

SERVO DRIVER(FDA7000 Series)
STANDARD PROTOCOL (Ver 1.1)

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1. INTRODUCTION

FDA7000

PROTOCOL

1.1 FDA7000

- FDA7000 Operator
- RS232C, RS485
- Protocol MODBUS
- RS232C D/L, PC/L, RS485
- MODBUS PLC, Touch Screen 가

1.2



1.2.1 RS232C

- 9600bps
- Digital Loader P-DORI Station Setup

1.2.2 RS485

- 9600, 19200, 38400, 57600bps
- P-DORI Station Setup
- (OPR CMD)

2. MODBUS PROTOCOL FRAME OUTLINE

MODBUS

Field

2.1 RTU(Remote Terminal Unit) Frame : Hex Data

START(logical)	ADDRESS FIELD	FUNCTION FIELD	DATA FIELD	CRC CHECK
3.5 Character Times	1 byte	1 byte	n x 1 byte	2 bytes

2.1.1 Start

- **Frame**
- 9600bps 1bit 0.104msec , (3.5character times, 1 Character = 10 bits) Start time 3.64msec(Min)

RS485

Frame

Frame

1. Frame

통신 속도	Start Time
9600 bps	3.64ms
19200 bps	1.82ms
38400 bps	0.91ms
57600 bps	0.46ms

- **Start time** **frame** , **frame**
- Field 10bits

2.1.2 Address Field

- Field 1 byte
- RS485 Slave Device() ID
- '1 ~ 247' 가 , RS-485 '1 ~ 31'

2.1.3 Function Field

- Field 1 byte
- Master() Slave() data 가 code
- (Function Code)
- Code '03, 06, 16'

- | | | | | |
|---|------------------------------------|-------|---------|---|
| - | Function Code | Field | 4 bytes | . |
| - | Register Address, Data, Byte-count | | | . |

- | | | | |
|---|-------|---------|----------------|
| - | Field | 2 bytes | . (CRC Check) |
|---|-------|---------|----------------|

- **Start bit : 1 bit**
- **Data bit : 8 bits** (4bit hex 2)
- **Parity bit : 1 bit**(even, odd), **no bit(no parity)**
- **Stop bit : 1 bit**, 2 bits
- Data LSB bit -> MSB bit

2.2 Mode

- ```

- RTU Mode ASCII Mode
- (baud rate, parity mode, port) Slave device Mode
- Modbus Network Device Mode
- , data RTU Mode

```

## 2.3 HIGEN Mode

- |     | Data | RTU Mode |
|-----|------|----------|
| 1   | 0    | 0        |
| 2   | 0    | 0        |
| 3   | 0    | 0        |
| 4   | 0    | 0        |
| 5   | 0    | 0        |
| 6   | 0    | 0        |
| 7   | 0    | 0        |
| 8   | 0    | 0        |
| 9   | 0    | 0        |
| 10  | 0    | 0        |
| 11  | 0    | 0        |
| 12  | 0    | 0        |
| 13  | 0    | 0        |
| 14  | 0    | 0        |
| 15  | 0    | 0        |
| 16  | 0    | 0        |
| 17  | 0    | 0        |
| 18  | 0    | 0        |
| 19  | 0    | 0        |
| 20  | 0    | 0        |
| 21  | 0    | 0        |
| 22  | 0    | 0        |
| 23  | 0    | 0        |
| 24  | 0    | 0        |
| 25  | 0    | 0        |
| 26  | 0    | 0        |
| 27  | 0    | 0        |
| 28  | 0    | 0        |
| 29  | 0    | 0        |
| 30  | 0    | 0        |
| 31  | 0    | 0        |
| 32  | 0    | 0        |
| 33  | 0    | 0        |
| 34  | 0    | 0        |
| 35  | 0    | 0        |
| 36  | 0    | 0        |
| 37  | 0    | 0        |
| 38  | 0    | 0        |
| 39  | 0    | 0        |
| 40  | 0    | 0        |
| 41  | 0    | 0        |
| 42  | 0    | 0        |
| 43  | 0    | 0        |
| 44  | 0    | 0        |
| 45  | 0    | 0        |
| 46  | 0    | 0        |
| 47  | 0    | 0        |
| 48  | 0    | 0        |
| 49  | 0    | 0        |
| 50  | 0    | 0        |
| 51  | 0    | 0        |
| 52  | 0    | 0        |
| 53  | 0    | 0        |
| 54  | 0    | 0        |
| 55  | 0    | 0        |
| 56  | 0    | 0        |
| 57  | 0    | 0        |
| 58  | 0    | 0        |
| 59  | 0    | 0        |
| 60  | 0    | 0        |
| 61  | 0    | 0        |
| 62  | 0    | 0        |
| 63  | 0    | 0        |
| 64  | 0    | 0        |
| 65  | 0    | 0        |
| 66  | 0    | 0        |
| 67  | 0    | 0        |
| 68  | 0    | 0        |
| 69  | 0    | 0        |
| 70  | 0    | 0        |
| 71  | 0    | 0        |
| 72  | 0    | 0        |
| 73  | 0    | 0        |
| 74  | 0    | 0        |
| 75  | 0    | 0        |
| 76  | 0    | 0        |
| 77  | 0    | 0        |
| 78  | 0    | 0        |
| 79  | 0    | 0        |
| 80  | 0    | 0        |
| 81  | 0    | 0        |
| 82  | 0    | 0        |
| 83  | 0    | 0        |
| 84  | 0    | 0        |
| 85  | 0    | 0        |
| 86  | 0    | 0        |
| 87  | 0    | 0        |
| 88  | 0    | 0        |
| 89  | 0    | 0        |
| 90  | 0    | 0        |
| 91  | 0    | 0        |
| 92  | 0    | 0        |
| 93  | 0    | 0        |
| 94  | 0    | 0        |
| 95  | 0    | 0        |
| 96  | 0    | 0        |
| 97  | 0    | 0        |
| 98  | 0    | 0        |
| 99  | 0    | 0        |
| 100 | 0    | 0        |
| 101 | 0    | 0        |
| 102 | 0    | 0        |
| 103 | 0    | 0        |
| 104 | 0    | 0        |
| 105 | 0    | 0        |
| 106 | 0    | 0        |
| 107 | 0    | 0        |
| 108 | 0    | 0        |
| 109 | 0    | 0        |
| 110 | 0    | 0        |
| 111 | 0    | 0        |
| 112 | 0    | 0        |
| 113 | 0    | 0        |
| 114 | 0    | 0        |
| 115 | 0    | 0        |
| 116 | 0    | 0        |
| 117 | 0    | 0        |
| 118 | 0    | 0        |
| 119 | 0    | 0        |
| 120 | 0    | 0        |
| 121 | 0    | 0        |
| 122 | 0    | 0        |
| 123 | 0    | 0        |
| 124 | 0    | 0        |
| 125 | 0    | 0        |
| 126 | 0    | 0        |
| 127 | 0    | 0        |
| 128 | 0    | 0        |
| 129 | 0    | 0        |
| 130 | 0    | 0        |
| 131 | 0    | 0        |
| 132 | 0    | 0        |
| 133 | 0    | 0        |
| 134 | 0    | 0        |
| 135 | 0    | 0        |
| 136 | 0    | 0        |
| 137 | 0    | 0        |
| 138 | 0    | 0        |
| 139 | 0    |          |



## 4. Data Field

### Data Field

#### 4.1 Data Field

- Register( ) Address, , data , Function Code

#### 4.2 Register Data

- Register data 4bytes
- Register Data type Integer , Float

##### 4.2.1 Integer data

- 가 Register ‘ 0 ~ 65535 ‘ data , 가 Register ‘-32768 ~ 32767’ data
- 4bytes 2bytes Don't care . data 2bytes
- ‘ 50000 (dec) ‘ data

| Reg. Value | Reg. Value | Reg. Value | Reg. Value |
|------------|------------|------------|------------|
| HI-H       | HI-L       | LO-H       | LO-L       |
| h00        | h00        | hC3        | h50        |

##### 4.2.2 Float data

- ‘ -999999.9 ~ +999999.9 ‘ data
- Float data format IEEE754

|       |    |    |
|-------|----|----|
| S     | E  | M  |
| 31 30 | 23 | 22 |
|       |    | 0  |

S : bit ( 1 bit )

E : bit ( 8 bit )

M : 가 bit ( 23 bit )

$$\text{Data} = (-1)^S \times 1.M \times 2^{(E-127)}$$

- 1) 1234.5 data .

| Reg. Value | Reg. Value | Reg. Value | Reg. Value |
|------------|------------|------------|------------|
| HI-H       | HI-L       | LO-H       | LO-L       |
| h44        | h9A        | h50        | h00        |

S : 0

E : 10001001 = 137

M : 0011010 01010000 00000000 =  $1/8 + 1/16 + 1/64 + 1/512 + 1/2048 = 0.205566406$

Data =  $(-1)^0 \times 1.205566406 \times 2^{(137-127)} = 1234.5$

- 2) -1234.5 data .

| Reg. Value | Reg. Value | Reg. Value | Reg. Value |
|------------|------------|------------|------------|
| HI-H       | HI-L       | LO-H       | LO-L       |
| C4         | 9A         | 50         | 00         |

S : 1

E : 10001001 = 137

M : 0011010 01010000 00000000 =  $1/8 + 1/16 + 1/64 + 1/512 + 1/2048 = 0.205566406$

Data =  $(-1)^1 \times 1.205566406 \times 2^{(137-127)} = -1234.5$

### 4.3 Register data

- Register Integer , Float , data type .

- (http://higenmotor.co.kr) ‘ Data ( Float <--> HEX ) ’ 가 .



## 5. CRC Check

### CRC Check Field

#### 5.1 Error Check Field

- Field 2 bytes
- 1 byte + 1 byte
- CRC Check Method CRC-16(  $X^{16} + X^{15} + X^2 + 1$  )

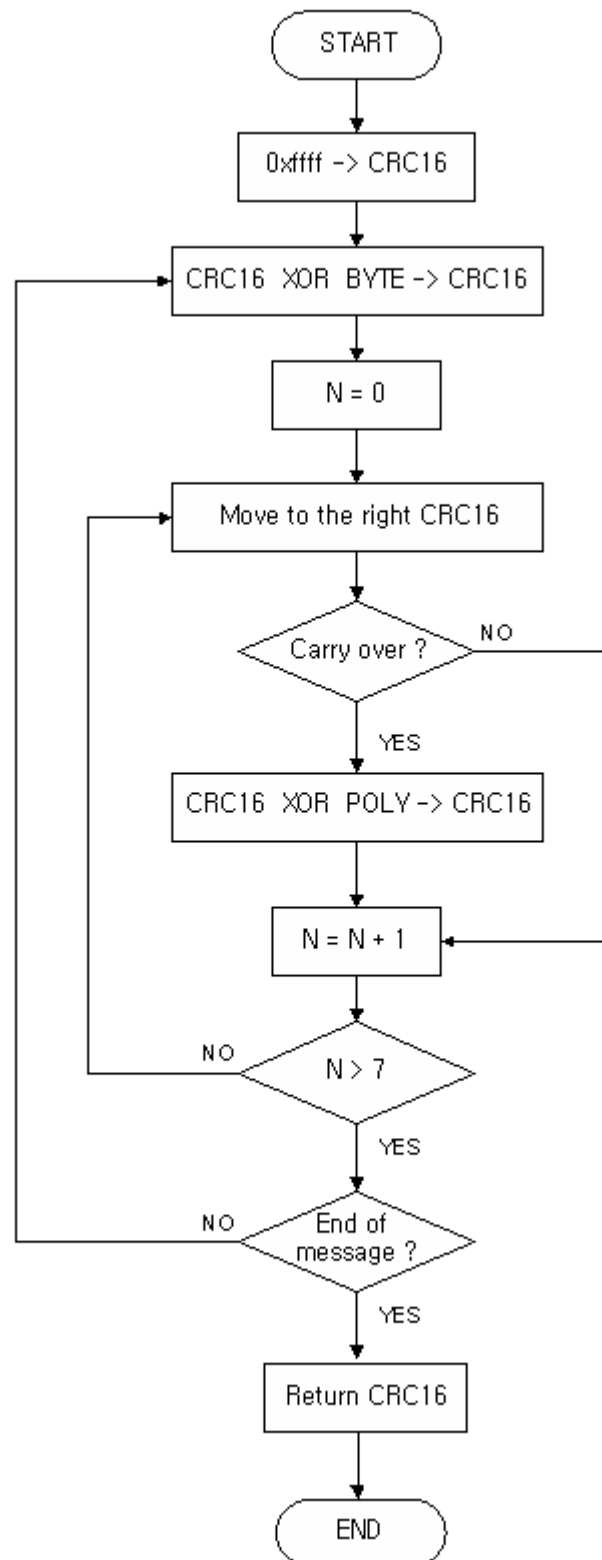
#### 5.2 CRC

- 1) 16bit register(0xFFFF) CRC Register( )
- 2) CRC Register data(Start, Parity, Stop bit 8 bit) XOR  
CRC Register
- 3) CRC Register 1 bit Shift
- 4) Shift carry 가 '0' , 3)  
carry 가 '1' , CRC Register 0xA001(POLY : polynomial value) XOR  
CRC Register 3)
- 5) 3) 4) 8
- 6) 8 data CRC Register
- 7) 1) ~ 6) 1byte CRC , frame N byte  
가 , 1) ~ 6) N-2 (-2 : Error CHK Field)

### 5.3 Block Diagram

- CRC

Block Diagram



## 5.4 CRC Check

|           |          |                     |                                |
|-----------|----------|---------------------|--------------------------------|
| - 0x02    | CRC16    | . ( POLY : 0xA001 ) |                                |
| CRC16     | 11111111 | 11111111            |                                |
| DATA      | 00000000 | 00000010            | XOR                            |
| CRC16     | 11111111 | 11111101            |                                |
| Shift - 1 | 01111111 | 11111110            | 1 : carry                      |
| POLY      | 10100000 | 00000001            | XOR                            |
| CRC16     | 11011111 | 11111111            |                                |
| Shift - 2 | 01101111 | 11111111            | 1 : carry                      |
| POLY      | 10100000 | 00000001            | XOR                            |
| CRC16     | 11001111 | 11111110            |                                |
| Shift - 3 | 01100111 | 11111111            | 0                              |
| Shift - 4 | 00110011 | 11111111            | 1 : carry                      |
| POLY      | 10100000 | 00000001            | XOR                            |
| CRC16     | 10010011 | 11111110            |                                |
| Shift - 5 | 01001001 | 11111111            | 0                              |
| Shift - 6 | 00100100 | 11111111            | 1 : carry                      |
| POLY      | 10100000 | 00000001            | XOR                            |
| CRC16     | 10000100 | 11111110            |                                |
| Shift - 7 | 01000010 | 01111111            | 0                              |
| Shift - 8 | 00100001 | 00111111            | 1 : carry                      |
| POLY      | 10100000 | 00000001            | XOR                            |
| CRC16     | 10000001 | 00111110            | => 0x813E ( 0x02에 대한 CRC16 값 ) |
|           | 0x813E   | 0x02                | CRC16 . hex CRC16              |
|           | CRC16    | Data                | CRC16                          |
|           | Register | CMD                 | CRC                            |

|        | ID    | F.C   | ADDR  | NO. REG | CRC_LO | CRC_HI |
|--------|-------|-------|-------|---------|--------|--------|
| DATA   | h02   | h03   | h00   | h6B     | h00    | h02    |
| CRC16값 | hFFFF | h813E | hD140 | hF0D0   | h73B0  | hB472  |
|        |       |       |       |         | hE4 B5 | hE4    |

CRC16 (Delphi )

가

Table

Modicon Modbus Protocol Reference Guide

## 6. Function Exam.

### Function Code

#### 6.1 ‘ 03 ‘ : Read Holding Register(0x03)

- Slave Device(ID : 2) Register 108 ~ 109

1) Register 108 : 555(dec), 109 : 0(dec) . ( Integer Type)

#### Request

| Address | Function | Starting<br>Address HI. | Starting<br>Address LO. | No. of<br>Registers HI. | No. of<br>Registers LO. | CRC LO | CRC HI |
|---------|----------|-------------------------|-------------------------|-------------------------|-------------------------|--------|--------|
| h02     | h03      | h00                     | h6B                     | h00                     | h02                     | hB5    | hE4    |

#### Response

| Address | Function | Byte<br>Count | Register<br>value<br>HLH(108) | Register<br>value<br>HLL(108) | Register<br>value<br>LO_H(108) | Register<br>value<br>LO_L(108) |
|---------|----------|---------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|
| h02     | h03      | h08           | h00                           | h00                           | h02                            | H2B                            |

| Register<br>value<br>HLH(109) | Register<br>value<br>HLL(109) | Register<br>value<br>LO_H(109) | Register<br>Value<br>LO_L(109) | CRC LO | CRC HI |
|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------|--------|
| h00                           | h00                           | h00                            | h00                            | hBF    | h77    |

2) Register 108 :+1234.5(dec), 109 : -1234.5(dec)가 . ( Float Type)

#### Request

| Address | Function | Starting<br>Address HI. | Starting<br>Address LO. | No. of<br>Registers HI. | No. of<br>Registers LO. | CRC LO | CRC HI |
|---------|----------|-------------------------|-------------------------|-------------------------|-------------------------|--------|--------|
| h02     | h03      | h00                     | h6B                     | h00                     | h02                     | hB5    | hE4    |

#### Response

| Address | Function | Byte Count | Register<br>value<br>HLH(108) | Register<br>value<br>HLL(108) | Register<br>value<br>LO_H(108) | Register<br>value<br>LO_L(108) |
|---------|----------|------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|
| h02     | h03      | h08        | h44                           | h9A                           | h50                            | h00                            |

| Register value | Register value | Register value | Register value | CRC LO | CRC HI |
|----------------|----------------|----------------|----------------|--------|--------|
| HI_H(109)      | HI_L(109)      | LO_H(109)      | LO_L(109)      |        |        |
| hC4            | h9A            | h50            | h00            | h88    | h16    |

## 6.2 ‘ 06 ‘ : Write Single Register(0x06)

- Slave Device(ID : 2) Register 2(Addr : 0001) ‘ 3 ‘ setting .

Request

| Address | Function | Starting Address | Starting Address | Register Value | Register Value | Register Value | Register Value | CRC LO | CRC HI |
|---------|----------|------------------|------------------|----------------|----------------|----------------|----------------|--------|--------|
|         |          | HI.              | LO.              | HI_H.          | HI_L.          | LO_H.          | LO_L.          |        |        |
| h02     | h06      | h00              | h01              | h00            | h00            | h00            | h03            | hDA    | h13    |

Response

| Address | Function | Starting Address | Starting Address | Register Value | Register Value | Register Value | Register Value | CRC LO | CRC HI |
|---------|----------|------------------|------------------|----------------|----------------|----------------|----------------|--------|--------|
|         |          | HI.              | LO.              | HI_H.          | HI_L.          | LO_H.          | LO_L.          |        |        |
| h02     | h06      | h00              | h01              | h00            | h00            | h00            | h03            | hDA    | h13    |

- Function Code ‘ 06 ‘ Request Frame . ( Set ting )

## 6.3 ‘ 16 ‘ : Write Multiple Register(0x10)

- Slave Device(ID : 2) Register 2 2 register ‘ 10 ‘ , ‘ 258 ‘ setting .

Request

| Address | Function | Starting Address HI. | Starting Address LO. | Quantity of Registers HI. | Quantity of Registers LO. | Byte Count |
|---------|----------|----------------------|----------------------|---------------------------|---------------------------|------------|
| h02     | h10      | h00                  | h01                  | h00                       | h02                       | h08        |

| Register Value | Register Value | Register Value | Register Value | Register Value | Register Value | Register Value | Register Value | CRC LO | CRC HI |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------|--------|
| HI_H.          | HI_L.          | LO_H.          | LO_L.          | HI_H.          | HI_L.          | LO_H.          | LO_L.          |        |        |
| h00            | h00            | h00            | h0A            | h00            | h00            | h01            | h02            | hF0    | hF7    |

## Response

| Address | Function | Starting Address HI. | Starting Address LO. | Quantity of Registers HI. | Quantity of Registers LO. | Error Check LO. | Error Check HI. |
|---------|----------|----------------------|----------------------|---------------------------|---------------------------|-----------------|-----------------|
| h02     | h10      | h00                  | h01                  | h00                       | h02                       | h10             | h3B             |

## 6.4 SP Function Code

## 6.4.1 JOG SP Function Code

| 메뉴명(변수명) | ID | F_C | Start_H | Start_L | Reg_H_h | Reg_H_l | Reg_L_h | Reg_L_l | CRC_H | CRC_L |
|----------|----|-----|---------|---------|---------|---------|---------|---------|-------|-------|
| JOG ON   | 02 | 46  | 08      | 98      | 00      | 00      | 00      | 01      | 07    | 42    |
| JOG OFF  | 02 | 46  | 08      | 99      | 00      | 00      | 00      | 02      | 7A    | 83    |
| 역회전 연속   | 02 | 46  | 08      | 9A      | 00      | 00      | 00      | 03      | FF    | 43    |
| 정회전 연속   | 02 | 46  | 08      | 9B      | 00      | 00      | 00      | 04      | 83    | 41    |
| 정지       | 02 | 46  | 08      | 9C      | 00      | 00      | 00      | 05      | F7    | 41    |
|          |    |     |         |         |         |         |         |         |       |       |
|          |    |     |         |         |         |         |         |         |       |       |

( data hex .)

⇒ Master JOG CMD Request Echo( CMD return )

## 6.4.2 Alarm SP Function Code

| 메뉴명(변수명)  | ID | F_C | Start_H | Start_L | Reg_H_h | Reg_H_l | Reg_L_h | Reg_L_l | CRC_H | CRC_L |
|-----------|----|-----|---------|---------|---------|---------|---------|---------|-------|-------|
| 현재 알람 요청  | 02 | 50  | 08      | 34      | 00      | 00      | 00      | 01      | E0    | 9B    |
| 현재 알람 지우기 | 02 | 49  | 08      | 35      | 00      | 00      | 00      | 02      | 15    | 9B    |
| 알람 이력 요청  | 02 | 50  | 08      | 36      | 00      | 00      | 00      | 03      | 18    | 9A    |
| 알람 이력 지우기 | 02 | 49  | 08      | 37      | 00      | 00      | 00      | 04      | EC    | 59    |

( data hex .)

⇒ / Request echo

⇒ / table

Response

| ID  | F_C | Byte count | ALARM 1   |           |           |           | CRC_L | CRC_H |
|-----|-----|------------|-----------|-----------|-----------|-----------|-------|-------|
|     |     |            | Reg_val_1 | Reg_val_2 | Reg_val_3 | Reg_val_4 |       |       |
| h02 | h50 | h04        | h00       | h00       | h00       | h01       | h04   | h90   |

Response

| ID  | F_C | Byte count | ALARM 1   |           |           |           | ALARM2<br>~ ALARM10 | CRC_L | CRC_H |
|-----|-----|------------|-----------|-----------|-----------|-----------|---------------------|-------|-------|
|     |     |            | Reg_val_1 | Reg_val_2 | Reg_val_3 | Reg_val_4 |                     |       |       |
| h02 | h50 | h28        | h00       | h00       | h00       | h03       | 4 byte x 9개         |       |       |

(Reg\_val\_4 )

| 알람 내용 | Reg_val_4 | 표준형             |
|-------|-----------|-----------------|
| AL-00 | h00       | NORMAL / E-STOP |
| AL-01 | h01       | OVER CURNT      |
| AL-02 | h02       | OVER VOLT       |
| AL-03 | h03       | OVER LOAD       |
| AL-04 | h04       | POWER FAIL      |
| AL-05 | h05       | LINE FAIL       |
| AL-06 | h06       | OVER SPEED      |
| AL-07 | h07       | FOLLOW ERR      |
| AL-08 | h08       | OUTPUT NC       |
| AL-09 | h09       | PPR ERROR       |
| AL-10 | h0A       | ABS DATA        |
| AL-11 | h0B       | ABS BATT        |
| AL-12 | h0C       | ABS MDER        |
| AL-13 | h0D       | ERASE FAIL      |
| AL-14 | h0E       | WRITE FAIL      |
| AL-15 | h0F       | PARA INIT       |

## 6.5 Data

- **Motor Parameter ( P1-02 ~ P1-06, P1-09 )** **Masking**  
 ( ‘ 1 ‘ ) .
- Parameter data , Parameter data  
 ‘ F ’ .  
 ) Parameter : P1-01 ~ P1-20, Parameter : P1-01 ~ P1-21 .  
 ⇒ Exception Error , P1-01 ~ P1-20 data  
 , P1-21( Parameter) ‘FFFFFFFF’ .
- Parameter Register Address data Exception Rule  
 Exception Code 가 .
- , 2 Start Address 가 Register .



## 7. Exception Response

### Exception Response

#### 7.1 Master Device Slave Device

- 1)
- 2) 가 Master , Slave  
⇒ (Master Device) Time-out
- 3) Master , data (parity, CRC, LRC )가 Slave  
⇒ (Master Device) Time-out
- 4) frame CMD , Slave  
Code 가  
⇒ Function code, Register Address Slave  
Exception Response . Exception Response  
Exception Code

#### 7.2 Exception Response

- 2 Field(Function Field + Exception Code Field)
- Function Field ( Code = Function Code + h80 )
  - ⇒ Modbus Protocol Function Code 128( h 80 )  
bit ‘ 00000001 ~ 01111111 ‘ , bit ‘ 0 ‘
  - ⇒ Exception Response bit ‘ 1 ‘ set 129 ( h81 )
  - ⇒ Exception Response Function Field data ‘ Function Code + h80 ‘
- Data Field
  - ⇒ Data , , Exception Response  
Exception Code

## 7.3

- Address Register .

## Request

| Address | Function | Starting Address HI. | Starting Address LO. | Quantity of Outputs HI. | Quantity of Outputs LO. | CRC LO | CRC HI |
|---------|----------|----------------------|----------------------|-------------------------|-------------------------|--------|--------|
| h02     | h01      | h04                  | hA1                  | h00                     | h01                     | hAD    | h2B    |

## Response

| Address | Function         | Exception Code | CRC LO | CRC HI |
|---------|------------------|----------------|--------|--------|
| h02     | h81 ( h01 + h80) | h02            | h31    | h91    |

## 7.4 Exception Code

| Code | Name                 | 내 용                                                                                                                                                                                    |
|------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| h01  | Illegal Function     | Slave에서 지원하지 않는 Function Code 요청시 발생.                                                                                                                                                  |
| h02  | Illegal Data Address | Slave에서 정의 되지 않은 Address의 register값 요청시 발생                                                                                                                                             |
| h03  | Illegal Data Value   | Slave의 정의된 register에 유효하지 않은 data를 저장하라는 요청시 발생.                                                                                                                                       |
| h04  | Slave Device Failure |                                                                                                                                                                                        |
| h05  | ACK                  | 지속적인 지령 요청( long CMD )에 대한 response는 시간이 오래 걸린다. 이 경우 Master측에서 timeout error로 인식할 수 있으므로, 응답을 준비중이라고 알리기 위한 Code임.<br>-> 정의된 long CMD의 개수는 없으므로, Master의 timeout error 기준 시간에 맞추어야 함. |
| h06  | Slave Device Busy    | 지속적인 요청 지령( long CMD )을 받고 그에 대한 응답을 수행하는 도중에 Master에서 재요청 cmd가 전송 될 경우 발생.                                                                                                            |
| h07  | NAK                  | 요청 Function Code "13","14"에 대해 수행 할 수 없는 경우 발생.                                                                                                                                        |
| h08  | Servo ON Notice      | Servo ON시 변경할 수 없는 파라메타의 값을 변경하고자 할 경우 발생.                                                                                                                                             |

## 8. I/O Status

- I/O ( : StE-17 ) .
- I/O Status Frame Data Field 4byte , 16bit
- Input , 16bit Output .
- 가 Register .

### 8.1

- Slave Device(ID : 2) I/O Status(Register Addr : 0x001A) .
- Request ( )

| Address | Function | Starting Address HI. | Starting Address LO. | No. of Registers HI. | No. of Registers LO. | CRC LO | CRC HI |
|---------|----------|----------------------|----------------------|----------------------|----------------------|--------|--------|
| h02     | h03      | h00                  | h1A                  | h00                  | h01                  | A5     | FE     |

### Response

| Address | Function | Byte Count | INPUT 정보                 |                          | OUTPUT 정보                |                          | CRC LO | CRC HI |
|---------|----------|------------|--------------------------|--------------------------|--------------------------|--------------------------|--------|--------|
|         |          |            | Register value HI_H(108) | Register value HI_L(108) | Register value LO_H(108) | Register value LO_L(108) |        |        |
| h02     | h03      | h04        | h02                      | h43                      | h00                      | H2B                      | 79     | 40     |

- ⇒ INPUT Data( 16bit) : 0x0243
- ⇒ OUTPUT Data( 16bit) : 0x002B

### 8.2

#### 8.2.1 16 bit ( Input )

| F          | E | D | C | B         | A          | 9     | 8    | 7     | 6      | 5    | 4   | 3    | 2    | 1    | 0      |
|------------|---|---|---|-----------|------------|-------|------|-------|--------|------|-----|------|------|------|--------|
| Don't care |   |   |   | ALARM/CLR | STOP/START | ESTOP | TLIM | CWLIM | CCWLIM | P/PI | DIR | SPD3 | SDP2 | SPD1 | SVONEN |

|            |   |   |   |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Don't care | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|

1 : ( GND24 )

0 :

| 신호명칭   | 표시상태 | 동작내용             |
|--------|------|------------------|
| ALMRST | 0    | 알람리셋 해제 기능 사용 안함 |
| STOP   | 0    | 모터 정지 사용 안함      |
| ESTOP  | 1    | 비상 정지 사용 안함      |
| TLIM   | 0    | 아날로그 토크 제한 사용 안함 |
| CWLIM  | 0    | CW 방향 회전 불가능     |
| CCWLIM | 1    | CCW 방향 회전 가능     |
| PI/P   | 0    | PI 제어로 동작함       |
| DIR    | 0    | 지령 방향 회전         |
| SPD3   | 0    | 내부 지령 속도 1 사용    |
| SPD2   | 0    |                  |
| SPD1   | 1    |                  |
| SVONEN | 1    | 서보 모터 구동 명령 중    |

### 8.2.2 16 bit ( Output )

|            |   |   |   |   |   |   |         |         |       |        |     |      |       |       |         |
|------------|---|---|---|---|---|---|---------|---------|-------|--------|-----|------|-------|-------|---------|
| F          | E | D | C | B | A | 9 | 8       | 7       | 6     | 5      | 4   | 3    | 2     | 1     | 0       |
| Don't care |   |   |   |   |   |   | A_CODE1 | A_CODE0 | ALARM | TRQOUT | RDY | ZSPD | INSPD | BRAKE | A_CODE2 |

|            |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|
| Don't care | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
|------------|---|---|---|---|---|---|---|---|---|

1 :

0 :

| 신호명칭        | 표시상태 | 동작내용                               |
|-------------|------|------------------------------------|
| A_CODE2     | 0    | No Alarm Code, 정상 상태 임             |
| A_CODE1     | 0    |                                    |
| A_CODE0     | 0    |                                    |
| ALARM       | 1    | No Alarm, 정상 상태 임                  |
| TRQOUT      | 0    | 토크 제한 중이 아님                        |
| RDY         | 1    | No Alarm, Power Good, 서보 Ready 상태임 |
| ZSPD        | 0    | 모터 정지 상태가 아님                       |
| INSPD/INPOS | 1    | 지령 속도 또는 지령 위치 도달 상태임              |
| BRK         | 1    | 모터 Brake 해제 신호 출력 상태임              |

## 9. OPR Register

- CN1 Register .
- I/O OPR CMD P01-17 '1' 가 .
- Frame 32bit , 16 bit Don't care .
- 16 bit bit Table .
- 가 Register .

### 9.1 I/O OPR CMD

#### 9.1.1

| F          | E | D | C | B             | A              | 9     | 8    | 7     | 6      | 5    | 4   | 3    | 2    | 1    | 0      |
|------------|---|---|---|---------------|----------------|-------|------|-------|--------|------|-----|------|------|------|--------|
| Don't care |   |   |   | ALARM/<br>CLR | STOP/<br>START | ESTOP | TLIM | CWLIM | CCWLIM | P/PI | DIR | SPD3 | SDP2 | SPD1 | SVONEN |

1 :

0 : ( GND24 )

#### 9.1.2 I/O OPR CMD

- I/O OPR CMD Register Address 42001(0x07D0) ,  
' CWLIM, CCWLIM, ESTOP, SPD1 : ON ' . ( Slave ID : 2 )

| F          | E | D | C | B             | A              | 9     | 8    | 7     | 6      | 5    | 4   | 3    | 2    | 1    | 0      |
|------------|---|---|---|---------------|----------------|-------|------|-------|--------|------|-----|------|------|------|--------|
| Don't care |   |   |   | ALARM<br>/CLR | STOP/<br>START | ESTOP | TLIM | CWLIM | CCWLIM | P/PI | DIR | SPD3 | SDP2 | SPD1 | SVONEN |
| Don't Care |   |   |   | 1             | 1              | 0     | 1    | 0     | 0      | 1    | 1   | 1    | 1    | 0    | 1      |

⇒ , I/O OPR CMD 0x0D3D 가 .

#### Request

| Address | Function | Starting<br>Address<br>HI. | Starting<br>Address<br>LO. | Register<br>Value<br>HI.H. | Register<br>Value<br>HI.L. | Register<br>Value<br>LO.H. | Register<br>Value<br>LO.L. | CRC Lo. | CRC Hi. |
|---------|----------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------|---------|
| h02     | h06      | h07                        | hD0                        | h00                        | h00                        | h0D                        | h3D                        | hA2     | hF6     |

Response : Request echo .

| Address | Function | Starting Address HI. | Starting Address LO. | Register Value HI_H. | Register Value HI_L. | Register Value LO_H. | Register Value LO_L. | CRC Lo. | CRC Hi. |
|---------|----------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------|---------|
| h02     | h06      | h07                  | hD0                  | h00                  | h00                  | h0D                  | h3D                  | hA2     | hF6     |

## 9.2 OPR CMD

- I/O OPR CMD CN1 .
- I/O CN1
- P1-17 'Serial I/O' '0' -> '1' .
- 가 .

## 10. FDA7000 Address Map

### 10.1

| Address |        | 메뉴 |        | Data Type | 메뉴명(변수명)        | 속성 | 초기치     | Min     | Max    | 단위    |
|---------|--------|----|--------|-----------|-----------------|----|---------|---------|--------|-------|
| 40011   | 0x000A |    | StE-01 | INT       | Display Select  | R  | 1203    | 100     | 1330   | —     |
| 40012   | 0x000B |    | StE-02 | Float     | Command Speed   | R  | 0.0     | −9999.9 | 9999.9 | rpm   |
| 40013   | 0x000C |    | StE-03 | Float     | Motor Speed     | R  | 0.0     | −9999.9 | 9999.9 | rpm   |
| 40014   | 0x000D |    | StE-04 | Float     | CCW Speed Limit | R  | 3000.0  | 0       | 9999.9 | rpm   |
| 40015   | 0x000E |    | StE-05 | Float     | CW Speed Limit  | R  | −3000.0 | −9999.9 | 0      | rpm   |
| 40016   | 0x000F |    | StE-06 | INT       | Command Pulse   | R  | 0       | −99999  | 99999  | pulse |
| 40017   | 0x0010 |    | StE-07 | INT       | Feedback Pulse  | R  | 0       | −99999  | 99999  | pulse |
| 40018   | 0x0011 |    | StE-08 | INT       | Error Pulse     | R  | 0       | −99999  | 99999  | pulse |
| 40019   | 0x0012 |    | StE-09 | Float     | Command Torque  | R  | 0.0     | −300    | 300    | %     |
| 40020   | 0x0013 |    | StE-10 | Float     | Load Rate       | R  | 0.0     | −300    | 300    | %     |
| 40021   | 0x0014 |    | StE-11 | Float     | Max Load Rate   | R  | 0.0     | −300    | 300    | %     |
| 40022   | 0x0015 |    | StE-12 | Float     | CCW TRQ LMT     | R  | 275.4   | 0       | 300    | %     |
| 40023   | 0x0016 |    | StE-13 | Float     | CW TRQ LMT      | R  | −275.4  | −300    | 0      | %     |
| 40024   | 0x0017 |    | StE-14 | Float     | Inertia Ratio   | R  | 2.0     | 0       | 50     | —     |
| 40025   | 0x0018 |    | StE-15 | INT       | MULTI Turns     | R  | 0       | 0       | 99999  | pulse |
| 40026   | 0x0019 |    | StE-16 | INT       | Single Turn     | R  | 0       | 0       | 131072 | pulse |
| 40027   | 0x001A |    | StE-17 | BIT       | I/O Status      | R  | —       | 0       | 99999  | —     |
| 40028   | 0x001B |    | StE-18 | Float     | PROG Version    | R  | 1.00    | 0       | 99.99  | —     |

|       |        |   |        |       |                  |     |        |       |        |                    |
|-------|--------|---|--------|-------|------------------|-----|--------|-------|--------|--------------------|
| 40101 | 0x0064 | * | P01-01 | INT   | Motor ID         | R/W | 21     | 0     | 99     | -                  |
| 40102 | 0x0065 |   | P01-02 | Float | Inertia          | -   | -      | 0.01  | 999.99 | gfc <sup>2</sup> m |
| 40103 | 0x0066 |   | P01-03 | Float | TRQ Constant     | -   | -      | 0.1   | 999.99 | kgfcm/A            |
| 40104 | 0x0067 |   | P01-04 | Float | Phase Inductance | -   | -      | 0.001 | 99.999 | mH                 |
| 40105 | 0x0068 |   | P01-05 | Float | Phase Resistance | -   | -      | 0.001 | 99.999 | Ω                  |
| 40106 | 0x0069 |   | P01-06 | Float | Rated Current    | -   | -      | 0.01  | 999.99 | A(rms)             |
| 40107 | 0x006A |   | P01-07 | Float | Rated Speed      | -   | 모터별    | 0     | 9999   | rpm                |
| 40108 | 0x006B |   | P01-08 | Float | MAX Speed        | -   | 모터별    | 0     | 9999   | rpm                |
| 40109 | 0x006C |   | P01-09 | Float | Rated TRQ        | -   | -      | 0     | 9999   | kgfcm              |
| 40110 | 0x006D |   | P01-10 | INT   | Pole Number      | -   | -      | 2     | 98     | pole               |
| 40111 | 0x006E | * | P01-11 | INT   | Drive ID         | R/W | 10     | 0     | 10     | -                  |
| 40112 | 0x006F | * | P01-12 | INT   | Encoder ID       | R/W | 1(A)   | 0     | 9      | -                  |
| 40113 | 0x0070 | * | P01-13 | INT   | Encoder Pulse    | R/W | 2000   | 1     | 32768  | ppr                |
| 40114 | 0x0071 |   | P01-14 | INT   | Pulse Out Rate   | R/W | 2000   | 1     | 131072 | pulse              |
| 40115 | 0x0072 | * | P01-15 | INT   | COM Baud Rate    | R/W | 0      | 0     | 3      | -                  |
| 40116 | 0x0073 | * | P01-16 | INT   | Serial Select    | R/W | 0      | 0     | 2      | -                  |
| 40117 | 0x0074 | * | P01-17 | INT   | Serial I/O       | R/W | 0      | 0     | 2      | -                  |
| 40118 | 0x0075 | * | P01-18 | INT   | Serial ID        | R/W | 1      | 0     | 31     | -                  |
| 40119 | 0x0076 |   | P01-19 | INT   | Parameter Lock   | R/W | 0(off) | 0     | 1      | -                  |
| 40120 | 0x0077 | * | P01-20 | INT   | Absolute Origin  | R/W | 0(off) | 0     | 1      | -                  |

|       |        |   |        |       |                  |     |         |       |        |     |
|-------|--------|---|--------|-------|------------------|-----|---------|-------|--------|-----|
| 40201 | 0x00C8 | * | P02-01 | INT   | Control Mode     | R/W | 1       | 0     | 5      | –   |
| 40202 | 0x00C9 |   | P02-02 | Float | Mode Change Time | R/W | 500.0   | 100   | 10000  | ms  |
| 40203 | 0x00CA |   | P02-03 | Float | CCW TRQ LMT      | R/W | 300.0   | 0     | 300    | %   |
| 40204 | 0x00CB |   | P02-04 | Float | CW TRQ LMT       | R/W | –300.0  | –300  | 0      | %   |
| 40205 | 0x00CC |   | P02-05 | Float | CCW Speed Limit  | R/W | 3000.0  | 0     | 6000   | rpm |
| 40206 | 0x00CD |   | P02-06 | Float | CW Speed Limit   | R/W | –3000.0 | –6000 | 0      | rpm |
| 40207 | 0x00CE |   | P02-07 | Float | Brake Speed      | R/W | 50.0    | 0     | 9999.9 | rpm |
| 40208 | 0x00CF |   | P02-08 | Float | Brake Time       | R/W | 50.0    | 0     | 10000  | ms  |
| 40209 | 0x00D0 |   | P02-09 | INT   | DB Mode          | R/W | 2       | 0     | 3      | –   |
| 40210 | 0x00D1 |   | P02-10 | INT   | Notch Filter1    | R/W | 0       | 0     | 2      | –   |
| 40211 | 0x00D2 |   | P02-11 | Float | NF Frequency1    | R/W | 300.0   | 50    | 2000   | Hz  |
| 40212 | 0x00D3 |   | P02-12 | Float | NF Bandwidth1    | R/W | 95.0    | 10    | 99.9   | %   |
| 40213 | 0x00D4 |   | P02-13 | INT   | Notch Filter2    | R/W | 0       | 0     | 1      | –   |
| 40214 | 0x00D5 |   | P02-14 | Float | NF Frequency2    | R/W | 500.0   | 50    | 2000   | Hz  |
| 40215 | 0x00D6 |   | P02-15 | Float | NF Bandwidth2    | R/W | 95.0    | 10    | 99.9   | %   |
| 40216 | 0x00D7 |   | P02-16 | Float | TRQ Filter TC    | R/W | 1.3     | 0     | 1000   | ms  |
| 40217 | 0x00D8 |   | P02-17 | INT   | Auto Tuning      | R/W | 0       | 0     | 1      | –   |
| 40218 | 0x00D9 |   | P02-18 | INT   | System Response  | R/W | 7       | 1     | 19     | –   |
| 40219 | 0x00DA |   | P02-19 | Float | Inertia Ratio    | R/W | 2.0     | 1     | 50     | –   |
| 40220 | 0x00DB |   | P02-20 | Float | Gain ADJ Speed1  | R/W | 800.0   | 100   | 5000   | rpm |
| 40221 | 0x00DC |   | P02-21 | Float | Gain ADJ Speed2  | R/W | 100.0   | 10    | 500    | rpm |
| 40222 | 0x00DD |   | P02-22 | Float | Gain ADJ TRQ1    | R/W | 150.0   | 50    | 300    | %   |
| 40223 | 0x00DE |   | P02-23 | Float | Gain ADJ TRQ2    | R/W | 50.0    | 0     | 300    | %   |
| 40224 | 0x00DF |   | P02-24 | Float | Contact Gain TC  | R/W | 100.0   | 0     | 10000  | ms  |
| 40225 | 0x00E0 |   | P02-25 | INT   | Temporary Stop   | R/W | 0(off)  | 0     | 1      | –   |
| 40226 | 0x00E1 |   | P02-26 | INT   | Emergency Stop   | R/W | 0(off)  | 0     | 1      | –   |
| 40227 | 0x00E2 |   | P02-27 | INT   | Direction Select | R/W | 0(off)  | 0     | 1      | –   |
| 40228 | 0x00E3 |   | P02-28 | INT   | Ripple COMPEN    | R/W | 0(off)  | 0     | 1      | –   |
| 40229 | 0x00E4 | * | P02-29 | INT   | Parameter INIT   | R/W | 0(off)  | 0     | 1      | –   |

|       |        |   |        |       |                 |     |       |   |        |     |
|-------|--------|---|--------|-------|-----------------|-----|-------|---|--------|-----|
| 40301 | 0x012C | * | P03-01 | INT   | Speed Gain Mode | R/W | 1     | 1 | 5      | –   |
| 40302 | 0x012D |   | P03-02 | Float | PI-IP Control % | R/W | 100.0 | 0 | 100    | %   |
| 40303 | 0x012E |   | P03-03 | Float | Friction COMPEN | R/W | 0.0   | 0 | 100    | %   |
| 40304 | 0x012F |   | P03-04 | Float | Load COMPEN     | R/W | 0.0   | 0 | 100    | %   |
| 40305 | 0x0130 |   | P03-05 | Float | SC Loop Gain1   | R/W | 30.0  | 0 | 1000   | Hz  |
| 40306 | 0x0131 |   | P03-06 | Float | SC TC1          | R/W | 30.0  | 0 | 10000  | ms  |
| 40307 | 0x0132 |   | P03-07 | Float | SC Loop Gain2   | R/W | 35.0  | 0 | 1000   | Hz  |
| 40308 | 0x0133 |   | P03-08 | Float | SC TC2          | R/W | 25.0  | 0 | 10000  | ms  |
| 40309 | 0x0134 |   | P03-09 | Float | Analog CMD TC   | R/W | 0.0   | 0 | 2000   | ms  |
| 40310 | 0x0135 |   | P03-10 | Float | ACCEL Time      | R/W | 0.0   | 0 | 90000  | ms  |
| 40311 | 0x0136 |   | P03-11 | Float | DECEL Time      | R/W | 0.0   | 0 | 90000  | ms  |
| 40312 | 0x0137 | * | P03-12 | Float | S-Mode TC       | R/W | 0.0   | 0 | 9000   | ms  |
| 40313 | 0x0138 |   | P03-13 | Float | In Speed Range  | R/W | 10.0  | 0 | 9999.9 | rpm |



|       |        |   |        |       |                   |     |         |         |        |     |
|-------|--------|---|--------|-------|-------------------|-----|---------|---------|--------|-----|
| 40314 | 0x0139 |   | P03-14 | Float | Zero Speed Range  | R/W | 10.0    | 0       | 9999.9 | rpm |
| 40315 | 0x013A | * | P03-15 | Float | Analog +10[V] RPM | R/W | 1500.0  | 0       | 9999.9 | rpm |
| 40316 | 0x013B | * | P03-16 | Float | Analog -10[V] RPM | R/W | -1500.0 | -9999.9 | 0      | rpm |
| 40317 | 0x013C |   | P03-17 | INT   | Auto Offset       | R/W | 0(off)  | 0       | 1      | -   |
| 40318 | 0x013D |   | P03-18 | Float | Manual Offset     | R/W | 0.0     | -1000   | 1000   | mV  |
| 40319 | 0x013E | * | P03-19 | INT   | Override ENB      | R/W | 0(off)  | 0       | 1      | -   |
| 40320 | 0x013F |   | P03-20 | INT   | Clamp Mode        | R/W | 0       | 0       | 2      | -   |
| 40321 | 0x0140 |   | P03-21 | Float | Clamp Voltage     | R/W | 0.0     | -1000   | 1000   | mV  |
| 40322 | 0x0141 | * | P03-22 | Float | F/Back TC         | R/W | 0.0     | 0       | 2000   | ms  |
| 40323 | 0x0142 |   | P03-23 | Float | Zero SPD VIB REJ  | R/W | 0.1     | 0       | 1000   | rpm |
| 40324 | 0x0143 | * | P03-24 | INT   | Feedforward TRQ   | R/W | 0       | 0       | 2      | -   |

|       |        |  |        |       |         |     |        |         |        |     |
|-------|--------|--|--------|-------|---------|-----|--------|---------|--------|-----|
| 40401 | 0x0190 |  | P04-01 | Float | Spd1    | R/W | 10.0   | -9999.9 | 9999.9 | rpm |
| 40402 | 0x0191 |  | P04-02 | Float | Speed2  | R/W | 100.0  | -9999.9 | 9999.9 | rpm |
| 40403 | 0x0192 |  | P04-03 | Float | Speed3  | R/W | 200.0  | -9999.9 | 9999.9 | rpm |
| 40404 | 0x0193 |  | P04-04 | Float | Speed4  | R/W | 500.0  | -9999.9 | 9999.9 | rpm |
| 40405 | 0x0194 |  | P04-05 | Float | Speed5  | R/W | 1000.0 | -9999.9 | 9999.9 | rpm |
| 40406 | 0x0195 |  | P04-06 | Float | Speed6  | R/W | 2000.0 | -9999.9 | 9999.9 | rpm |
| 40407 | 0x0196 |  | P04-07 | Float | Speed7  | R/W | 3000.0 | -9999.9 | 9999.9 | rpm |
| 40408 | 0x0197 |  | P04-08 | Float | Torque1 | R/W | 0.0    | -300    | 300    | %   |
| 40409 | 0x0198 |  | P04-09 | Float | Torque2 | R/W | 2.0    | -300    | 300    | %   |
| 40410 | 0x0199 |  | P04-10 | Float | Torque3 | R/W | 20.0   | -300    | 300    | %   |
| 40411 | 0x019A |  | P04-11 | Float | Torque4 | R/W | 50.0   | -300    | 300    | %   |
| 40412 | 0x019B |  | P04-12 | Float | Torque5 | R/W | 75.0   | -300    | 300    | %   |
| 40413 | 0x019C |  | P04-13 | Float | Torque6 | R/W | 100.0  | -300    | 300    | %   |
| 40414 | 0x019D |  | P04-14 | Float | Torque7 | R/W | 120.0  | -300    | 300    | %   |

|       |        |   |        |       |                 |     |        |   |       |       |
|-------|--------|---|--------|-------|-----------------|-----|--------|---|-------|-------|
| 40501 | 0x01F4 | * | P05-01 | INT   | POS Gain Mode   | R/W | 1      | 1 | 5     | -     |
| 40502 | 0x01F5 | * | P05-02 | INT   | POS Pulse Type  | R/W | 1      | 0 | 5     | -     |
| 40503 | 0x01F6 |   | P05-03 | INT   | Speed Mode      | R/W | 0(off) | 0 | 1     | -     |
| 40504 | 0x01F7 |   | P05-04 | Float | Feedforward     | R/W | 0.0    | 0 | 100   | %     |
| 40505 | 0x01F8 |   | P05-05 | Float | PC P Gain1      | R/W | 30.0   | 0 | 500   | Hz    |
| 40506 | 0x01F9 |   | P05-06 | Float | PC P Gain2      | R/W | 35.0   | 0 | 500   | Hz    |
| 40507 | 0x01FA |   | P05-07 | INT   | PI-P Pulse ERR  | R/W | 0      | 0 | 99999 | pulse |
| 40508 | 0x01FB |   | P05-08 | INT   | IN Position     | R/W | 100    | 0 | 99999 | pulse |
| 40509 | 0x01FC |   | P05-09 | INT   | Follow ERR      | R/W | 30000  | 0 | 99999 | pulse |
| 40510 | 0x01FD |   | P05-10 | Float | POS CMD TC      | R/W | 0.0    | 0 | 2000  | ms    |
| 40511 | 0x01FE |   | P05-11 | Float | FF TC           | R/W | 0.0    | 0 | 2000  | ms    |
| 40512 | 0x01FF | * | P05-12 | INT   | ELCTR Gear NUM1 | R/W | 1      | 1 | 99999 | -     |
| 40513 | 0x0200 | * | P05-13 | INT   | ELCTR Gear DEN1 | R/W | 1      | 1 | 99999 | -     |
| 40514 | 0x0201 | * | P05-14 | INT   | ELCTR Gear NUM2 | R/W | 1      | 1 | 99999 | -     |

|       |        |   |        |       |                 |     |     |       |       |       |
|-------|--------|---|--------|-------|-----------------|-----|-----|-------|-------|-------|
| 40515 | 0x0202 | * | P05-15 | INT   | ELCTR Gear DEN2 | R/W | 2   | 1     | 99999 | –     |
| 40516 | 0x0203 | * | P05-16 | INT   | ELCTR Gear NUM3 | R/W | 1   | 1     | 99999 | –     |
| 40517 | 0x0204 | * | P05-17 | INT   | ELCTR Gear DEN3 | R/W | 4   | 1     | 99999 | –     |
| 40518 | 0x0205 | * | P05-18 | INT   | ELCTR Gear NUM4 | R/W | 1   | 1     | 99999 | –     |
| 40519 | 0x0206 | * | P05-19 | INT   | ELCTR Gear DEN4 | R/W | 8   | 1     | 99999 | –     |
| 40520 | 0x0207 |   | P05-20 | Float | Bias SPD COMPEN | R/W | 0.0 | –1000 | 1000  | rpm   |
| 40521 | 0x0208 |   | P05-21 | INT   | Bias Pulse Band | R/W | 10  | 0     | 500   | pulse |
| 40522 | 0x0209 |   | P05-22 | INT   | Backlash Pulse  | R/W | 0   | 0     | 99999 | pulse |

|       |        |   |        |       |                |     |        |       |      |    |
|-------|--------|---|--------|-------|----------------|-----|--------|-------|------|----|
| 40601 | 0x0258 | * | P06-01 | Float | Analog TRQ TC  | R/W | 0.0    | 0     | 2000 | ms |
| 40602 | 0x0259 |   | P06-02 | Float | TRQ ACCEL Time | R/W | 0.0    | 0     | 9000 | ms |
| 40603 | 0x025A |   | P06-03 | Float | TRQ DECEL Time | R/W | 0.0    | 0     | 9000 | ms |
| 40604 | 0x025B | * | P06-04 | Float | TRQ S-Mode     | R/W | 0.0    | 0     | 2000 | ms |
| 40605 | 0x025C |   | P06-05 | Float | In TRQ Range   | R/W | 10.0   | 0     | 100  | %  |
| 40606 | 0x025D |   | P06-06 | Float | Stop TRQ Range | R/W | 10.0   | 0     | 100  | %  |
| 40607 | 0x025E |   | P06-07 | Float | 10[V] TRQ      | R/W | 100.0  | 0     | 300  | %  |
| 40608 | 0x025F |   | P06-08 | INT   | Auto Offset    | R/W | 0(off) | 0     | 1    | –  |
| 40609 | 0x0260 |   | P06-09 | Float | Manual Offset  | R/W | 0.0    | –1000 | 1000 | mV |

|       |        |   |        |     |        |     |    |   |    |   |
|-------|--------|---|--------|-----|--------|-----|----|---|----|---|
| 40701 | 0x02BC | * | P07-01 | INT | CN1-18 | R/W | 1  | 0 | 30 | – |
| 40702 | 0x02BD | * | P07-02 | INT | CN1-43 | R/W | 9  | 0 | 20 | – |
| 40703 | 0x02BE | * | P07-03 | INT | CN1-17 | R/W | 10 | 0 | 20 | – |
| 40704 | 0x02BF | * | P07-04 | INT | CN1-42 | R/W | 11 | 0 | 20 | – |
| 40705 | 0x02C0 | * | P07-05 | INT | CN1-16 | R/W | 3  | 0 | 20 | – |
| 40706 | 0x02C1 | * | P07-06 | INT | CN1-41 | R/W | 4  | 0 | 20 | – |
| 40707 | 0x02C2 | * | P07-07 | INT | CN1-15 | R/W | 13 | 0 | 20 | – |
| 40708 | 0x02C3 | * | P07-08 | INT | CN1-40 | R/W | 14 | 0 | 20 | – |
| 40709 | 0x02C4 | * | P07-09 | INT | CN1-14 | R/W | 12 | 0 | 20 | – |
| 40710 | 0x02C5 | * | P07-10 | INT | CN1-39 | R/W | 16 | 0 | 20 | – |
| 40711 | 0x02C6 | * | P07-11 | INT | CN1-13 | R/W | 15 | 0 | 20 | – |
| 40712 | 0x02C7 | * | P07-12 | INT | CN1-38 | R/W | 19 | 0 | 20 | – |

|       |        |   |        |     |        |     |    |   |    |   |
|-------|--------|---|--------|-----|--------|-----|----|---|----|---|
| 40801 | 0x0320 | * | P08-01 | INT | CN1-23 | R/W | 0  | 0 | 30 | – |
| 40802 | 0x0321 | * | P08-02 | INT | CN1-48 | R/W | 3  | 0 | 18 | – |
| 40803 | 0x0322 | * | P08-03 | INT | CN1-22 | R/W | 6  | 0 | 18 | – |
| 40804 | 0x0323 | * | P08-04 | INT | CN1-47 | R/W | 5  | 0 | 18 | – |
| 40805 | 0x0324 | * | P08-05 | INT | CN1-21 | R/W | 7  | 0 | 18 | – |
| 40806 | 0x0325 | * | P08-06 | INT | CN1-46 | R/W | 9  | 0 | 18 | – |
| 40807 | 0x0326 | * | P08-07 | INT | CN1-20 | R/W | 14 | 0 | 18 | – |
| 40808 | 0x0327 | * | P08-08 | INT | CN1-45 | R/W | 15 | 0 | 18 | – |
| 40809 | 0x0328 | * | P08-09 | INT | CN1-19 | R/W | 16 | 0 | 18 | – |
| 40810 | 0x0329 | * | P08-10 | INT | CN1-44 | R/W | 17 | 0 | 18 | – |

|       |        |  |        |       |                 |     |        |       |      |    |
|-------|--------|--|--------|-------|-----------------|-----|--------|-------|------|----|
| 40901 | 0x0384 |  | P09-01 | INT   | Monitor1        | R/W | 0      | 0     | 5    | –  |
| 40902 | 0x0385 |  | P09-02 | INT   | Monitor2        | R/W | 0(off) | 0     | 1    | –  |
| 40903 | 0x0386 |  | P09-03 | Float | Monitor ABS1    | R/W | 1.0    | 0.1   | 2000 | –  |
| 40904 | 0x0387 |  | P09-04 | Float | Monitor ABS2    | R/W | 0.0    | –1000 | 1000 | mV |
| 40905 | 0x0388 |  | P09-05 | INT   | Monitor Scale1  | R/W | 1      | 0     | 5    | –  |
| 40906 | 0x0389 |  | P09-06 | INT   | Monitor Scale2  | R/W | 0(off) | 0     | 1    | –  |
| 40907 | 0x038A |  | P09-07 | Float | Monitor Offset1 | R/W | 1.0    | 0.1   | 2000 | –  |
| 40908 | 0x038B |  | P09-08 | Float | Monitor Offset2 | R/W | 0.0    | –1000 | 1000 | mV |

|       |        |  |        |       |                |     |        |         |        |             |
|-------|--------|--|--------|-------|----------------|-----|--------|---------|--------|-------------|
| 41001 | 0x03E8 |  | P10-01 | INT   | Key Jog Mode   | R/W | 0(off) | 0       | 1      | –           |
| 41002 | 0x03E9 |  | P10-02 | Float | Key Jog Speed  | R/W | 100.0  | –9999.9 | 9999.9 | rpm         |
| 41003 | 0x03EA |  | P10-03 | INT   | Auto Jog Mode  | R/W | 0      | 0       | 2      | –           |
| 41004 | 0x03EB |  | P10-04 | Float | Jog Speed1     | R/W | 100.0  | –9999.9 | 9999.9 | rpm         |
| 41005 | 0x03EC |  | P10-05 | Float | Jog Time1/REV1 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41006 | 0x03ED |  | P10-06 | Float | Jog Speed2     | R/W | –100.0 | –9999.9 | 9999.9 | rpm         |
| 41007 | 0x03EE |  | P10-07 | Float | Jog Time2/REV2 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41008 | 0x03EF |  | P10-08 | Float | Jog Speed3     | R/W | 200.0  | –9999.9 | 9999.9 | rpm         |
| 41009 | 0x03F0 |  | P10-09 | Float | Jog Time3/REV3 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41010 | 0x03F1 |  | P10-10 | Float | Jog Speed4     | R/W | –200.0 | –9999.9 | 9999.9 | rpm         |
| 41011 | 0x03F2 |  | P10-11 | Float | Jog Time4/REV4 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41012 | 0x03F3 |  | P10-12 | Float | Jog Speed5     | R/W | 400.0  | –9999.9 | 9999.9 | rpm         |
| 41013 | 0x03F4 |  | P10-13 | Float | Jog Time5/REV5 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41014 | 0x03F5 |  | P10-14 | Float | Jog Speed6     | R/W | –400.0 | –9999.9 | 9999.9 | rpm         |
| 41015 | 0x03F6 |  | P10-15 | Float | Jog Time6/REV6 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41016 | 0x03F7 |  | P10-16 | Float | Jog Speed7     | R/W | 800.0  | –9999.9 | 9999.9 | rpm         |
| 41017 | 0x03F8 |  | P10-17 | Float | Jog Time7/REV7 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |
| 41018 | 0x03F9 |  | P10-18 | Float | Jog Speed8     | R/W | –800.0 | –9999.9 | 9999.9 | rpm         |
| 41019 | 0x03FA |  | P10-19 | Float | Jog Time8/REV8 | R/W | 1.0    | 0       | 5000   | [sec]/[rev] |

## ◆ Operating Address

| Address |        | 메뉴 | Data Type | 메뉴명(변수명)    | 속성 | 초기치    | Min | Max | 단위 |
|---------|--------|----|-----------|-------------|----|--------|-----|-----|----|
| 42001   | 0x07D0 | -  | -         | I/O DGT CMD | W  | 0x0d3f | -   | -   | -  |
| 42002   | 0x07D1 | -  | Float     | SPD DGT CMD | W  | 0      | -   | -   | -  |
| 42003   | 0x07D2 | -  | -         | POS DGT CMD | W  | 0      | -   | -   | -  |
| 42004   | 0x07D3 | -  | Float     | TRQ DGT CMD | W  | 0      | -   | -   | -  |

## ◆ Alarm Address

| Address |        | 메뉴 | Data Type | 메뉴명(변수명)            | 속성 | 초기치 | Min | Max | 단위 |
|---------|--------|----|-----------|---------------------|----|-----|-----|-----|----|
| 42101   | 0x0834 | -  | -         | Current Alarm       | R  | -   | -   | -   | -  |
| 42102   | 0x0835 | -  | -         | Alarm Reset         | W  | -   | -   | -   | -  |
| 42103   | 0x0836 | -  | -         | Alarm History       | R  | -   | -   | -   | -  |
| 42104   | 0x0837 | -  | -         | Alarm History Reset | W  | -   | -   | -   | -  |

## ◆ Jog Key Address

| Address |        | 메뉴 | Data Type | 메뉴명(변수명) | 속성 | 초기치 | Min | Max | 단위 |
|---------|--------|----|-----------|----------|----|-----|-----|-----|----|
| 42201   | 0x0898 | -  | -         | JOG ON   | W  | -   | -   | -   | -  |
| 42202   | 0x0899 | -  | -         | JOG OFF  | W  | -   | -   | -   | -  |
| 42203   | 0x089A | -  | -         | 역회전(CW)  | W  | -   | -   | -   | -  |
| 42204   | 0x089B | -  | -         | 정회전(CCW) | W  | -   | -   | -   | -  |
| 42205   | 0x089C | -  | -         | 정지(Stop) | W  | -   | -   | -   | -  |

## PARAMETER

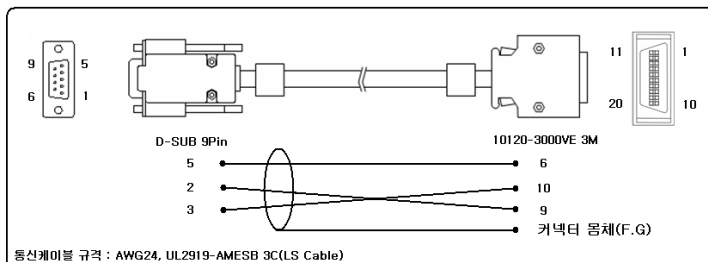
## FDA7000

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## 11. APPENDIX

### 11.1 Appendix A : Serial Communication Cable

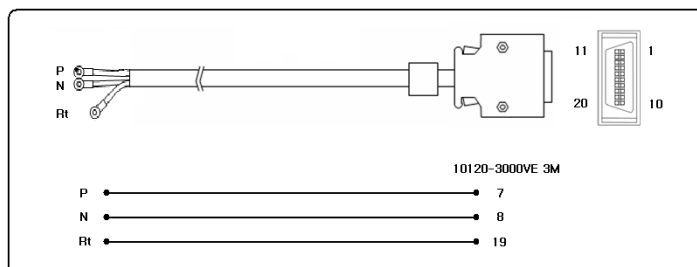
#### 11.1.1 RS232C Channel



[ PC Serial Port ]

[ Servo DRV \_CN3 CON. ]

#### 11.1.2 RS485 Channel



[ Upper System ]

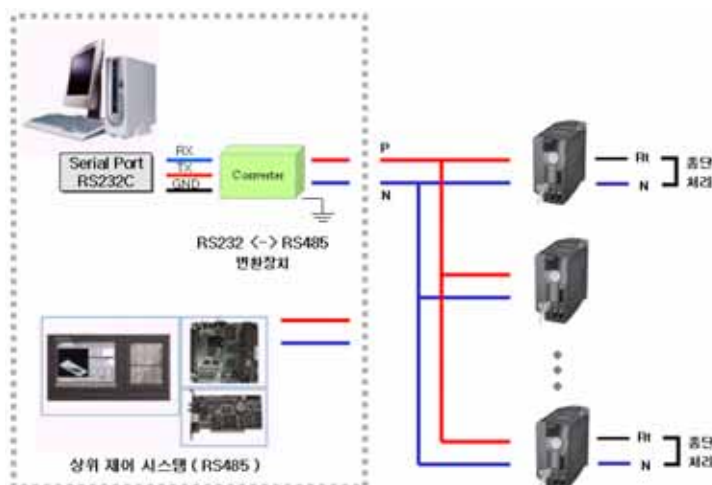
[ Servo DRV \_CN3 CON. ]

1) Rt P Short( )

2) (120 )

3) 가 Rt

- RS485 Network ( )



## 11.2 Appendix B : P- DORI Station

P-DORI STATION      Servo Driver      PC

P-DORI STATION      HIGEN

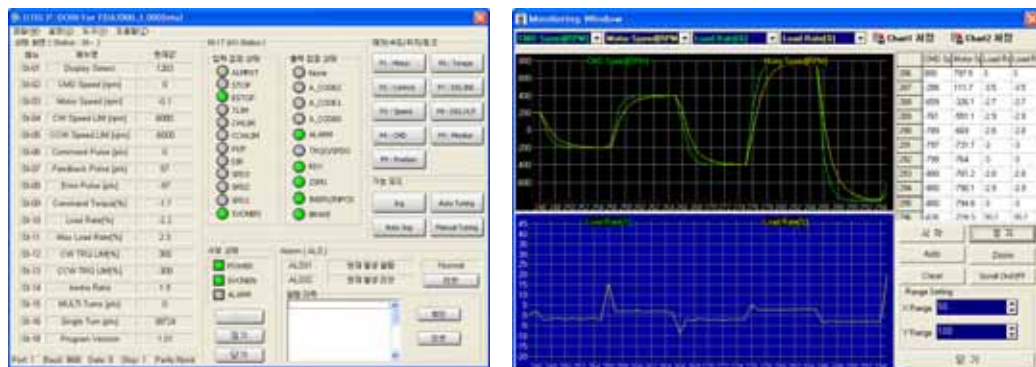
### 11.2.1

- FDA7000

### 11.2.2

- Parameter Read/Write.
- Status Monitoring.
- Auto-tuning Menu.
- Digital

< MAIN >



< >

< I/O >



### 11.2.3

- P-DORI STATION

P-DORI STATION MANUAL

- MEMO -