# MMD-100 Series

# Modular Motion Driver System

## Reference Manual

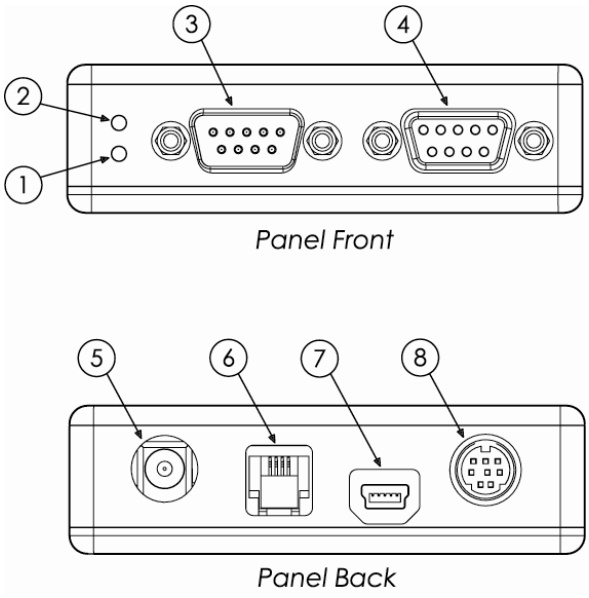
micronix USA
PRECISION MOTION SOLUTIONS

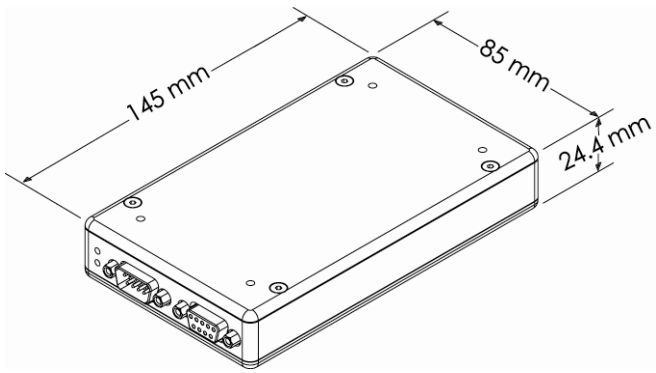
## Table of Contents

# *1. Introduction*

## *1.1 Product Description*

The MMD-100 is a high performance two phase piezo motor driver designed to be used as a step/ direction single axis unit, or stacked as a compact multi-axis module. The MMD-100 is capable of driving a piezo motor with a resolution as fine as 1 nm in open loop (motor dependent). The closed loop resolution is dependent on the resolution of the encoder (typically 1 nm).




1. LED Error Indicator 1
    a. Red – An error has occurred
2. LED Addressing Indicator 2
    a. Orange – Stage is Unaddressed
    b. Green – Stage has an address and is ready
3. Encoder Input, Male D-Sub 9 Pin Connector
4. Motor/Axis Output, Female D-Sub 9-Pin Connector
5. Power Supply, +5VDC, Regulated
6. RS485 Intermodular Connector
7. USB Connector
8. I/O Connector

(Note: For Pin-outs see page 3-4)

### *1.2 Features*

- Driver for MICRONIX USA stick-slip piezo motors
- Simple Step and Direction input
- Step Pulse frequency up to 3.5 MHz
- Compact, modular design allows for bench-top or standard 2U height rack mounting
- Configurable as a single driver unit or stackable up to 99 axes
- Open loop/closed loop operation
- Open loop resolution of less than 1 nm
- Closed loop resolution dependent on the encoder (typically 2 nm)
- A quad B encoder feedback

## *2. Technical Information*

### *2.1 MMD-100 Specifications*

| Parameter | Description |
|---|---|
| Motor Type | Stick-slip piezo motors |
| Control Interface | Step(rising edge)/Direction(level triggered) |
| Signal Input Voltage | 5V TTL |
| Max Input Frequency | 3.5 MHz |
| Power Supply | Regulated 5V DC (1A per module/axis*) |
| Enclosure Dimensions | 145 x 85 x 25 |

*A single power supply may be used per stack. Each module/axis requires 1A. To calculate the needed amperage, add up individual module power requirements to determine the power supply amperage requirement.

## *3. Connector Pin-outs*

### *3.1 8-pin Din I/O Connector Pin-Out*


Pin8 – +5V (output)
Pin7 – IO1 – output only
Pin6 – Pulse
Pin5 – Direction
Pin3 – IO4
Pin4 - GND

Pin-Out Shown is the front view of the socket MMD-100 side.
Pulse and Direction expects 5V inputs
For more on I/O see IOD, and IOF in the appendix.

## *3.2 Encoder Input Pin-out*

| Pin | Color | Description |
|---|---|---|
| 1 | Brown | A+/Cos+ |
| 2 | Red | B+/Sin+ |
| 3 | Orange | Index + |
| 4 | Yellow | Ground |
| 5 | Green | +5V |
| 6 | Blue | A-/Cos- |
| 7 | Purple | B-/Sin- |
| 8 | Grey | Index - |
| 9 | Black | Not In Use |

## *3.3 Motor Input Pin-out*

| Pin | Description |
|---|---|
| 1 | Phase 1 |
| 2 | Phase 2 |
| 3 | N/C |
| 4 | Not In Use |
| 5 | Ground |
| 6 | +5V |
| 7 | +5V |
| 8 | Not In Use |
| 9 | Not In Use |

# *4. Encoder Features*

## *4.1 Feedback Control*

The MMD-100 can be driven in Open Loop or Closed Loop. The FBK command is used to switch between these modes.

The Open Loop mode (nFBK0) is a traditional Open Loop. It moves to the distance specified by the number of input pulses and the DPP setting. This is entirely theoretical and does not guarantee a set trajectory or end point.

The Closed Loop mode (nFBK3) is a more traditional closed loop. The controller will constantly track to the distance specified by the number of input pulses and the PDX setting.

## *4.2 HOM, MLN, and MLP*

The HOM, MLN and MLP commands all require the attached stage to have an encoder. The HOM command will move negative direction by default. This can be changed using the HCG command. If the stage is above the index, it will move until it reaches the index then move a predetermined distance out of the index in the negative direction. The stage will then travel in the positive direction at a slower speed stopping at the edge of the index. If the stage is below the index it will move until it reaches a hard limit or the maximum travel. It then reverses direction and proceeds until it reaches the index. It will then travel a predetermined distance out of the index in the negative direction and finally travel toward the index at a slower velocity finally resting on the edge of the index. The HOM command will always home to the negative side of the limit.