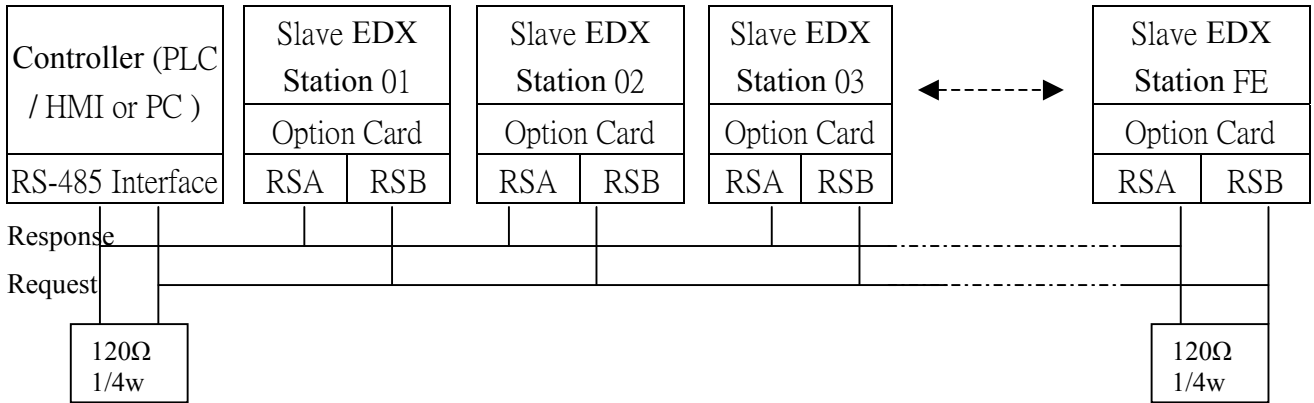


## 1. Communication Data Frame

EDX 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



\*\* The network is terminated at each end with an external terminating resistor (120 ohm, 1/4 watt).

### 1.2 Data format frame

#### 1.2.1 FOR ASCII MODE

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

## 1.2.2 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 (all's 1). 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

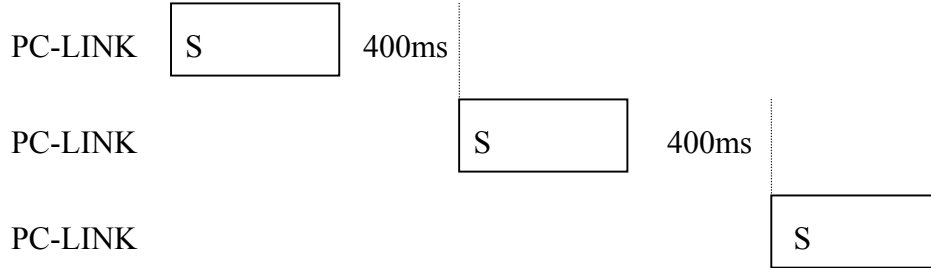
#### ●CRC calculation application program

```

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

```
    }  
  }  
  return( wkg );  
}
```

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



(When INV time-out or detect checksum error, or INV response error code = checksum error, PC-LINK retry maximum two times, and if two times after still error, then display “ER6”)

### 3. Error 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.

<b>Error Code</b>	<b>Description</b>
51	Function Code Error
52	Address Error
53	Data Amount Error
54	Data Over Range
55	Writing Mode Error

## 4. Command Start Address Description

### 4.1 Command Data (Readable and Writable)

Register No.	Content			
00E6H	Operation Signal			
	Bit	Description	1	0
	0	Operation Command	Run	Stop
	1	Reverse Command	Reverse	Forward
	2	External Fault	Fault (EFO)	
	3	Fault Reset	Reset	
	4	Jog Command	Jog	
	5	Multi-function Command S1	ON	OFF
	6	Multi-function Command S2	ON	OFF
	7	Multi-function Command S3	ON	OFF
	8	Multi-function Command S4	ON	OFF
	9	(Not used)		
	A	(Not used)		
	B	Multi-function Command AIN	ON	OFF
	C	Multi-function Command RY1	ON	OFF
	D	(Not used)		
	E	(Not used)		
F	(Not used)			
00E7H	Frequency Command			
00E8H	Remote Keypad Used			
00E9H	(Reserved)			
00EAH	(Reserved)			
00EBH	(Reserved)			
00ECH	(Reserved)			
00EDH	(Reserved)			
00EEH	(Reserved)			

**Note:** Write in zero for Not used BIT, do not write in data for the reserved register.

4.2 Monitor Data (Only for reading)

Register No.	Content			
00EFH	Bit	Description	1	0
	0	Operation state	Run	Stop
	1	Direction state	Reverse	Forward
	2	Inverter operation prepare state	Ready	Unready
	3	Abnormal	Abnormal	
	4	DATA setting error	Error	
	5-F	(unused)		
	00F0H	<b>Fault Description</b>		
Code		Description	Code	Description
00		The inverter is normal	01	Inverter over heat (OH)
02		Over current at stop (OC)	03	Under voltage (LV)
04		Over voltage (OV)	05	External BB (b.b.)
06		CPU interrupted (CT)	07	PID feedback signal loss (PID)
08		EEPROM abnormal (EPR)	09	Inverter over load (OL2)
10		Motor over load (OL1)	11	Emergency stop (E.S.)
12		(unused)	13	Over current at constant speed (OCC)
14		Over current during accelerating (OCA)	15	Over current during decelerating (OCD)
16		Over current at startup (OCS)	17	Under voltage during running (LVC)
18		Over voltage at constant speed / decelerating (OVC)	19	Inverter over heat at constant speed (OHC)
20		Stop at 0 Hz (SP0)	21	Direct start disable (SP1)
22		Control panel emergency stop (SP2)	23	Keypad operation error (ER1)
24		Parameter setting error (ER2)	25	Analog converting error (ER4)
26		Modifying the parameter in communication (ER5)	27	Communication failure (ER6)
28		Incorrect parameter setting (ER7)	29	Factory setting error (ER8)
30		Copy (CPY)	31	Compare (CPR)
32		Copy error (EP1)	33	Compare error (EP2)
34		Inverter over speed (OVS)	35	Over current limit (OCL)
36~45		(unused)		

**Note:** Please define the unused Bit as 0.

Register No.	Content																																											
00F1H	<table border="1"> <thead> <tr> <th colspan="2">Bit</th> <th>Description</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td rowspan="7">Sequence input status</td> <td>0</td> <td>Terminal S1</td> <td>Closed</td> <td>Opened</td> </tr> <tr> <td>1</td> <td>Terminal S2</td> <td>Closed</td> <td>Opened</td> </tr> <tr> <td>2</td> <td>Terminal S3</td> <td>Closed</td> <td>Opened</td> </tr> <tr> <td>3</td> <td>Terminal S4</td> <td>Closed</td> <td>Opened</td> </tr> <tr> <td>4</td> <td>(Unused)</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>(Unused)</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>Terminal AIN</td> <td>Closed</td> <td>Opened</td> </tr> <tr> <td rowspan="2">Contact output</td> <td>7</td> <td>Multi-function output 1(RELAY1)</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>8-F</td> <td>(Unused)</td> <td></td> <td></td> </tr> </tbody> </table>	Bit		Description	1	0	Sequence input status	0	Terminal S1	Closed	Opened	1	Terminal S2	Closed	Opened	2	Terminal S3	Closed	Opened	3	Terminal S4	Closed	Opened	4	(Unused)			5	(Unused)			6	Terminal AIN	Closed	Opened	Contact output	7	Multi-function output 1(RELAY1)	ON	OFF	8-F	(Unused)		
	Bit		Description	1	0																																							
	Sequence input status	0	Terminal S1	Closed	Opened																																							
		1	Terminal S2	Closed	Opened																																							
		2	Terminal S3	Closed	Opened																																							
		3	Terminal S4	Closed	Opened																																							
		4	(Unused)																																									
		5	(Unused)																																									
		6	Terminal AIN	Closed	Opened																																							
	Contact output	7	Multi-function output 1(RELAY1)	ON	OFF																																							
8-F		(Unused)																																										
00F2H	Frequency command																																											
00F3H	Output frequency																																											
00F4H	Output voltage command (1/1V)																																											
00F5H	Output DC voltage command (1/1V)																																											
00F6H	Output current (10/1A)																																											
00F7H	PID Feedback value (100% / Max output frequency, 10/1%)																																											
00F8H	PID input value (100% / Max output frequency, 10/1%, sign attached)																																											
00F9H	TM2 AIN input value (1024 / 10V) *1																																											
00FAH	Keypad AIN input value (1024 / 10V) *1																																											
00FBH	Remote keypad used																																											
00FCH	Remote keypad used																																											
00FDH	(Reserved)																																											
00FEH	(Reserved)																																											
00FFH	(Reserved)																																											

**Note:** Do not write in data for the reserved register.



## 5. Function Code

### 5.1 Read the data in the holding register [03H]

Master unit reads the contents of the holding registers with the continuous numbers for the specified quantity.

**(Example)** Read the SLAVE station No: 01, EDX drive's frequency command.

#### ASCII Mode

Instruction Message		Response Message (Normal)		Response Message (Fault)	
STX	3AH	STX	3AH	STX	3AH
SLAVE Address	30H 31H	SLAVE Address	30H 31H	SLAVE Address	30H 32H
Function Code	30H 33H	Function Code	30H 33H	Function Code	38H 33H
Start Address	30H	DATA number	30H	Error Code	35H
	30H		32H		32H
	46H	First holding register	31H	LRC CHECK	32H
	32H		37H		41H
Quantity	30H	LRC CHECK	37H	END	0DH
	30H		33H		0AH
	30H	END	0DH		
	31H		0AH		
LRC CHECK	30H 39H				
END	0DH 0AH				

#### RTU Mode

Instruction Message			Response Message (Normal)			Response Message (Fault)		
SLAVE Address		01H	SLAVE Address		01H	SLAVE Address		01H
Function Code		03H	Function Code		03H	Function Code		83H
Start Address	High	00H	DATA number		02H	Error Code		52H
	Low	F2H	First holding register	High	17H	CRC-16	High	C0H
Quantity	High	00H		Low	70H		Low	CDH
	Low	01H	CRC-16	High	B6H			
High	25H	Low		50H				
Low	F9H							

**5.2 Loop back testing [08H]**

The function code is check communication between MASTER and SLAVE, the Instruction message is returned as a response message without being change, Any values can be used for test codes or data.

**ASCII Mode**

Instruction Message	
STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	38H
Test Codes	30H
	30H
	30H
	30H
DATA	41H
	35H
	33H
	37H
LRC CHECK	31H
	42H
END	0DH
	0AH

Response Message (Normal)	
STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	38H
Test Codes	30H
	30H
	30H
	30H
DATA	41H
	35H
	33H
	37H
LRC CHECK	31H
	42H
END	0DH
	0AH

Response Message (Fault)	
STX	3AH
SLAVE Address	30H
	31H
Function Code	38H
	38H
Error Code	32H
	30H
LRC CHECK	37H
	35H
END	0DH
	0AH

**RTU Mode**

Instruction Message		
SLAVE Address		01 H
Function Code		08H
Test Codes	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Response Message (Normal)		
SLAVE Address		01H
Function Code		08H
Test Codes	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Response Message (Fault)		
SLAVE Address		01H
Function Code		88H
Error Code		20H
CRC-16	High	47H
	Low	D8H

**5.3 Write holding register [06H]**

The specified data are written into the specified holding register.

**(Example)** Set SLAVE station No: 01, EDX drive's frequency command is 60.0Hz.

**ASCII Mode**

Instruction Message

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	36H
Start Address	30H
	30H
	45H
	37H
DATA	31H
	37H
	37H
	30H
LRC CHECK	38H
	42H
END	0DH
	0AH

Response Message (Normal)

STX	3AH
SLAVE Address	30H
	31H
Function Code	30H
	36H
Start Address	30H
	30H
	45H
	37H
DATA	31H
	37H
	37H
	30H
LRC CHECK	38H
	42H
END	0DH
	0AH

Response Message (Fault)

STX	3AH
SLAVE Address	30H
	31H
Function Code	38H
	36H
Error Code	35H
	32H
LRC CHECK	32H
	37H
END	0DH
	0AH

**RTU Mode**

Instruction Message

SLAVE Address	01 H	
Function Code	06H	
Start Address	High	00H
	Low	E7H
DATA	High	17H
	Low	70H
CRC-16	High	37H
	Low	E9H

Response Message (Normal)

SLAVE Address	01H	
Function Code	06H	
Start Address	High	00H
	Low	E7H
DATA	High	17H
	Low	70H
CRC-16	High	37H
	Low	E9H

Response Message (Fault)

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

**5.4 Write in several holding registers [10H]**

Specified data are written into the several specified holding registers from the specified number, respectively.

**(Example)** Set SLAVE station No: 01, EDX drive as forward run at frequency reference 60.0Hz

**ASCII Mode**

Instruction Message	
STX	3AH
SLAVE Address	30H
	31H
Function Code	31H
	30H
Start Address	30H
	30H
	45H
	36H
Quantity	30H
	30H
	30H
	32H
DATA Number*	30H
	34H
First DATA	30H
	30H
	30H
	31H
Next DATA	31H
	37H
	37H
	30H
LRC CHECK	37H
	42H
END	0DH
	0AH

Response Message (Normal)	
STX	3AH
SLAVE Address	30H
	31H
Function Code	31H
	30H
Start Address	30H
	30H
	45H
	36H
Quantity	30H
	30H
	30H
	32H
LRC CHECK	30H
	37H
END	0DH
	0AH

Response Message (Fault)	
STX	3AH
SLAVE Address	30H
	31H
Function Code	39H
	30H
Error Code	35H
	32H
LRC CHECK	31H
	44H
END	0DH
	0AH

**RTU Mode**

Instruction Message		
SLAVE Address		01 H
Function Code		10H
Start Address	High	00H
	Low	E6H
Quantity	High	00H
	Low	02H
DATA Number *		04H
First DATA	High	00H
	Low	01H
Next DATA	High	17H
	Low	70H
CRC-16	High	22H
	Low	19H

Response Message (Normal)		
SLAVE Address		01H
Function Code		10H
Start Address	High	00H
	Low	E6H
Quantity	High	00H
	Low	02H
CRC-16	High	A0H
	Low	3FH

Response Message (Fault)		
SLAVE Address		01H
Function Code		90H
Error Code		52H
CRC-16	High	CDH
	Low	FDH

\* Data numbers are the actual number times 2

**6 Comparison list between parameter and register** (As for parameter function descriptions, please refer to parameter function list)

Register No.	Function
0000H	F00
0001H	F01
0002H	F02
0003H	F03
0004H	F04
0005H	F05
0006H	F06
0008H	F07
0009H	F08
000AH	F09
000BH	F10
000EH	F11
000FH	F12
0010H	F13
0011H	F14
0012H	F15
0092H	F16
0013H	F17
0014H	F18
0076H	F19
0077H	F20
0015H	F21
0016H	F22
0017H	F23
009FH	F24

Register No.	Function
00A0H	F25
0018H	F26
0019H	F27
001AH	F28
001BH	F29
001CH	F30
001DH	F31
001EH	F32
001FH	F33
0020H	F34
0021H	F35
0022H	F36
0023H	F37
0024H	F38
0025H	F39
0026H	F40
0027H	F41
0028H	F42
0095H	F43
0096H	F44
0099H	F45
0097H	F46
0098H	F47
00DCH	F48
00DDH	F49

Register No.	Function
00DFH	F50
002AH	F51
002BH	F52
002CH	F53
002DH	F54
002EH	F54
002FH	F54
0039H	
003AH	
003BH	
003CH	
003DH	
003EH	
003FH	
0040H	
0041H	
0042H	
0043H	
0044H	
0045H	
0046H	
0047H	
0048H	
0049H	
004AH	

Register No.	Function
004BH	
004CH	
004DH	
004EH	
004FH	
0050H	
0051H	
0052H	
0053H	
0054H	
0055H	
0056H	
0057H	
0058H	
0059H	
005AH	
005BH	
005CH	
005DH	
005EH	
005FH	
0060H	
0061H	
0062H	
0063H	

# EDX MODBUS COMMUNICATION PROTOCOL

Register No.	Function
0064H	C00
0065H	C01
0066H	C02
0067H	C03
0068H	C04
0069H	C05
006AH	C06
006BH	C07
006CH	C08
006DH	C09
006EH	C10
006FH	C11
0070H	C12
0071H	C13
009AH	C14
0007H	C15
009EH	C16
007AH	C17
007BH	C18
007CH	C19
007DH	C20
007EH	C21
007FH	C22
000CH	C23
000DH	C24

Register No.	Function
0029H	C25
0080H	C26
0081H	C27
0082H	C28
0083H	C29
008AH	C30
008BH	C31
008CH	C32
008DH	C33
008EH	C34
008FH	C35
0090H	C36
0091H	C37
0093H	C38
0094H	C39
0072H	C40
009DH	C41
0073H	C42
0074H	C43
0075H	C44
0078H	C45
0079H	C46
0030H	C47
0084H	C48
0085H	C49

Register No.	Function
0086H	C50
0087H	C51
0088H	C52
0089H	C53
009BH	C54
009CH	C55
009CH	
009DH	
009EH	
009FH	
00A0H	
00A1H	
00A2H	
00A3H	
00A4H	
00A5H	
00A6H	
00A7H	
00A8H	
00A9H	
00AAH	
00ABH	
00ACH	
00ADH	
00AEH	

Register No.	Function
00AFH	
00B0H	
00B1H	
00B2H	
00B3H	
00B4H	
00B5H	
00B6H	
00B7H	
00B8H	
00B9H	
00BAH	
00BBH	
00BCH	
00BDH	
00BEH	
00BFH	
00C0H	
00C1H	
00C2H	
00C3H	
00C4H	
00C5H	
00C6H	
00C7H	