B-5 Communication Protocol of M, VB and VH Series

B-5-1 Communication Parameters

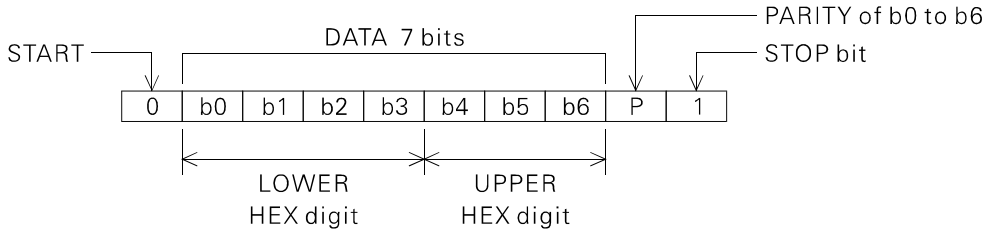
- Data length: 7 bits (ASCII)

  Parity: EVEN

  Stop bit: 1 bit

  Baud rate: the PLC built-in CP1 is fixed to 19200 bps
  User can select any of 4800/9600/19200/38400 bps for CP2 by Ladder Master.
  CP3 is fixed to 19200 bps.

- Format of communication syntax



- This communication protocol use ASCII Code to transmit data, the table below lists the possible characters and the corresponding ASCII Codes.

Character	ASCII Code
STX	02H
ETX	03H
ACK	06H

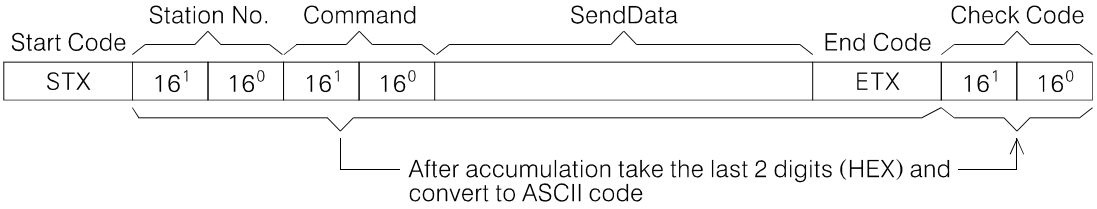
Character	ASCII Code
0	30H
1	31H
2	32H
3	33H
4	34H
5	35H
6	36H
7	37H

Character	ASCII Code
8	38H
9	39H
A	41H
B	42H
C	43H
D	44H
E	45H
F	46H

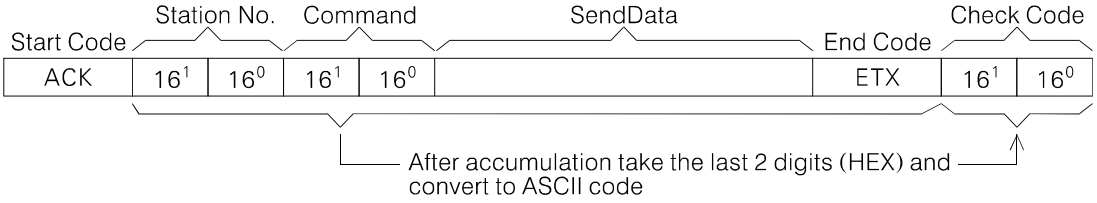
- Communication station number: PLC built-in CP1 is fixed to be number 0.
  User can select any of the range 0 ~ 255 by Ladder Master for CP2.
  CP3 is set using the rotary switch on the left side of VB-CADP module, the range is 0~99.

B-5-2 Communication Protocol Data Format

- The communication format to PLC



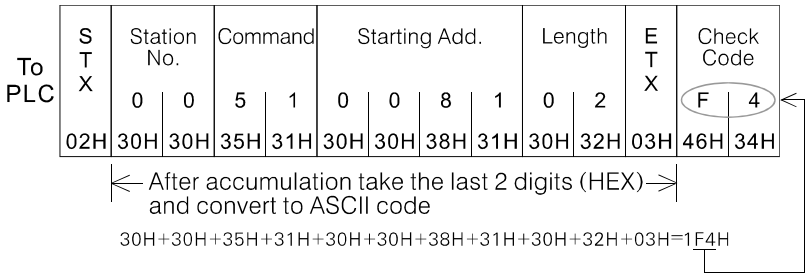
- The communication format to PLC



- Start code: starting character of data to transfer. The start code when send command to PLC is ASCII code STX (02H) and the start code when PLC send back data is ASCII code ACK (06H).
- Station Number: the identification number of the data transfer target. Every PLC in the communication circuit needs to have a station number. And when computer give communication command to PLC, it uses station number to identify which PLC is the target.
- Command: the computer command PLC to do the assigned tasks.

Command	Command code	Target Component	Introduction
Serial Data Read	51H	X、Y、M、S、T、C、D	Continuously read the bit component status or register value
Serial Data Write	61H	X、Y、M、S、T、C、D	Continuously write the bit component status or register value
Bit Component ON	70H	X、Y、M、S	Set the appointed component to ON
Bit Component OFF	71H	X、Y、M、S	Set the appointed component to OFF

- Data to Send: the content of the data to send. It may includes error code, data address, length of data to send, content of data to send, etc.
- End Code: the end bit of the data to send. The end code is ASCII code ETX (03H).
- Check Code: accumulate the data value from the station number until the end code, then take the last 2 digits (HEX) and convert to ASCII code as the checking code. Execute the same checking code processing operation at both the data sending side and the data receiving side, in order to ensure the transmit data is correct.



- Error Code: there will be an error code information in the data sent back by PLC to computer, and the table below lists the meaning of each error code.

Error Code	Details
00H	Communication no error
10H	ASCII converting error
11H	Communication SUM Check Error
12H	No such command
14H	Communication Error like STOP, Parity Error
28H	Data address exceeds range

B-5-3 Communication Instructions

- The table of component ID and the corresponding communication data addresses.

Component Name	Component ID	Data Address	Data Content							
			b7	b6	b5	b4	b3	b2	b1	b0
Input Relay X	X0～X7	0000	X7	X6	X5	X4	X3	X2	X1	X0
	≀	≀	≀							
	X770～X777	003F	X777	X776	X775	X774	X773	X772	X771	X770
Output Relay Y	Y0～Y7	0040	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
	≀	≀	≀							
	Y770～Y777	007F	Y777	Y776	Y775	Y774	Y773	Y772	Y771	Y770
Auxiliary Relay M	M0～M7	0080	M7	M6	M5	M4	M3	M2	M1	M0
	≀	≀	≀							
	M5112～M5119	02FF	M5119	M5118	M5117	M5116	M5115	M5114	M5113	M5112
Step Relay S	S0～S7	0300	S7	S6	S5	S4	S3	S2	S1	S0
	≀	≀	≀							
	S992～S999	037C	S999	S998	S997	S996	S995	S994	S993	S992
Timer Contact	T0～T7	0380	T7	T6	T5	T4	T3	T2	T1	T0
	≀	≀	≀							
	T248～T255	039F	T255	T254	T253	T252	T251	T250	T249	T248
Counter Contact	C0～C7	03A0	C7	C6	C5	C4	C3	C2	C1	C0
	≀	≀	≀							
	C248～C255	03BF	C255	C254	C253	C252	C251	C250	C249	C248
Special Relay M9000 ≀ M9255	M9000～M9007	03E0	M9007	M9006	M9005	M9004	M9003	M9002	M9001	M9000
	≀	≀	≀							
	M9248～M9255	03FF	M9255	M9254	M9253	M9252	M9251	M9250	M9249	M9248
Timer Coil	T0～T7	0780	T7	T6	T5	T4	T3	T2	T1	T0
	≀	≀	≀							
	T248～T255	079F	T255	T254	T253	T252	T251	T250	T249	T248
Counter Coil	C0～C7	07A0	C7	C6	C5	C4	C3	C2	C1	C0
	≀	≀	≀							
	C248～C255	07BF	C255	C254	C253	C252	C251	C250	C249	C248
Timer Current Value	T0	1400	T0 MSB 16^1 16^0 16^1 16^0 LSB 1401 1400							
		1401								
	≀	≀								
	T255	15FE								
		15FF								
Special register D9000 ≀ D9255	D9000	1600	D9000 MSB 16^1 16^0 16^1 16^0 LSB 1601 1600							
		1601								
	≀	≀								
	D9255	17FE								
		17FF								
C0 ≀ C199 Current Value	C0	1800	C0 MSB 16^1 16^0 16^1 16^0 LSB 1801 1800							
		1801								
	≀	≀								
	C199	198E								
		198F								
C200 ≀ C255 Current Value	C200	1A00	C200 MSB 16^1 16^0 16^1 16^0 16^1 16^0 16^1 16^0 LSB 1A03 1A02 1A01 1A00							
		1A03								
	≀	≀								
	C255	1ADC								
		1ADF								
D0 ≀ D8191 Content Value	D0	1C00	D0 MSB 16^1 16^0 16^1 16^0 LSB 1C01 1C00							
		1C01								
	≀	≀								
	D8191	5BFE								
		5BFF								

- Command Number 51H: continuous data read command (can read 128 bytes at most)

To PLC

STX	Station No.		Command		Starting Add.				Length (Bytes)		ETX	Check Code	
	16^1	16^0	16^1	16^0	16^3	16^2	16^1	16^0	16^1	16^0		16^1	16^0

From PLC

ACK	Station No.		Command		Error Code		Byte 1 data		Byte 2 data		∫∫	Last data Byte		ETX	Check Code	
	16^1	16^0	16^1	16^0	16^1	16^0	16^1	16^0	16^1	16^0	∫∫	16^1	16^0		16^1	16^0

Example 1: read the status value of M8 ~ M23

Suppose that the status of M8 ~ M23 of the PLC are as below:

M23								M16	M15						M8
1	0	0	1	0	0	1	1	1	0	1	0	0	1	1	1
9				3				A				7			

To PLC

STX	Station No.		Command		Starting Add.				Length		ETX	Check Code	
	0	0	5	1	0	0	8	1	0	2		F	4
02H	30H	30H	35H	31H	30H	30H	38H	31H	30H	32H	03H	46H	34H

From PLC

ACK	Station No.		Command		Error Code		Byte 1		Byte 2		ETX	Check Code	
	0	0	5	1	0	0	A	7	9	3		0	D
06H	30H	30H	35H	31H	30H	30H	41H	37H	39H	33H	03H	30H	44H

Example 2: read the content value of D1, D2

Suppose the content value of D1 of the PLC is 1234H, and the content value of D2 is ABCDH.

To PLC

STX	Station No.		Command		Starting Add.				Length		ETX	Check Code	
	0	0	5	1	1	C	0	2	0	4		0	3
02H	30H	30H	35H	31H	31H	43H	30H	32H	30H	34H	03H	30H	33H

From PLC

ACK	Station No.		Command		Error Code		Byte 1		Byte 2		Byte 3		Byte 4		ETX	Check Code	
	0	0	5	1	0	0	3	4	1	2	C	D	A	B		F	D
06H	30H	30H	35H	31H	30H	30H	33H	34H	31H	32H	43H	44H	41H	42H	03H	46H	44H

● Command Number 61H: continuous data write command (can write 128 bytes at most)

To PLC

STX	Station No.		Command		Starting Add.				Length (Bytes)		Byte 1 data		Byte 2 data		⟅⟆	Last data Byte		ETX	Check Code	
	16^1	16^0	16^1	16^0	16^3	16^2	16^1	16^0	16^1	16^0	16^1	16^0	16^1	16^0		16^1	16^0		16^1	16^0

From PLC

ACK	Station No.		Command		Error Code		ETX	Check Code	
	16^1	16^0	16^1	16^0	16^1	16^0		16^1	16^0

Example 1: write into Y30 ~ Y47

Suppose that the status of Y30 ~ Y47 of the PLC to be written are as below:

Y47							Y40	Y37							Y30
0	0	1	1	1	1	1	0	1	1	0	0	0	1	1	0
3				E				C				6			

To PLC

STX	Station No.		Command		Starting Add.				Length		Byte 1		Byte 2		ETX	Check Code	
	0	0	6	1	0	0	4	3	0	2	C	6	3	E		E	4
02H	30H	30H	36H	31H	30H	30H	34H	33H	30H	32H	43H	36H	33H	45H	03H	45H	34H

From PLC

ACK	Station No.		Command		Error Code		ETX	Check Code	
	0	0	6	1	0	0		2	A
06H	30H	30H	36H	31H	30H	30H	03H	32H	41H

Example 2: write A325H into the register D1 of the PLC

To PLC

STX	Station No.		Command		Starting Add.				Length		Byte 1		Byte 2		ETX	Check Code	
	0	0	6	1	1	C	0	2	0	2	2	5	A	3		D	D
02H	30H	30H	36H	31H	31H	43H	30H	32H	30H	32H	32H	35H	41H	33H	03H	44H	44H

From PLC

ACK	Station No.		Command		Error Code		ETX	Check Code	
	0	0	6	1	0	0		2	A
06H	30H	30H	36H	31H	30H	30H	03H	32H	41H

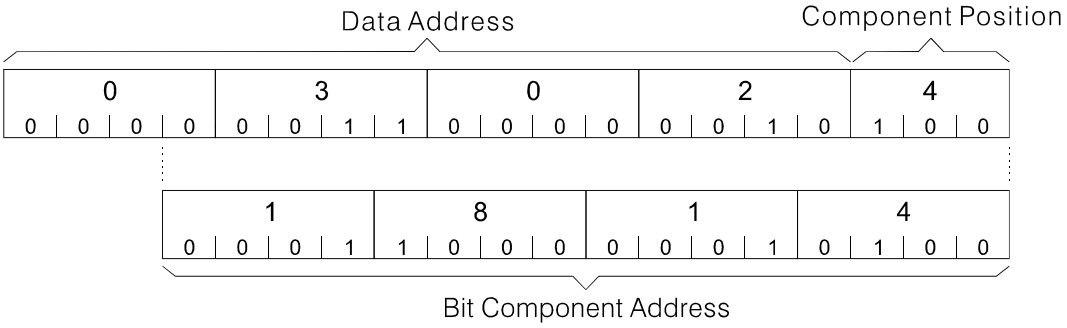
- Command Number 70H: bit component ON command
  Command Number 71H: bit component OFF command

To PLC

STX	Station No.		Command		Bit Component Address				ETX	Check Code	
	16^1	16^0	16^1	16^0	16^3	16^2	16^1	16^0		16^1	16^0

The bit component address consists of the data address and the big component position. Here use S20 as example to explain below:
Bit component is S20 (S)20÷8=2…4。

The component position of S20 is 4
The data address of S0 is 0300H
The data address of S20 is 0300H + 2H = 0302H



From PLC

ACK	Station No.		Command		Error Code		ETX	Check Code	
	16^1	16^0	16^1	16^0	16^1	16^0		16^1	16^0

Example 1: set M10 to ON

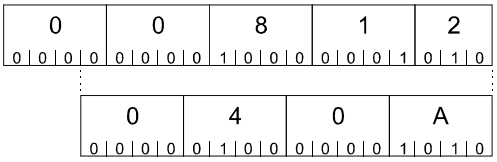
To PLC

STX	Station No.		Command		Bit Component Address				ETX	Check Code	
	0	0	7	0	0	4	0	A		9	F
02H	30H	30H	37H	30H	30H	34H	30H	41H	03H	39H	46H

From PLC

ACK	Station No.		Command		Error Code		ETX	Check Code	
	0	0	7	0	0	0		2	A
06H	30H	30H	37H	30H	30H	30H	03H	32H	41H

Calculate the bit component address of M10:
(M) 10 / 8 = 1…2
The data address of M0 is 0080H, and the data address of M10 is 0080H + 1H = 0081H
0080H+1H=0081H



Example 2: set M1000 to OFF

To PLC

STX	Station No.		Command		Bit Component Address				ETX	Check Code	
	0	0	7	1	0	4	6	4		9	9
02H	30H	30H	37H	31H	30H	34H	36H	34H	03H	39H	39H

From PLC

ACK	Station No.		Command		Error Code		ETX	Check Code	
	0	0	7	1	0	0		2	B
06H	30H	30H	37H	31H	30H	30H	03H	32H	42H

Calculate the bit component address of M100:
(M) 10 / 8 = 12…4
The data address of M0 is 0080H, and the data address of M10 is 0080H + CH = 008CH