INSIZE
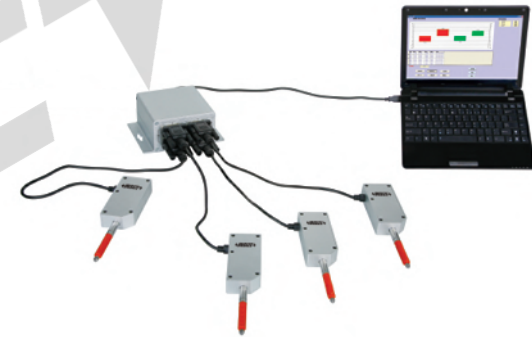
www. insize. com

**7107
MULTI LINEAR
GAGE SYSTEM
OPERATION MANUAL**

INSIZE

Appendix: CRC algorithm

unsigned short CRC(unsigned char frame[], int n)
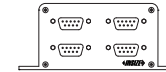//Array frame is the object of CRC need to verify, n is the number of bytes need to verify

```
{
     int  i, j;
     unsigned short crc, flag;
     crc=0xffff;
     for(I =0;i<n;i++)
     {
         crc^=frame[i];
         for(j=0;  j<8;  j++)
         {
             flag=crc&0x0001;
             crc>>=1;
             if(flag)
             {
                 crc&=0x7fff;
                 crc^=0xa001;
             }
         }
     }
     return(crc);
}
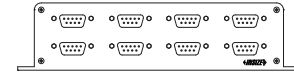```

Note: About the transmission of MODBUS CRC check code, low order first then high order.

## Introduction

◆ Multi channel interface box
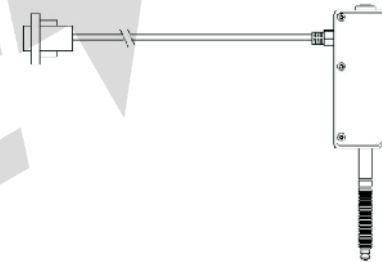
    4-channel interface box      8-channel interface box
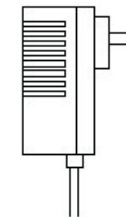    (Code 7107-1)             (Code 7107-2)
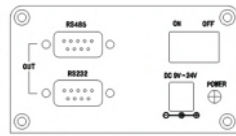
◆ Linear gage
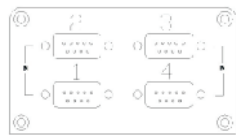   Plug-Type(Code 7107-11/12)

◆ Cable
   RS232 data port

◆ Power
   12V voltage power for multi channel interface box

◆ Plate



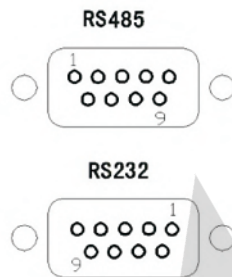front plate



back plate

1. Power in and data output is on front plate, and two kinds data port RS232 and RS485 shows below:

**RS485**



**RS232**



| RS232 data port | | RS485 data port | |
|---|---|---|---|
| Code | Function | Code | Function |
| 2 | RXD | 2 | A(+) |
| 3 | TXD | 3 | B(-) |
| 5 | GND(ground) | 5 | GND(ground) |

2. Linear gage connecting port is on the back plate.

| Host command 80 06 02 02 00 01 F6 63 | | Multi channel interface box response 80 06 02 02 00 01 F6 63 | |
|---|---|---|---|
| Address code | 80H | Address code | 80H |
| Function code | 06H | Function code | 06H |
| The first address access register | 02H | The first address access register | 02H |
| | 02H | | 02H |
| Parity mode after modification | 00H | Parity mode after modification | 00H |
| | 01H | | 01H |
| CRC(low 8 order) | F6H | CRC(low 8 order) | F6H |
| CRC(high 8 order) | 63H | CRC(high 8 order) | 63H |

Note 1: Parity mode setting

0000H no parity, 2 bits stop bits
0001H odd parity, 1 bit stop bit
0002H even parity, 1 bit stop bit(factory default)

Note 2: In above example, the parity mode is odd parity.

Note 1: Address range setting of multi channel interface box
     0001H00FEH (1254)     Factory default is 0080H(128)

Note 2:  In above example, address is modified from 80H to 01H.

2.3 Modify baud rate
     (Before modify baud rate, remember to send key command first.)

| Host command 80 06 02 01 00 01 06 63 | | Multi channel interface box response 80 06 02 01 00 01 06 63 | |
|---|---|---|---|
| Address code | 80H | Address code | 80H |
| Function code | 06H | Function code | 06H |
| The first address access register | 02H | The first address access register | 02H |
| | 01H | | 01H |
| Baud rate after modification | 00H | Baud rate after modification | 00H |
| | 01H | | 01H |
| CRC(low 8 order) | 06H | CRC(low 8 order) | 06H |
| CRC(high 8 order) | 63H | CRC(high 8 order) | 63H |

Note 1: Baud rate mode setting
     0000H baud rate is 9600   0001H baud rate is 19200
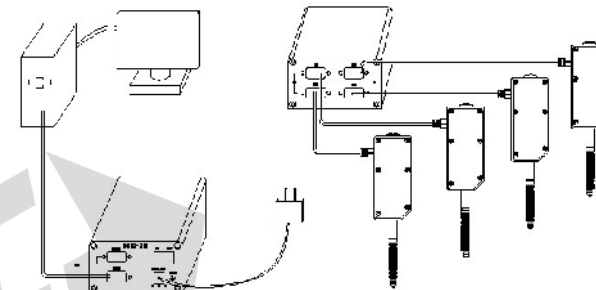     0002H baud rate is 38400(factory default)

Note 2: In above example, set the baud rate 19200.

2.4 Modify parity mode
     (Before modify parity mode, remember to send key command first.)

---

## Operation of multi channel interface box

◆ Connect the mulit channel interface box to PC or IPC



1. Connect to a standard data port PC with RS232 cable. And connect to an unusual data port PC with RS232 and USB cable, so the multi channel interface box can connect to USB port, then the computer can install the driver of the cable.
2. Data output refers to manual operation of output protocol

◆ Linear gage connect to PLC(programable logic controller)

The connecting type of linear gage to computer is the same with PLC to computer, connect the RS232 or RS485 port of the interface box to the port of PLC, and this protocol is standard MODBUS protocol, PLC can custom protocol to collect data of linear gages via serial communications. If PLC is equipped with MODBUS mode, communication is easier, and there is an example about PLC communication mode in appendix of  this manual operation.

## MODBUS output protocol of multi channel interface box

1. Data frame format: RTU mode
   Baud rate: 38400
   Data frames: 1start bit, 8pcs data bits, 2pcs stop bits
   Note: Can send commands to modify baud rate and parity parameter of stop bits, and also can modify address of multi channel interface box
2. Read data of multi channel interface box
   2.1  Read data of 4-channel interface box

## Host command / Multi channel interface box response

| Host command 80 03 00 00 00 08 A4 1B | | Multi channel interface box response 80 03 10 01 00 12 35 00 00 13 A6 01 00 14 16 00 00 14 B8 C8 58 | | | |
|---|---|---|---|---|---|
| Address code | 80H | Address code | 80H | | |
| Function code | 03H | Function code | 03H | | |
| The first address access register | 00H | Data bytes | 10H | | |
| | 00H | Data 1 higher 8 bits | 01H | Data of linear gage 1 | Flat bit |
| Data bytes | 00H | Data 1 higher 8 bits | 00H | | |
| | 08H | Data 2 higher 8 bits | 12H | | Data (hexadecimal) |
| CRC(low 8 order) | A4H | Data 2 higher 8 bits | 35H | | |
| CRC(high 8 order) | 1BH | Data 3 higher 8 bits | 00H | Data of linear gage 2 | Flat bit |
| | | Data 3 higher 8 bits | 00H | | |
| | | Data 4 higher 8 bits | 13H | | Data (hexadecimal) |
| | | Data 4 higher 8 bits | A6H | | |
| | | Data 5 higher 8 bits | 01H | Data of linear gage 3 | Flat bit |
| | | Data 5 higher 8 bits | 00H | | |
| | | Data 6 higher 8 bits | 14H | | Data (hexadecimal) |
| | | Data 6 higher 8 bits | 16H | | |
| | | Data 7 higher 8 bits | 00H | Data of linear gage 4 | Flat bit |
| | | Data 7 higher 8 bits | 00H | | |
| | | Data 8 higher 8 bits | 14H | | Data (hexadecimal) |
| | | Data 8 higher 8 bits | B8H | | |
| | | CRC(low 8 order) | C8H | | |
| | | CRC(high 8 order) | 58H | | |

## 2 Internal parameter setting

### 2.1 Parameter key setting

(Before modify internal parameter, remember to send key command first then execute the modification command.

| Key command 80 06 08 06 AB 56 B4 8A | | Multi channel interface box response 80 06 08 06 AB 56 B4 8A | |
|---|---|---|---|
| Address code | 80H | Address code | 80H |
| Function code | 06H | Function code | 06H |
| The first address access register | 08H | The first address access register | 08H |
| | 06H | | 06H |
| Address of multi channel box after modification | ABH | Address of multi channel box after modification | ABH |
| | 56H | | 56H |
| CRC(low 8 order) | B4H | CRC(low 8 order) | B4H |
| CRC(high 8 order) | 8AH | CRC(high 8 order) | 8AH |

### 2.2 Setting address of multi channel interface box(Before modify address parameter, remember to send key command first)

| Host inquiry command 80 06 02 00 00 01 A3 57 | | Multi channel interface box response 80 06 02 00 00 01 A3 57 | |
|---|---|---|---|
| Address code | 80H | Address code | 80H |
| Function code | 06H | Function code | 06H |
| The first address access register | 02H | The first address access register | 02H |
| | 00H | | 00H |
| Address of multi channel box after modification | 00H | Address of multi channel box after modification | 00H |
| | 01H | | 01H |
| CRC(low 8 order) | A3H | CRC(low 8 order) | A3H |
| CRC(high 8 order) | 57H | CRC(high 8 order) | 57H |

| Inquiry command 80 03 02 00 00 04 5B A0 | | Multi channel interface box response 80 03 08 00 80 00 02 00 02 00 00 61 21 | | |
|---|---|---|---|---|
| Address code | 80H | Address code | 80H | |
| Function code | 03H | Function code | 03H | |
| The first address access register | 02H | Data byte length | 08H | |
| | 00H | Data 1 higher 8 bits | 00H | Address of multi channel interface box ---note 1 |
| Data byte length | 00H | Data 1 higher 8 bits | 80H | |
| | 04H | Data 2 higher 8 bits | 00H | Baud rate ---note 2 |
| CRC(low 8 order) | 5BH | Data 2 higher 8 bits | 02H | |
| CRC(high 8 order) | A0H | Data 3 higher 8 bits | 00H | Parity mode ---note 3 |
| | | Data 3 higher 8 bits | 02H | |
| | | Data 4 higher 8 bits | 00H | — |
| | | Data 4 higher 8 bits | 00H | |
| | | CRC(low 8 order) | 61H | |
| | | CRC(high 8 order) | 21H | |

Note 1: Address setting range of multi channel interface box
　0001H00FEH (1254)　factory default is 0080H(128)

Note 2: Baud rate setting
　0000H baud rate is 9600
　0001H baud rate is 19200
　0002H baud rate is 38400(factory default)

Note 3: Parity mode setting
　0000H no parity, 2 bits stop bits
　0001H odd parity, 1 bit stop bit
　0002H even parity, 1 bit stop bit(factory default)

Note:

1) It is a sample about 4-channel interface box with control unit above. The control unit send 8 data bytes inquiry command, and the multi channel interface box response 21 bytes, higher bit is first, and the yellow part are measuring data of 4 pcs linear gages.

2) Each measuring data includes 4 data bytes, the first byte is sign bit which stands for plus-minus, and the third and fourth bytes are measuring data of hexadecimal.

3) In above example, the four measuring data can convert to decimal:

Linear gage 1:　4661　　　Linear gage 2:　5030

Linear gage 3:　5142　　　Linear gage 4:　5304

For the resolution is 1μm, sign bit 01H of linear gage 1 and linear gage 2 means minus, so the actual shift length as below:

Linear gage 1: -4.661mm　Linear gage 2:　5.030mm

Linear gage 3: -5.142mm　Linear gage 4:　5.304mm

4) The factory initial code of address code is 80H(128 decimal), and address code can be modified according to command, after modification, the address code in command would be changed accordingly.

5) Native CRC is adopted as the 16 bits CRC test code, and the polynomial is $X^{16}+X^{15}+X^2+1$, and the detail example refers to appendix.

2.2 Read data of 8-channel interface box

| Host command 80 03 00 00 00 10 5A 17 | | Multi channel interface box response 80 03 20 01 00 12 35 00 00 13 A6 01 00 14 16 00 00 14 B8 01 00 12 35 00 00 13 A6 01 00 14 16 00 00 14 B8 77 87 | | |
|---|---|---|---|---|
| Address code | 80H | Address code | 80H | |
| Function code | 03H | Function code | 03H | |
| The first address access register | 00H | Data bytes | 20H | |
| | 00H | Data bit 1 to 2 | 01001235H | Data of linear gage 1 |
| Data byte length | 00H | Data bit 3 to 4 | 000013A6H | Data of linear gage 2 |
| | 08H | Data bit 5 to 6 | 01001416H | Data of linear gage 3 |
| CRC(low 8 order) | 5AH | Data bit 7 to 8 | 000014B8H | Data of linear gage 4 |
| CRC(high 8 order) | 17H | Data bit 9 to 10 | 01001235H | Data of linear gage 5 |
| | | Data bit 11 to 12 | 000013A6H | Data of linear gage 6 |
| | | Data bit 13 to 14 | 01001416H | Data of linear gage 7 |
| | | Data bit 15 to 16 | 000014B8H | Data of linear gage 8 |
| | | CRC(low 8 order) | 77H | |
| | | CRC(high 8 order) | 87H | |

Note:

1) The way of reading data from 8-channel and 4-channel is almost the same, the only different is the reading length is different.

2) Please refer to the introduction of 4-channel to process data.

3) For above, 8 measuring data can convert to decimal:
   Linear gage 1: -4.661mm    Linear gage 2: 5.030mm
   Linear gage 3: -5.142mm    Linear gage 4:5.304mm
   Linear gage 5: -4.661mm    Linear gage 6:5.030mm
   Linear gage 7: -5.142mm    Linear gage 8:5.304mm

4) Native CRC is adopted as the 16 bits CRC test code, and the polynomial is $X^{16}+X^{15}+X^2+1$, and the detail example refers to appendix.

## Reset of multi channel interface box

| Host command 80 06 08 00 AB 56 6A B5 | | Multi channel interface box response 80 06 08 00 AB 56 6A B5 | |
|---|---|---|---|
| Address code | 80H | Address code | 80H |
| Function code | 06H | Function code | 06H |
| The first address access register | 08H | The first address access register | 08H |
| | 00H | | 00H |
| Reset command | ABH | Reset command | ABH |
| | 56H | | 56H |
| CRC(low 8 order) | 6AH | CRC(low 8 order) | 6AH |
| CRC(high 8 order) | B5H | CRC(high 8 order) | B5H |

1) This command can set zero of all four-channel linear gages.

2) The factory initial code of address code is 80H, and address code can be modified according to command, after modification, the address code in command would be changed accordingly.

3) Native CRC is adopted as the 16 bits CRC test code, and the polynomial is $X^{16}+X^{15}+X^2+1$, and the detail example refers to appendix.

## Operation of internal parameter

1. Read internal parameter