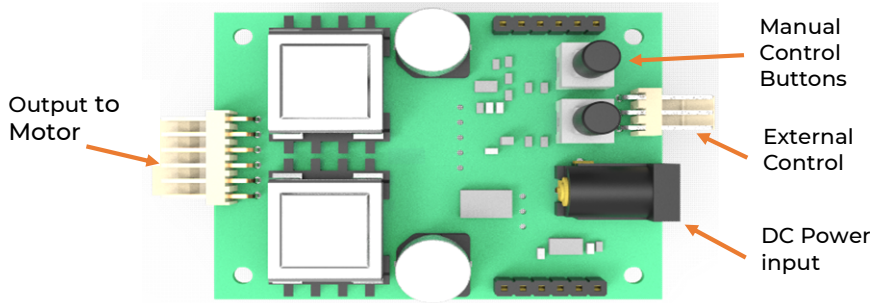




DTI's electronic driver PCB has been designed to provide an economical user-control interface compatible with all DTI piezo motors. Each driver PCB is supplied pre-programmed for the specific motor model and is software configurable to provide optimization of drive signals and integrated controls. The primary purpose of the driver PCB is the formation of electrical pulses with specific frequency and amplitude for excitation of the piezo motor.



OEM Driver Board



Driver with enclosure

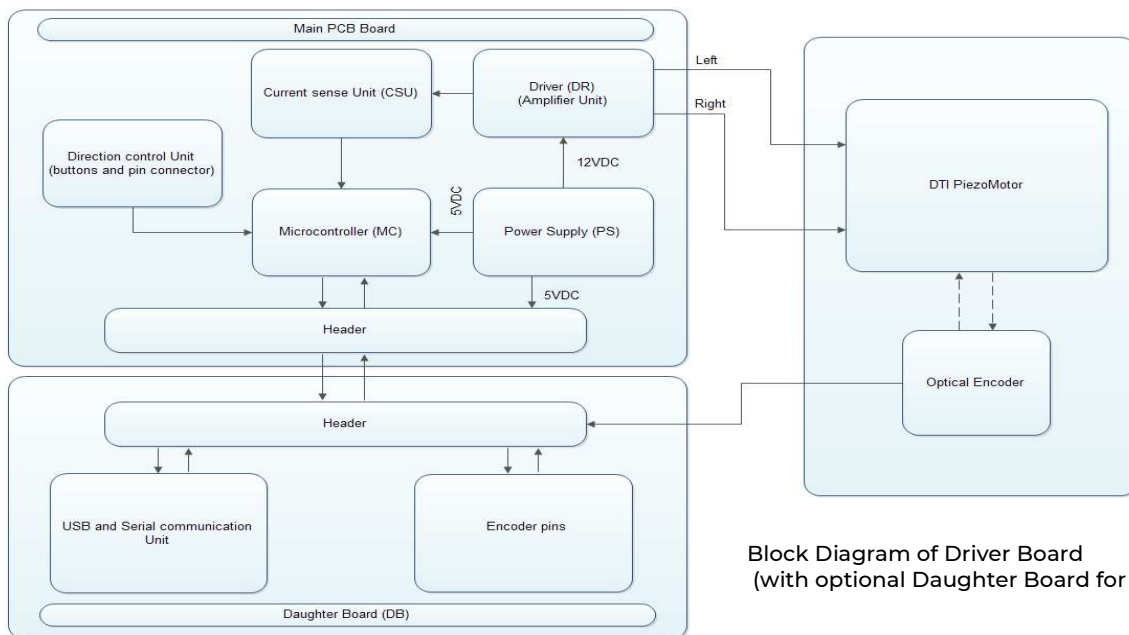
Overview

The driver PCB can be programmed to work in either open-loop or closed-loop modes. In open loop mode the driver PCB controls the motor as a standalone device without any positional feedback information. When either the environmental temperature or the load of the motor changes the driver PCB implements stabilization of the pre-programmed current (which is different for each model of piezo motor). This provides maximum speed of movement according to the published motor specifications.

Manual control of motor motion can be performed by pressing either of the two Manual Control Buttons located on the driver PCB. External control of the motor is implemented by applying a logical TTL "0" to either of the two independent External Input Control pins located on the driver PCB. Input to these pins controls the direction of movement of the motor. A third pin is Ground. Motion is stopped by apply a logical TTL "1".

The electronic driver PCB enables precision motion control of the piezo motor via a microcontroller based 12 V DC digital system, which also allows for user generated inputs for motion control.

The driver assembly (Main PCB) is comprised of five main sections as shown in the block diagram. The Power Supply (PS), accepts a 12 V DC input through a DC power jack with a 2.0 mm center positive pin. The 12 V is filtered then regulated to 5 V DC and filtered again to provide the board operational voltage.



Block Diagram of Driver Board (with optional Daughter Board for Encoder)



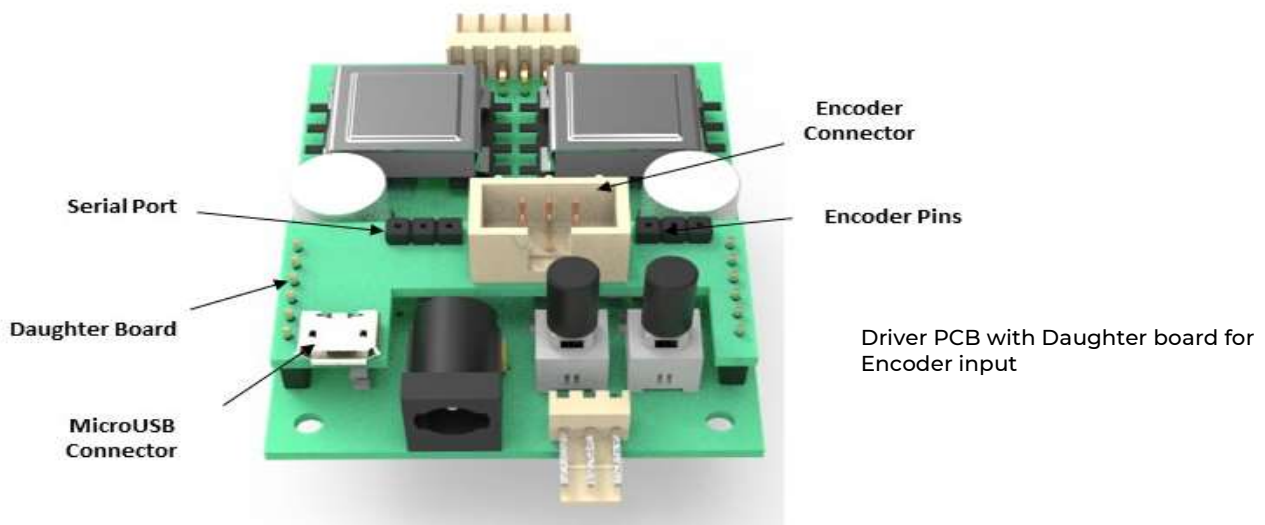
Principle of Operation

The Direction Control Unit (DCU), includes manual (push button) directional control signal inputs to the microcontroller (MC) for continuous piezo motor operation. This is implemented through active TTL low inputs to the microcontroller. An external control input signal interface is included to facilitate user generated signal or pulse train controls for stepping mode operation (i.e. Pulse Width Modulation, "PWM"). The Current Sense Unit (CSU) monitors current during motor operation.

The Microcontroller (MC), provides software-based control of motor motion in response to directional control inputs. When directional control signals are received, the microcontroller generates enable control output signals proportional to the control signals, and current feedback (via CSU) to the Driver (DR). In PWM mode of operation, the pulse width of the driver enable signal determines the amplitude of motion. A current negative feedback input is used by software to determine the optimal excitation frequency of the piezo motor to maintain the required current.

The Driver element (DR) is comprised of two gate driver ICs with FETs (to provide drive current) and step up voltage transformers. The enabled gate driver amplifies the 5V TTL phase signals to a 12 V gate drive signal that switches on the FETs. When the FETs are active, the transformer steps up the ultrasonic signal voltage to the level required for excitation of the piezo motor (which can be between 30 V to 120 V depending on piezo motor model). Channel drive current is also detected within the Driver element, where it is amplified then integrated to provide an analog signal proportional to the channel drive current. This current sense feedback is used to optimize motor control and performance. Activation of motor motion in a specific direction is performed by command from the microcontroller.

In closed-loop control (feedback control) mode, an additional daughter PCB is mounted on driver PCB. Feedback from an external optical encoder, mounted on the piezo motor, is fed to the daughter board and used to close the loop. The position and speed of the motor can then be controlled through a set of commands via either a USB port (through DTI's GUI) or serial (RS 232) port commands.



PLC and Serial Port Control

Pre-programmed motion control algorithms enable implementation of several operators/commands for specific motion control. The key commands are for defining of speed ("Set Velocity") and for movement to a defined position ("Destination"). These commands are resident within a library which can be accessed using either DTI's optional programmable logic control (PLC) software, or via the serial (RS-232) port.

For full details of motion control including open and closed loop control please refer to the relevant Motor user Manual

Ordering Information

Electronic Driver

Electronic Drivers are configured to the Piezomotor parameters and each Driver has a unique part number associated with the Motor

Electronic Drivers can be supplied as a pcb for OEM installations or with an enclosure.

Please refer to the individual Piezomotor datasheets for the correct part number to order for each motor