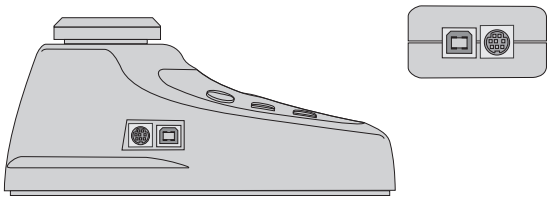
# Data Interface & Transfer Protocol

## 1 Data Interface

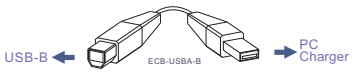


### USB-B Female Socket: USB 2.0

Used for connecting to PC or other USB host equipments.

| Pin | Description |
|---|---|
| 1 | VBUS,Recharge V+ |
| 2 | D+ |
| 3 | D- |
| 4 | GND,Recharge GND |

The connecting cable: USB-B to USB-A male plug.



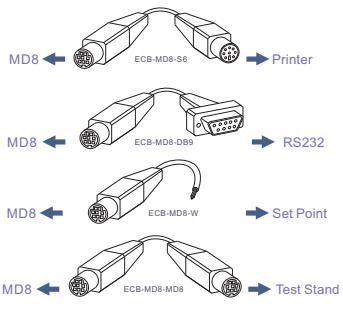

### MD8 Socket: RS232 and setpoint output

Used for connecting to printer or connecting to RS232 equipment and setpoint output(alarm signals)


| Pin | Description |
|---|---|
| 1 | RS232 Transmit(TX) |
| 2 | RS232 Receive(RX) |
| 3 | RS232 Ground |
| 4 | Output A+ |
| 5 | Reserved |
| 6 | Output COM- |
| 7 | Output B+ |
| 8 | Reserved |

The connecting cable:

MD8 male plug to S6 male plug (to printer)
or MD8 male plug to DB9 male plug( RS232)
or MD8 male plug cable (to get setpoint signal)

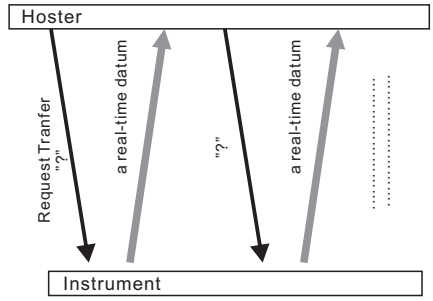



## 2 USB Interface

After installation of a data acquisition software, the realtime data or the records in memory of instrument can be uploaded.The upload of records in memory must be through USB port.

### 2.1 Real-time Data

The real-time data transfer process is initiated by the PC.
The PC sends transfer instruction to instrument, the instrument sends a current measured value and related information.




Transfer Instruction ?(0x3f)

The instrument received ? instruction, send the current measured value and relative informations to hoster.
Data Format

All in ASCII

| Define | Direction | Measured Value | Space | Units | End Sign |
|---|---|---|---|---|---|
| Length | 1 byte or no | 1~6 byte | 1 byte | 1~6 byte | 1 byte |
| | "-"(0x2d) "+" none | in ASCII | 0x20 | in ASCII | "CR"(0x0d) |

① The byte length of the data is a minimum of 4 bytes and a maximum of 15 bytes..
② Direction: If it is "-" ,expressed as 0x0d. If it is "+", there is no this byte.
③ Measured Value: Numbers in ASCII, including decimal points(if there is).
④ Units: The unit characters in ASCII code.

| Units | HEX |
|---|---|
| N | 0x4e |
| kN | 0x6b, 0x4e |
| mN | 0x6d, 0x4e |
| kgf | 0x6b, 0x67, 0x66 |
| gf | 0x67, 0x66 |
| tf | 0x74, 0x66 |
| lbf | 0x6c, 0x62, 0x66 |
| klbf | 0x6b, 0x6c, 0x62, 0x66 |
| ozf | 0x6f, 0x7a, 0x66 |
| N.m | 0x4e, 0x2e, 0x6d |
| N.cm | 0x4e, 0x2e, 0x63, 0x6d |
| kgf.m | 0x6b, 0x67, 0x66, 0x2e, 0x6d |
| kgf.cm | 0x6b, 0x67, 0x66, 0x2e, 0x63, 0x6d |
| lbf.ft | 0x6c, 0x62, 0x66, 0x2e, 0x66, 0x74 |
| lbf.in | 0x6c, 0x62, 0x66, 0x2e, 0x69, 0x6e |
| MPa | 0x4d, 0x50, 0x61 |

⑤ The example:

force (pull) 0 N — 0x30, 0x20, 0x4e,0x0d
"0" space "N" CR

torque(CCW) 123.45kgf.cm
— 0x2d, 0x31, 0x32, 0x33, 0x2e, 0x34, 0x35, 0x20,
"-" 123.45 space
0x6b, 0x67, 0x66, 0x2e, 0x63, 0x6d, 0x0d
kgf.cm CR

## 2.2 Records in Memory of Instrument

Records in the instrument memory can only be uploaded via USB.

1 The content of records upoaded in memory

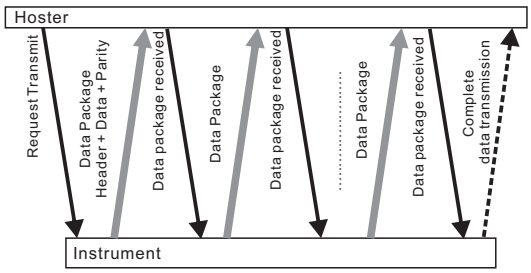
| No. | Value | Unit | Mode | Direction | Group |
|---|---|---|---|---|---|
| 1 | xxxx | xxx | xxx | xxx | xxx |
| 2 | xxxx | xxx | xxx | xxx | xxx |
| 3 | xxxx | xxx | xxx | xxx | xxx |
| 4 | xxxx | xxx | xxx | xxx | xxx |
| 5 | xxxx | xxx | xxx | xxx | xxx |
| … | … | … | … | … | … |
| n | xxxx | xxx | xxx | xxx | xxx |

2 Instructions about transmit

Request Transmit
8 bytes:
0xfc,0x33,0x00,0x08,0x3f,0x3f,0xc0,0x1a

Data package received
8 bytes:
0xfc,0x33,0x00,0x08,0x2b,0x2b,0xcf,0x15

Complete data transmission
9 bytes:
0Xfc,0x33,0x00,0x09,0x55,0x2b,0x2b,0x74,0xaf




3 Data packages

| | | |
|---|---|---|
| Header | | 5 bytes |
| Data Group❶ | D1 | 7 bytes |
| | D2 | |
| | D3 | |
| | D4 | |
| | D5 | |
| Parity | | 2 bytes |

Header Format

| Bytes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Define | 0xfc | 0x33 | H<br>Length(byte)❷ | L | 0xaa |

Data Format

| Bytes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Define | H<br>Significant digits | L | Decimal Position❸ | Units Code❹ | Measuring Mode❺ | Directions❻ | Work Group |

Parity Format

| Bytes | 1 | 2 |
|---|---|---|
| Define | H | L |
| | CRC | |

❶ A datapackagecan contain no more than 5 records

❷ The data length is the byte length of this data package, include with header, records and CRC.

❸ Decimal Position: Counts from right to the left in significant digits.

❹ Units Code:

| Code | | Units |
|---|---|---|
| DEC | HEX | |
| 1 | 0x01 | N |
| 2 | 0x02 | kN |
| 3 | 0x03 | mN |
| 4 | 0x04 | kgf |
| 5 | 0x05 | gf |
| 6 | 0x06 | tf |
| 7 | 0x07 | lbf |
| 8 | 0x08 | klbf |
| 9 | 0x09 | ozf |
| 32 | 0x20 | N.m |
| 33 | 0x21 | N.cm |
| 34 | 0x22 | kgf.m |
| 35 | 0x23 | kgf.cm |
| 36 | 0x24 | lbf.ft |
| 37 | 0x25 | lbf.in |
| 112 | 0x70 | MPa |

❺ Mode Code:

| Code | | Measuring Mode |
|---|---|---|
| DEC | HEX | |
| 0 | 0x00 | Track |
| 1 | 0x01 | Peak |
| 2 | 0x02 | Preset |
| 3 | 0x03 | First Peak |
| 4 | 0x04 | Auto Peak |
| 5 | 0x05 | Auto First Peak |
| 6 | 0x06 | Double Peak |

❻ Directions

| Code | | Measuring Mode |
|---|---|---|
| DEC | HEX | |
| 0 | 0x00 | +/Pull/CW |
| 1 | 0x01 | - /Push/CCW |

## 3 RS232

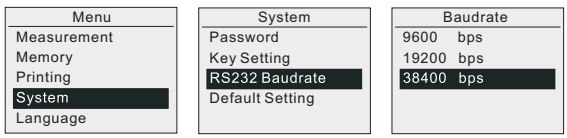
RS232 port is used in connecting to a printer or the other equipement(such as PLC).
On the insreument side, the connector is MD8 female socket,can be connected to a variety of cable.

### 3.1 RS232 Specifications

| | |
|---|---|
| Word Length | 8 bits |
| Stop Bit | 1 bit |
| Parity | None |
| Baudrate | Settable |
| Hardware Flow Control | None |

### 3.2 Baudrate Setting

In order for RS232 communication to proceed normally, both parties must have the same baud rate.
The baud rate is usually required to be set in the setup menu.
(See the relevant instructions)




### 3.3 Protocol

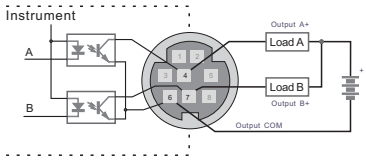
RS232 protocol is same as the one in USB real-time data transmission exactly.
(See 2.1 **Real-time Data**)

## 4 Setpoint Signal Port

The setpoint signal port is in MD8 port, it include two switches. It is used to out put the overload alarm signal or over tolerance limit alarm signals.


Pin 4 Output A: Overload, exceed upper limit;
Pin 6 Output Com.
Pin 7 Output B: Below lower limit.

Through this port, connect an external indication or actuating device to protect the instrument from damage due to overload.
It can also be used as a filter check indication after setting the tolerance.




This port is optically isolated from the inside of the instrument and external interference does not easily affect the operation of the instrument.
But the port itself is not very complete protection, so when connecting external devices should strictly abide by some restrictions, so as not to damage the port.

**! Maximum permissible voltage**

pin 7 to pin 6, pin 4 to pin 6: 35V;
pin 6 to pin 7, pin 6 to pin 4: 6V.

Port output status