

## MEASURING DISTANCE TYPE OBSTACLE DETECTION SENSOR PBS SERIES

### COMMUNICATION PROTOCOL BETWEEN PBS AND PC

#### 1) Specifications of Communication.

Communication System	RS-232C
Baud Rate	57.6kbps
Parity	Non
Data Bit	7 bit
Stop bit	1
Flow control	Non

#### 2) Encoding

Since communication speed of PBS is higher than PB9, the higher baud rate is adopted for PBS and also message in data transmission is encoded by original method that is based on BASE64 and uuencode. The encoding procedure is as follows.

3 bytes in which a byte is equal to 8 bits are considered as a bit line of 24 bits. These 24 bits are divided by 6 bits to make data of 4 bytes. Each data is added by 20h and converted to ASCII code. In case binary data does not fill up 3 bytes at the end of the encoding, 0(s) is added to deficient part of the last data to make it complete with 6 bits. Padding is not made afterward unlike BASE64 and/or uuencode.

<Example>

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Original data line
01h, 23h, 45h, 67h, 89, abh, cdh, eff

binary number
00000001 00100011 01000101 01100111 10001001 10101011 11001101 11101111

bit line of 24 bits
000000010010001101000101 011001111000100110101011 1100110111101111

divided by 6 bits (2 bits of 0 are added to the last data of 4 bits)
000000 010010 001101 000101 011001 111000 100110 101011 110011 01 1110 111100

20h is added (converted to ASCII code)
00100000 001110010 00101101 00100101 00111001 01011000 01000110 01001011 01010011 0011110 01011100

encoded character line (padding is not made for the last part which is not filled up to 4 bytes)
r2-%9x fks>\j
    
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Take the above procedure in reverse order for decoding. Data of 3 bytes are taken from 4 characters. In case that 4 characters are not filled up at the last data, take data that is equivalent to number of byte included in the actual number of character (3 characters → 2 bytes, 2 characters → 1byte)

1/3

#### 3) Communication Format

STX (02h)	E n c o d e d message	ETE (03h)
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#### 4) Message (in data transmission)

Acquisition of Link Authentication Code  
(PC → PBS)

Link Command (A0h)	Acquisition (69h)	CRC (16 bits)
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(PBS → PC)

Link Command (A0h)	Acquisition (69h)	Generated Data of Authentication Code (8 bytes)	CRC (16 bits)
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CRC (16 bits) of Generated Data of Authentication Code becomes Link Authentication Code.

Link Authentication

(PC → PBS)

Link Command (A0h)	Setup (5ah)	Link Level (1byte)	Authentication Code (2 bytes)	CRC (16 bits)
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(PBS → PC)

Link Command (A0h)	Setup (5ah)	Link Level (1byte)	CRC (16bit)
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Link Level : 0 = Link disconnected. 1 = normal.

Distance Data Acquisition.

(PC → PBS)

Distance Data Command (A2h)	Acquisition (69h)	CRC (16 bits)
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(PBS → PC)

Distance Data Command (A2h)	Acquisition (69h)	Distance Data 1 (2 bytes)	...	Distance data 121 (2 bytes)	CRC (16bit)
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Unit of distance data = mm

Value corresponding to F000h or more = Error (no object). Error information is in lower byte.

Distance data of each 1 through 121 = Distance in a straight line at each angle.

**5) CRC**

Generation polynomial expression ( $X^{16}+X^{12}+X^5+1$ ) of CRC-CCITT is used to generate CRC code and it is processed as LSB first.

**6) Communication Procedure**

Transmit command for Acquisition of Link Authentication Code and then receive Generated Data of Authentication Code. Then, obtain CRC value of 16 bits that is corresponding to the aforesaid Generated Data of Authentication Code of 8 bytes and make it as a Link Authentication Code.

Transmit Link Authentication Command after setting 1 (normal level) to [Link Level] and the value obtained by the above procedure to [Authentication Code]. Link is established when the Link Level of the received Link Authentication Command is 1 (normal level). Repeat transmission of Link Authentication Command with the same Authentication Code at a certain interval in order to maintain the link establishment. PBS automatically

disconnects the link when 3 seconds have passed since it received the latest Link Authentication Command. In case of the link disconnection, begin all over from the procedure of Acquisition of Link Authentication again to regain the link establishment.

When Distance Data Acquisition Command is transmitted at the status of link establishment, the distance data scanned just before the transmission can be received from PBS. Nothing is received from PBS even if Distance Data Acquisition Command is transmitted at the status of link not yet established. Single distance data is received from PBS even if Distance Data Acquisition Command is transmitted 2 or more times during the time of one scanning. Unit of the distance data is mm (millimeter). Value of F00h or more is an error and the error information is stored in the lower byte. The distance data #1 through #121 shows distance in a straight line at each angle. Angle at just right side of PBS looking down from right above is regarded as 0 (zero) degree and the angle increases counterclockwise. The data called as Distance Data #1 is the one obtained at minus 18 degree of angle. The distance data number increases at every 1.8 degree and the last Distance Data #121 is at 198 degree.

Note:

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