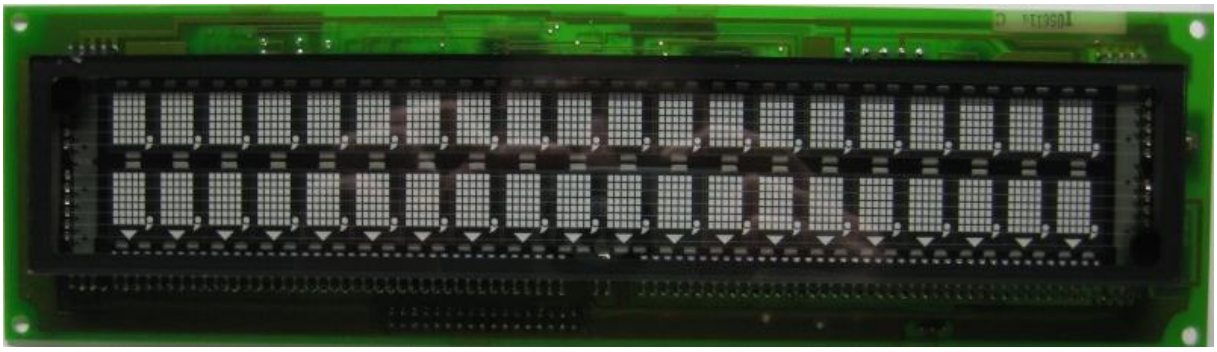
Futaba **M202MD01BA**



## Disclaimer

This documentation based on try & error and should never be treated as official documentation. There is no guarantee that information listed in this document is complete and there is no warranty about correctness of the information. The documentation is distributed as it is, no warranty implied or otherwise is given. The author is not liable for any loss or damage of data or hardware and other things caused by use of this documentation.

If there are any errors or more commands/information for this display, feel free to inform me and I will update this documentation. Please note that this documentation can be used for free but is **not** released as public domain.

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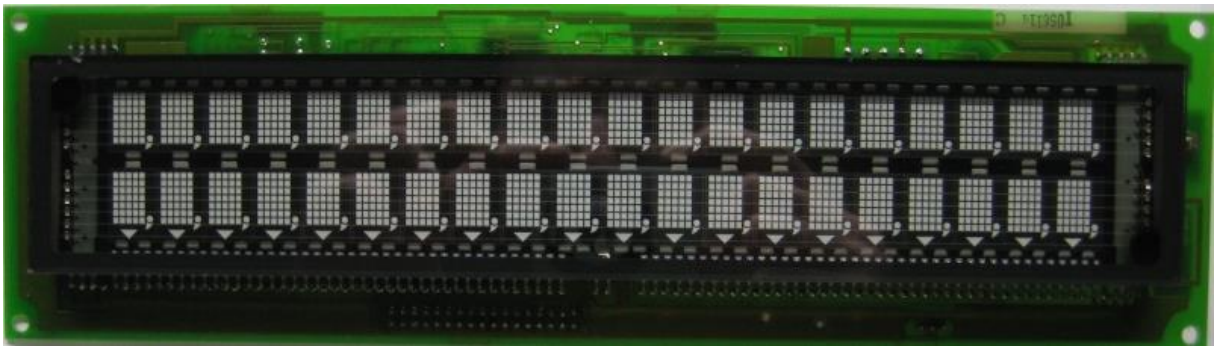
## Pictures




## Mechanical Properties

| | |
|---|---|
| Rows x Columns | 2 x 20 |
| Char Set | 5 x 7 dots |
| Special Features | comma, semicolon, dot, triangles (lower line) |
| Character size | 7 x 11 mm |
| Character size (including semicolon) | 7 x 12 mm |
| Character size (including triangle on lower line) | 7 x 14 mm |
| Module size | 273 x 76 mm |
| Mounting holes | at each corner, 266 x 69 mm, Ø 3.2 mm |

## Electrical Properties

| | |
|---|---|
| Supply voltage | 5 V DC |
| Supply current | 1.2 A (measured: 990 mA) |
| Interfaces | parallel, asynchronous serial |

## Protocol Properties

| | |
|---|---|
| Character Fonts | International Font |
| Dimming | supported, 4 levels |
| User Definable Font (UDF) | not supported |
| Cursor Modes | not supported |
| Cursor positioning | supported |
| Scroll modes | normal, vertical |

## Interface

**Connector CON1**, 34-pin boxed header

| Pin | Signal | Description | Pin | Signal | Description |
|---|---|---|---|---|---|
| 1 | DB7 | data bit 7 | 2 | Gnd | Ground |
| 3 | DB6 | data bit 6 | 4 | Gnd | Ground |
| 5 | DB5 | data bit 5 | 6 | Gnd | Ground |
| 7 | DB4 | data bit 4 | 8 | Gnd | Ground |
| 9 | DB3 | data bit 3 | 10 | Gnd | Ground |
| 11 | DB2 | data bit 2 | 12 | Gnd | Ground |
| 13 | DB1 | data bit 1 | 14 | Gnd | Ground |
| 15 | DB0 | data bit 0 | 16 | Gnd | Ground |
| 17 | /WR | Write signal | 18 | Gnd | Ground |
| 19 | n.c. | not connected | 20 | Gnd | Ground |
| 21 | n.c. | not connected | 22 | Gnd | Ground |
| 23 | /SEL | Select signal | 24 | Gnd | Ground |
| 25 | /TEST | Test Display | 26 | Gnd | Ground |
| 27 | BUSY | BUSY signal | 28 | Gnd | Ground |
| 29 | n.c. | not connected | 30 | Gnd | Ground |
| 31 | ??? | unknown | 32 | Gnd | Ground |
| 33 | RxD | Serial In (TTL level) | 34 | Gnd | Ground |

All pins are input signals except pin 27 (BUSY). When the test signal (pin 25) is low, all characters of the font table will be output on the display. Leave the test mode by assigning a high level again.

**Connector CN2**, 3-pin (Molex KK series, 0.1”)

| Pin | Signal | Description |
|---|---|---|
| 1 | Gnd | Ground |
| 2 | Vcc | 5 V |
| 3 | Gnd | Ground |

**Parallel Interface**

To write an character to the display, set first the /SEL signal to low followed by the /WR signal. Assign the data on the data lines (DB0 .. 7). Now set /WR signal to high, followed by the /SEL signal.

After writing data to the display, wait some time for the execution of the command/data. A wait delay of 150 µs seemed to be suitable. Keep in mind that some commands take some extra time (e.g. RESET (0x1F) will additionally take 500 µs).

To avoid any delays use the BUSY signal to check if the display is ready to take some data or commands.

**Serial Interface**

The serial interface is RS232 with TTL level. The default communication settings are 1200 Baud, 8 bits, no parity, 1 stop bit.

## Jumper

| J5 | J4 | J3 | J2 | J1 | Function |
|---|---|---|---|---|---|
| X | X | 1 | 0 | 0 | 9600 Baud |
| X | X | 1 | 0 | 1 | 4800 Baud |
| X | X | 1 | 1 | 0 | 2400 Baud |
| X | X | 1 | 1 | 1 | 1200 Baud |
| 1 | 0 | 1 | 1 | 1 | Factory Setting |

0: Short 1: Open X: Don't Care

## Protocol

| Code | Bezeichnung | Beschreibung |
|---|---|---|
| DIM (0x04)<br>DL | Dimming | DL is dimming level:<br><br>100 % 0xFF<br>60 % 0x60<br>40 % 0x40<br>20 % 0x20 |
| BS (0x08) | Back Space | Cursor left |
| HT (0x09) | Horizontal Tab | Cursor right |
| LF (0x0A) | Line Feed | Cursor down |
| CR (0x0D) | Carriage Return | Cursor 1st column |
| DP (0x10)<br>POS | Display Position | POS in range 0x00 .. 0x27<br><br>line 1 0x00 .. 0x13<br>line 2 0x14 .. 0x27 |
| DC1 (0x11)<br>DC2 (0x12) | Device Control 1<br>Device Control 2 | Normal Scroll Mode<br>Vertical Scroll Mode |
| DC6 (0x16)<br>DC7 (0x17) | Device Control 6<br>Device Control 7 | Decimal Point<br>Comma |
| DC8 (0x18)<br>POS<br>DC9 (0x19)<br>POS | Device Control 8<br><br>Device Control 9 | Triangle On<br><br>Triangle Off<br><br>Both commands: POS in range 0x14 .. 0x27 |
| DC10 (0x1A) | Device Control 10 | All Triangle Off |
| RST (0x1F) | Reset | Reset all settings, display content, etc |

## Example code

```
/*
 * Futaba M202MD01BA.c
 *
 * Created: 01.04.2016 23:34:00
 * Author : Muetze1
 */

#include <avr/io.h>
#include <util/delay.h>

// connection:
//   PORTB[0..7] = DB[0..7]
//   PORTC       = control lines (see below)

#define PIN_WR      PC0
#define PIN_SEL     PC1
#define PIN_BUSY    PC2

void outc(char a)
{
#ifdef PIN_BUSY
    // check BUSY signal
  while ( (PINC & _BV(PIN_BUSY)) )
    ;
#endif

  PORTC &= ~_BV(PIN_SEL);
  PORTC &= ~_BV(PIN_WR);

  PORTB = a;

  PORTC |= _BV(PIN_WR);
  PORTC |= _BV(PIN_SEL);

#ifndef PIN_BUSY
    // if not checking BUSY signal, wait some time
  _delay_us(150);
#endif
}

void outs(const char * s)
{
  while ( s && *s )
    outc(*s++);
}

int main(void)
{
  DDRB = 0xFF;                          // data port (PB0..7 = DB0..7)
  DDRC = _BV(PIN_SEL) | _BV(PIN_WR);  // control lines (/SEL, WR)

  outc(0x1f);
#ifndef PIN_BUSY
  _delay_us(500); // reset takes some extra time
#endif

  outs("Futaba M202MD01BA\r\nC\x17o\x17m\x17m\x17");
  outs("a\x17 P\x16o\x16i\x16n\x16t\x16 “);
  outs(“Triangle\x18\x20\x18\x21\x18\x22\x18\x23\x18\x24\x18\x25\x18\x26\x18\x27");
}
```

Example Code output: