Start to encode	High	01H
	Low	01H
Data quantity	High	00H
	Low	02H
DATA number *		04H
Primary DATA	High	00H
	Low	01H
Secondary DATA	High	17H
	Low	70H
CRC-16	High	60H
	Low	27H

Respond signal (Normally)

SLAVE Address		01H
Function Code		10H
Start to encode	High	01H
	Low	01H
Data quantity	High	00H
	Low	02H
CRC-16	High	11H
	Low	F4H

Respond signal (Error)

SLAVE Address		01H
Function Code		90H
Exception Code		52H
CRC-16	High	CDH
	Low	FDH

* ‘DATA number’ is equal to the ‘data quantity’ multiply 2.

Comparison list between parameter and register (as for the parameter description, please refer to the parameter function list)

Register Code	FUNCTION BLOCK	Register Code	FUNCTION BLOCK
0000H	0-0	0023H	3-11
0001H	0-1	0024H	3-12
0002H	0-2	0025H	3-13
0003H	0-3	0026H	3-14
0004H	0-4	0027H	3-15
0005H	0-5	0028H	3-16
0006H	0-6	0029H	3-17
0007H	0-7	002AH	3-18
0008H	0-8	002BH	3-19
0009H	1-0	002CH	3-20
000AH	1-1	002DH	3-21
000BH	1-2	002EH	3-22
000CH	1-3	002FH	4-0
000DH	1-4	0030H	4-1
000EH	1-5	0031H	4-2
000FH	1-6	0032H	4-3
0010H	1-7	0033H	4-4
0011H	2-0	0034H	4-5
0012H	2-1	0035H	5-0
0013H	2-2	0036H	5-1
0014H	2-3	0037H	5-2
0015H	2-5	0038H	5-3
0016H	2-6	0039H	5-4
0017H	2-7	003AH	5-5
0018H	3-0	003BH	5-6
0019H	3-1	003CH	5-7
001AH	3-2	003DH	~
001BH	3-3	003EH	6-0
001CH	3-4	003FH	6-1
001DH	3-5	0040H	6-2
001EH	3-6	0041H	6-3
001FH	3-7	0042H	6-4
0020H	3-8	0043H	6-5
0021H	3-9	0044H	6-6
0022H	3-10	0045H	6-7

Register Code	FUNCTION BLOCK	Register Code	FUNCTION BLOCK
0046H	6-8	0069H	10-6
0047H	7-0	006AH	10-7
0048H	7-1	006BH	10-8
0049H	7-2	006CH	10-9
004AH	7-3	006DH	11-0
004BH	7-4	006EH	11-1
004CH	7-5	006FH	11-2
004DH	8-0	0070H	11-3
004EH	8-1	0071H	11-4
004FH	8-2	0072H	11-5
0050H	8-3	0073H	11-6
0051H	8-4	0074H	11-7
0052H	8-5	0075H	12-0
0053H	9-0	0076H	12-1
0054H	9-1	0077H	12-2
0055H	9-2	0078H	12-3
0056H	9-3	0079H	12-4
0057H	9-4	007AH	12-5
0058H	9-5	007BH	12-6
0059H	9-6	007CH	13-0
005AH	9-7	007DH	13-1
005BH	9-8	007EH	13-2
005CH	9-9	007FH	13-3
005DH	9-10	0080H	13-4
005EH	9-11	0081H	14-0
005FH	9-12	0082H	14-1
0060H	9-13	0083H	14-2
0061H	9-14	0084H	14-3
0062H	9-15	0085H	14-4
0063H	10-0	0086H	15-0
0064H	10-1	0087H	15-1
0065H	10-2	0088H	15-2
0066H	10-3	0089H	15-3
0067H	10-4	008AH	15-4
0068H	10-5	008BH	15-5

Register Code	FUNCTION BLOCK	Register Code	FUNCTION BLOCK
008CH	15-6	00AFH	~
008DH		00B0H	~
008EH		00B1H	~
008FH		00B2H	~
0090H	3-23	00B3H	~
0091H	3-24	00B4H	~
0092H	3-25	00B5H	~
0093H	3-26	00B6H	~
0094H	3-27	00B7H	~
0095H	3-28	00B8H	~
0096H	3-29	00B9H	~
0097H	5-8	00BAH	~
0098H	~	00BBH	~
0099H	2-4	00BCH	~
009AH	2-8	00BDH	~
009BH	~	00BEH	~
009CH	~	00BFH	~
009DH	~	00C0H	~
009EH	~	00C1H	~
009FH	~	00C2H	~
00A0H	~	00C3H	~
00A1H	~	00C4H	~
00A2H	~	00C5H	~
00A3H	~	00C6H	~
00A4H	~	00C7H	~
00A5H	~	00C8H	~
00A6H	~	00C9H	~
00A7H	~	00CAH	~
00A8H	~	00CBH	~
00A9H	~	00CCH	~
00AAH	~	00CDH	~
00ABH	~	00CEH	~
00ACH	~	00CFH	~
00ADH	~	00D0H	~
00AEH	~	00D1H	~

Register Code	FUNCTION BLOCK	Register Code	FUNCTION BLOCK
00D2H	~	00F7H	~
00D3H	~	00F8H	~
00D4H	~	00F9H	~
00D5H	~	00FAH	~
00D6H	~	00FBH	~
00D7H	~	00FCH	~
00D8H	~	00FDH	~
00D9H	~	00FEH	~
00DAH	~	00FFH	~
00DBH	~	~	~
00DCH	~		
00DDH	~		
00DEH	~		
00DFH	~		
00E0H	~		
00E1H	~		
00E2H	~		
00E3H	~		
00E4H	~		
00E5H	~		
00E6H	~		
00E7H	~		
00E8H	~		
00E9H	~		
00EAH	~		
00EBH	~		
00ECH	~		
00EDH	~		
00EEH	~		
00EFH	~		
00F0H	~		
00F1H	~		
00F2H	~		
00F3H	~		
00F4H	~		
00F5H	~		
00F6H	~		

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Ref. C/4505BU/E 5.0 Ed. 06/05