

**Dual Motor Controller with I2C / Serial Interface
«DMC-1»**

User's Guide

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1 Introduction.

The DMC-1 dual motor controller has been designed to function as a versatile DC motor control module for controlling one or two motors.

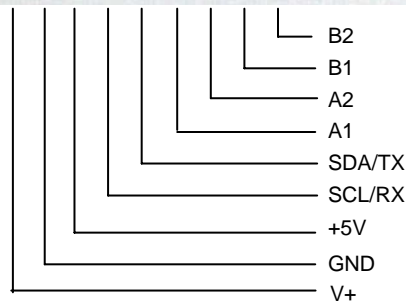
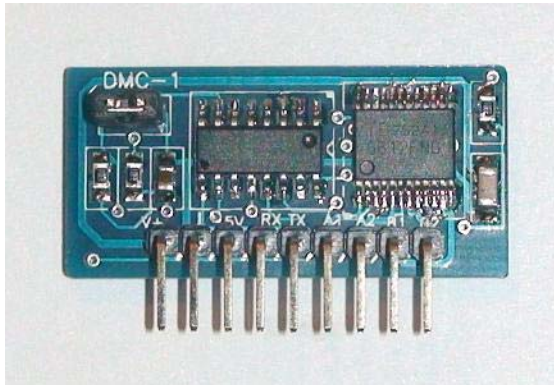
The motor controller supports an I2C and serial TTL interface and uses only two lines to communicate with a main controller (microcontroller or PC). The simple ASCII commands allow easy module control from microcontroller or PC.

The module is ideal for use in small robotics projects for controlling two-wheel axles.

The module has the following features:

- Support the dual interface: standard 100Kbps I2C interface and Serial TTL interface.
- 2400, 4800, 9600, 19200 Serial interface Baud Rate controlled via software
- 2 DC motor control
- Motor supply voltage 2.5 – 15 V
- Motor current – 1.2A (3A peak) each
- Logic supply voltage 5 V
- PWM resolution – 8 bit
- PWM frequency – 20 KHz
- Up to 20 controllers may be connected to I2C or Serial bus
- Small form factor (1.35" x 0.65").

2 Module connection.



2.1 Connector pin assignments.

Pin No.	Pin Name	Description
1	V+	Motor supply voltage (2.5 – 15V)
2	GND	Ground connection (0V)
3	+5V	Logic supply voltage (+ 5V)
4	SCL/RX	I2C SCL signal (RX – for serial interface)
5	SDA/TX	I2C SDA signal (TX – for serial interface)
6	A1	Motor 1, positive output
7	A2	Motor 1, negative output
8	B1	Motor 2, positive output
9	B2	Motor 2, negative output

2.2 Communication interface.

The module supports 2 interfaces:

- I2C slave interface
- Serial TTL interface

I2C Slave Interface

Industry standard Philips I²C bus compatible interface.

Data rate 100 kbps.

Serial Interface

Baud Rates 2400, 4800, 9600 and 19200 bits per second (default 9600).

8 Bits per character

None Parity

1 Stop Bit

None Flow Control

Do NOT connect PC serial port (RS232) directly to the module. Use a MAX232 chip or equivalent to convert the RS232 levels to 5v.

The communication interface is determined by the states of the single jumper. When the jumper is present (factory default) the module is in serial mode. If the jumper is removed the module is in I2C mode. The mode jumper is only checked as part of the power-up sequence.

Once the interface has been changed, the module parameters will be restored to DEFAULT values.

To restore the module default parameters (module address, baud rate, contrast, brightness):

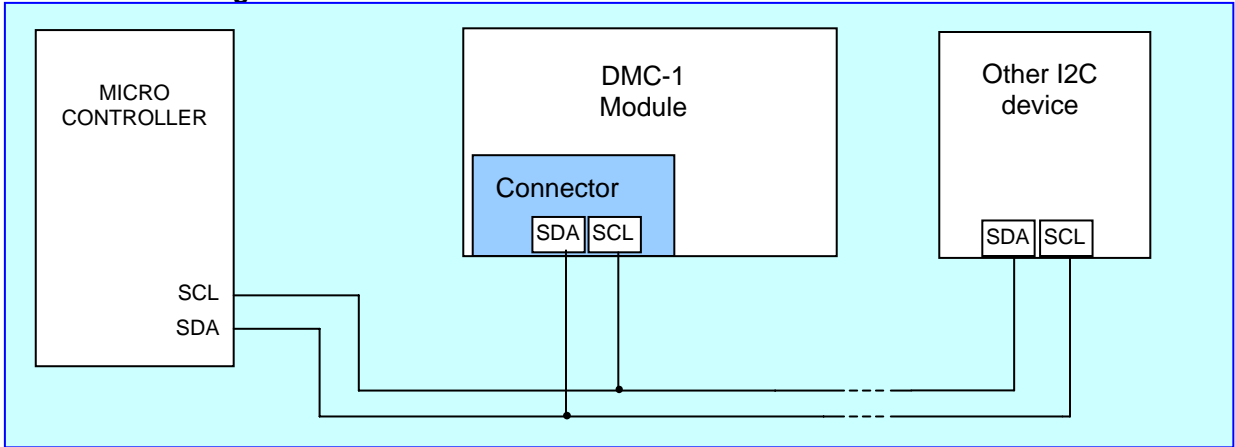
1. Change the jumper state.
2. Power up.
3. Power down.
4. Change back the jumper state.
5. Power up.

2.3 Module connection to I2C / Serial bus.

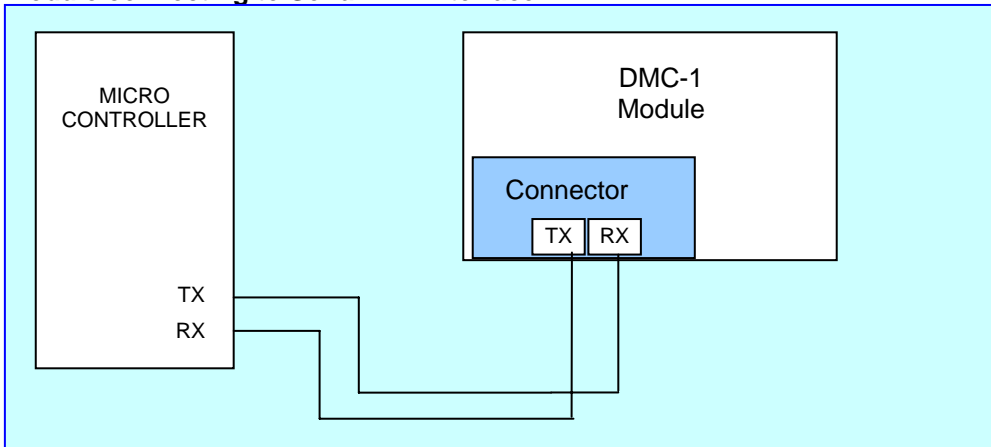
Each device must have its own unique address (ID). The address range is from 'A' to 'Z' (HEX from 0x41 to 0x5A). Default address shipped from the manufacturer is 'M' (0x4D).

The address can be easily changed by sending the command "Set the new device address".

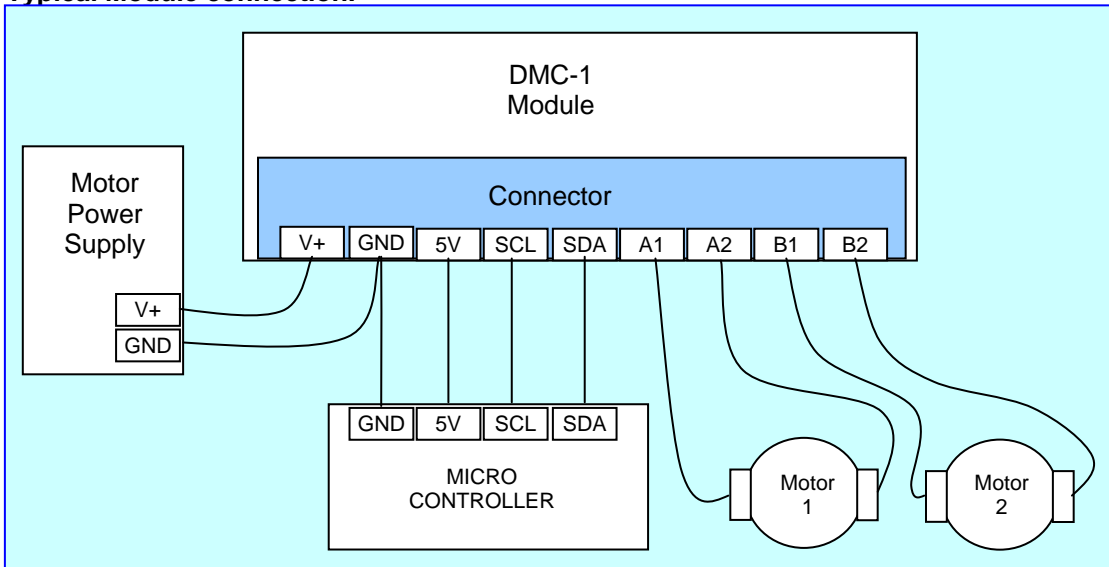
Module connecting to I2C bus.



Module connecting to Serial TTL interface.



Typical Module connection.



3 Commands.

The module is controlled using ASCII characters. The character decimal 254 (0xFE) is a command prefix. All commands start with 0xFE and a device address byte. Then a one command code byte followed by the parameters.

Command Syntax: 0xFE [device address byte] [command byte] [parameter]

Command Summary

Prefix	Command	Parameter	Description
0xFE	0x00	null	No operation
0xFE	0x01	1 byte	Changing the I2C Slave Address
0xFE	0x02	1 byte	Changing BAUD Rate
0xFE	0x03	2 bytes	Set Motor Speed
0xFE	0x04	null	Read Module Information

3.1 Configuration Commands.

All settings are stored in internal module EEPROM and loaded during power up.

Changing the I2C Slave Address

Syntax hexadecimal 0xFE [device address] 0x01 [new address]

Parameter	Length	Description
[new address]	1 byte	New I2C address

Description: This command sets the I2C address, the address must be 0x42 – 0x5A ('A'–'Z'). The address change requires 50 ms to take effect; therefore, the subsequent input must have an appropriate delay.

Default 0x4D

Changing BAUD Rate

Syntax hexadecimal 0xFE [device address] 0x02 [baud]

Parameter	Length	Description
[baud]	1 byte	New Serial communication rate (1 – 4)

Description: This command sets the serial communication rate, the single byte parameter select the desired BAUD rate as in the table below.

The rate change requires 50 ms to take effect; therefore, the subsequent input must have an appropriate delay.

Default 9600 BAUD

Parameter	BAUD
1	2400
2	4800
3	9600
4	19200

Set Motor Speed

Syntax hexadecimal 0xFE [device address] 0x03 [Motor & Direction] [Speed value]

Parameter	Length	Description
[Motor & Direction]	1 byte	Select the motor and direction

[Speed value]	1 byte	Motor speed (from 0 to 250)
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Description: This command sets the motor speed value.

[Motor & Direction] byte has two parts:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
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Bit 0 defines the motor direction: 1 – forward, 0 – reverse

Bit 1 defines the motor number: 0 – motor 1, 1 – motor 2.

[Motor Speed] byte sets the motor speed from 0 to 250.

Examples:

0xFE 0x4D 0x01 0x25 – for motor controller with address 0x4D set for motor 1 forward direction and speed value 0x25

0xFE 0x4D 0x02 0x64 – for motor controller with address 0x4D set for motor 2 reverse direction and speed value 0x64

Read Module Information

Syntax hexadecimal 0xFE [device address] 0x04

Parameter	Length	Description
null	0 byte	Read the Module Information

Description: This command sends the request for the device information. The Motor Controller returns 4 bytes:

Byte 1 – device type (0x4D ‘M’ – motor controller)

Byte 2 - device address (default 0x4D ‘M’)

Byte 3 – BAUD rate (0x31 – 2400 BAUD, 0x32 – 4800 BAUD, 0x33 – 9600 BAUD, 0x34 – 19200 BAUD)

Byte 4 – software version