# Officina Turini

User Manual

Hercules

INTRODUCTION

Hercules is a very small size module that cand drive up to four step motor with microstepping tecnique. But at the same time it can be used as a controller or a complete instruments.
Drive bipolar motor up to 3A rms and with a supply voltage from 9 to 24VDC (up to 40VDC under request). To change its functionality simply upload a prebuilt binary with a dedicated utility. Many free ready to use functions are available. Is available with different models according to number of controlled motors, connectors or for heavy duty use.
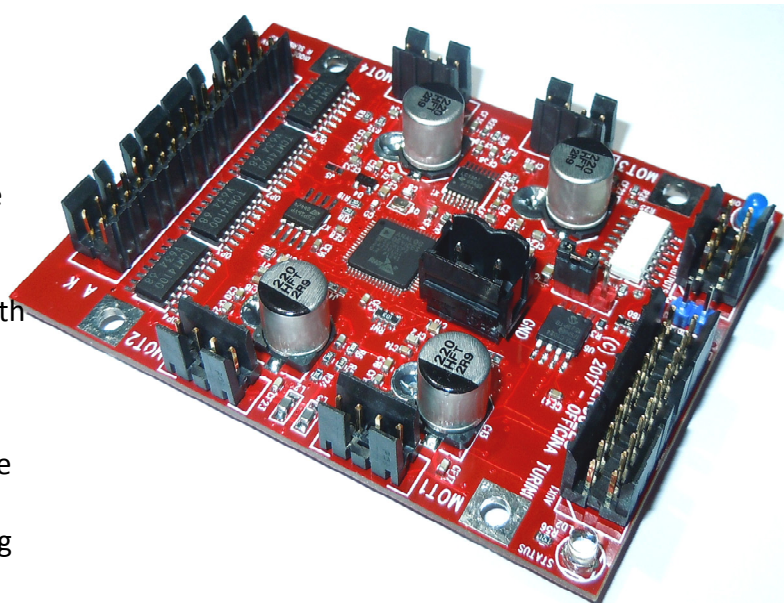

Top view of the module with FCI connettors

FEATURES

- Open frame with 1 to 4 motor drives in 80x60x20 mm (up to 40mm in heavy duty version).
- Optional heat sink plus fan for heavy duty applications.
- Range of operating voltages: 9-24 VDC (custom versions up to 40V).
- Range of current: 0.3 - 6A pp. Setting up to 15 possible values by means software setup and stored in EEPROM or changed on the fly by remote controls.
- Microstepping: 400,800,1600,3200,6400,12800,25600 steps/revolution. Setting by means software setup and stored in EEPROM or changed on the fly by remote controls.
- Automatic current reduction at motor standstill.
- Protections:
- -Protection against under-voltage and over-voltage.
- -Protection against a short-circuit at motor outputs.
- -Programmable non-dissipative overcurrent protection on high and low-side
- -Overtemperature protection with thermal sensor.
- -Three-levels of overtemperature protection.
- Programmable speed profile and positioning.
- Programmable power MOS slew rate.
- Sensorless stall detection.
- 16 opto-coupled inputs.
- 4 power opto-coupled outputs (55V 2A max).
- Powerful 400MHz DSP with 2MB of FLASH.
- 128KB EEPROM for user data.
- Expansion ports with serial I/O, I2C and SPI.
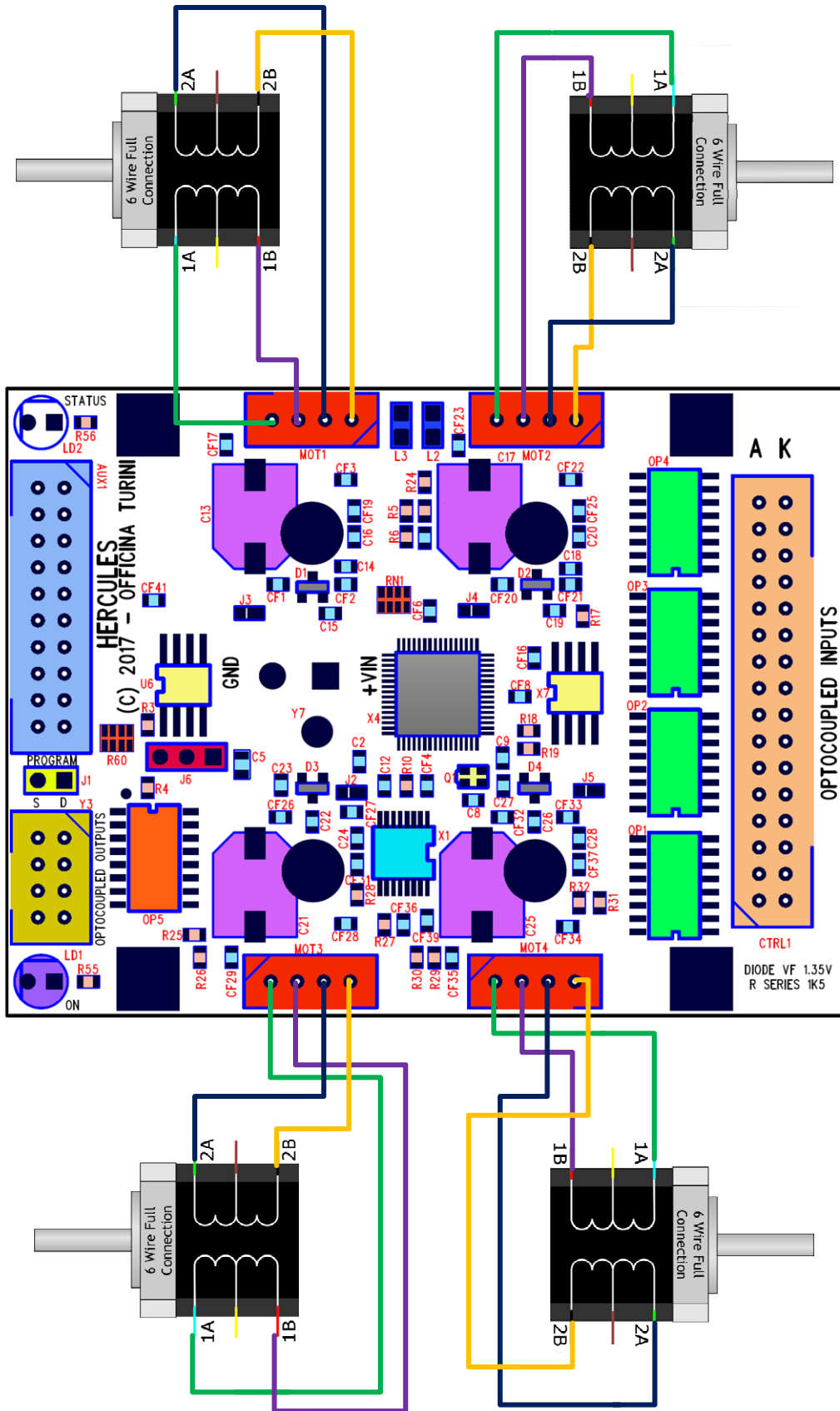- Warranty: 24 months.

MECHANICAL DIMENSION TOP VIEW (mm)
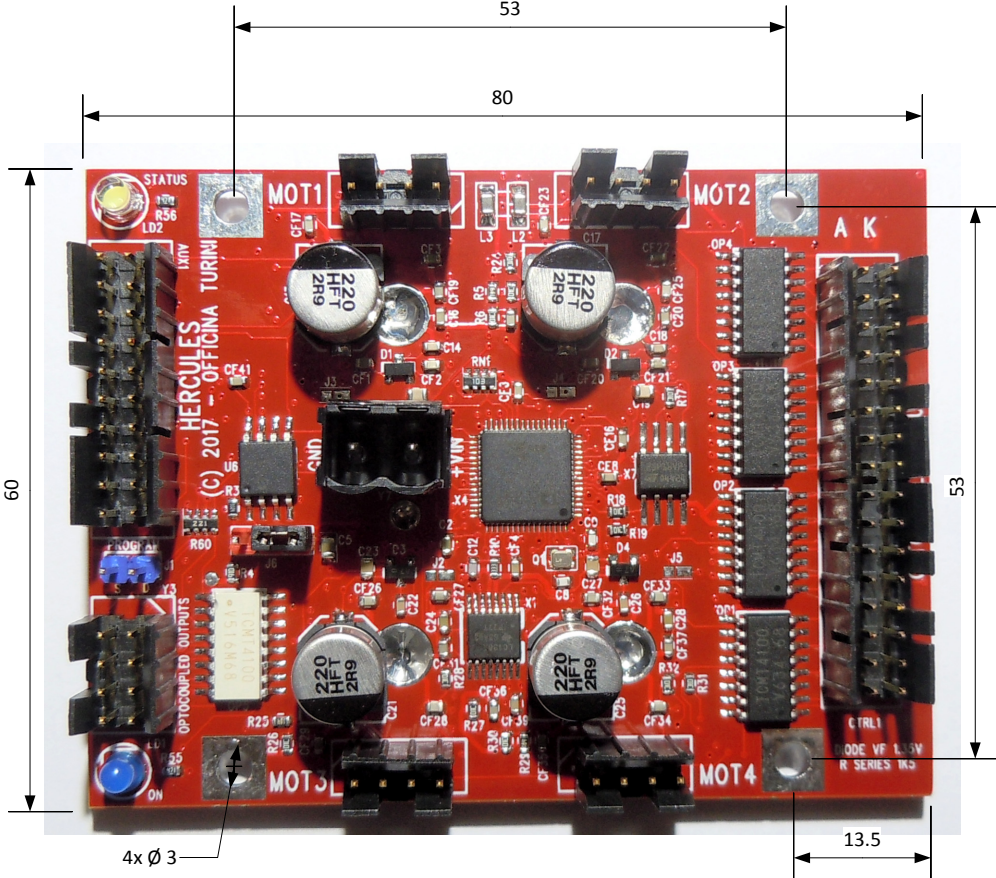
DEPTH FOR THE HEAVY DUTY MODEL
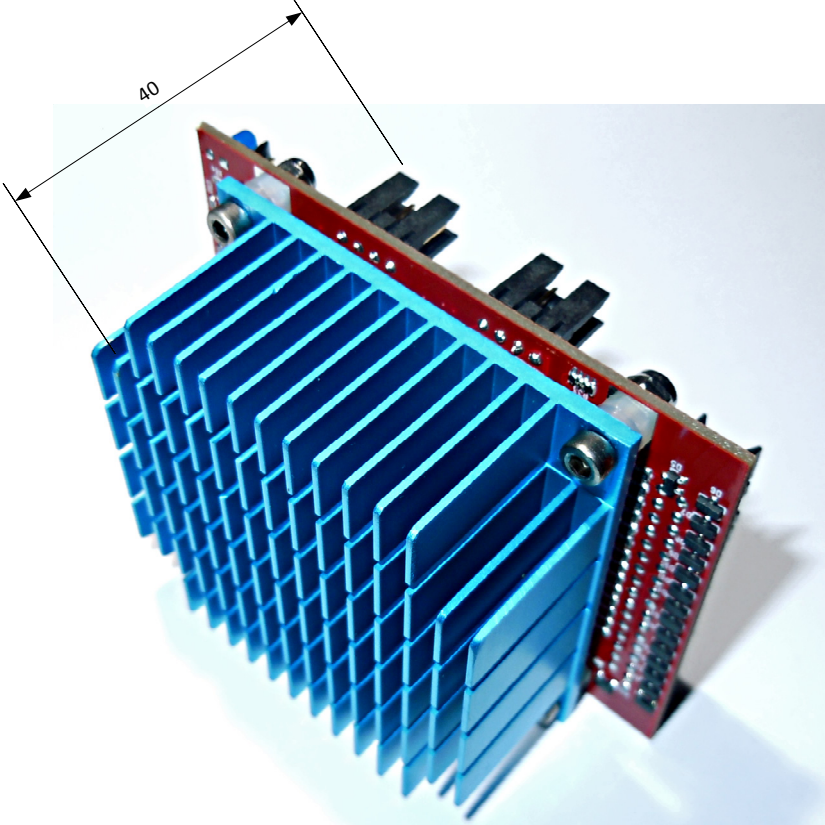
CONNECTORS LAYOUT

CONNECTOR SIGNALS

PIN	AUX1 - I/O SIGNALS (LVTTL)
1	+5V - External power supply (Reserved)
2	GND
3	FAN - Mosfet DRAIN for fan power supply
4	IO0 - DSP port
5	TXD - Serial transmit
6	RXD - Serial receive
7	SDA - I2C data
8	SCL - I2C clock
9	SCK - SPI serial clock
10	MOSI - SPI Master Output Slave Input
11	MISO - SPI Master Input Slave Output
12	\PCS7 - SPI (active low) peripheral selection
13	+5V - Digital power supply (max 100mA)
14	GND
15	EIO0 - Bit 0 bidirectional user port
16	EIO1 - Bit 1 bidirectional user port
17	EIO2 - Bit 2 bidirectional user port
18	EIO3 - Bit 3 bidirectional user port
19	PWR - Motor power supply (same Y7.1)
20	GND

Y3-POWER OUTPUT

PIN	SIGNAL DESCRIPTION
1	DRAIN - 1
2	SOURCE - 1
3	DRAIN - 2
4	SOURCE - 2
5	DRAIN - 3
6	SOURCE - 3
7	DRAIN - 4
8	SOURCE - 4

MOT-1:4 MOTOR CONNECTORS

PIN	SIGNAL	DESCRIPTION
1	OUT1A	Coil A
2	OUT2A	Coil A
3	OUT1B	Coil B
4	OUT2B	Coil B

With a **TTL-232R-3V3-WE** by FTDI is possible to control HERCULES board for the user application o for to change or update internal firmware. For firmware update is necessary to insert a jumper on connector Y1, insert the following programming cable and the turn on the board, with a specific utility is possible to upload the new firmware.

USB2 PROGRAMMING AND CONTROL CABLE

AUX1	SIGNAL	TTL-232R-3V3-WE
5	TXD	YELLOW wire
6	RXD	ORANGE wire
2	GND	BLACK wire

CTRL1-OPTOCOUPLED INPUT

Following signal are opto-coupled, each signal have a cathode and an anode. All these signals are valid only for MOTOR-DRIVE application, different application use these signal in different mode.

PIN	SIGNAL DESCRIPTION
1	AI.1 – Anode, Generic input
2	KI.1 – Cathode, Generic input
3	AI.2 – Anode, Generic input
4	KI.2 – Cathode, Generic input
5	AI.3 – Anode, Generic input
6	KI.3 – Cathode, Generic input
7	AI.4 – Anode, Generic input
8	KI.4 – Cathode, Generic input
9	AEN.1 – Cathode, Enable motor 1
10	KEN.1 – Anode, Enable motor 1
11	AEN.2 – Cathode, Enable motor 2
12	KEN.2 – Anode, Enable motor 2
13	AEN.3 – Cathode, Enable motor 3
14	KEN.3 – Anode, Enable motor 3
15	AEN.4 – Cathode, Enable motor 4
16	KEN.4 – Anode, Enable motor 4
17	ASTP.1 – Anode, Clock motor 1
18	KSTP.1 – Cathode, Clock motor 1
19	ADIR.1 – Anode, Direction motor 1
20	KDIR.1 – Cathode, Direction motor 1
21	ASTP.2 – Anode, Clock motor 2
22	KSTP.2 – Cathode, Clock motor 2
23	ADIR.2 – Anode, Direction motor 2
24	KDIR.2 – Cathode, Direction motor 2
25	ASTP.3 – Anode, Clock motor 3
26	KSTP.3 – Cathode, Clock motor 3
27	ADIR.3 – Anode, Direction motor 3
28	KDIR.3 – Cathode, Direction motor 3
29	ASTP.4 – Anode, Clock motor 4
30	KSTP.4 – Cathode, Clock motor 4
31	ADIR.4 – Anode, Direction motor 4
32	KDIR.4 – Cathode, Direction motor 4

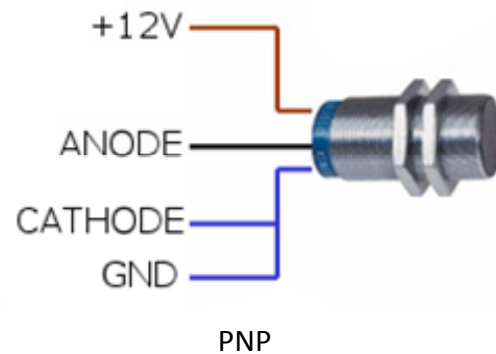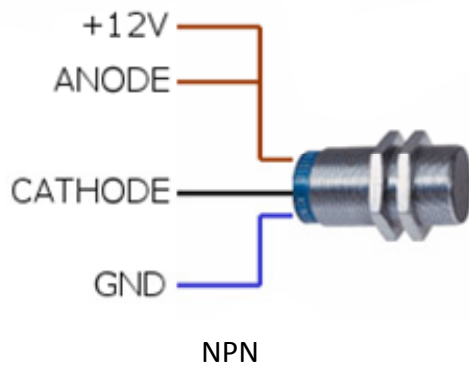## TYPICAL POWER OUTPUT USAGE
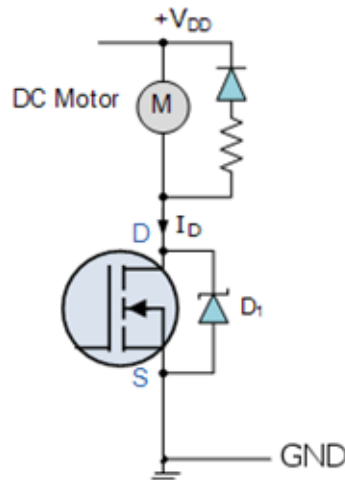
Typical usage of the POWER OUTPUT, D (Drain) and S (Source) are signal available on Y3 connector. These signal are related to the internal N-MOSFET (1A 55V max). D1 is the diode embedded in the mosfet.

TYPICAL OPTO-COUPLER INPUT USAGE
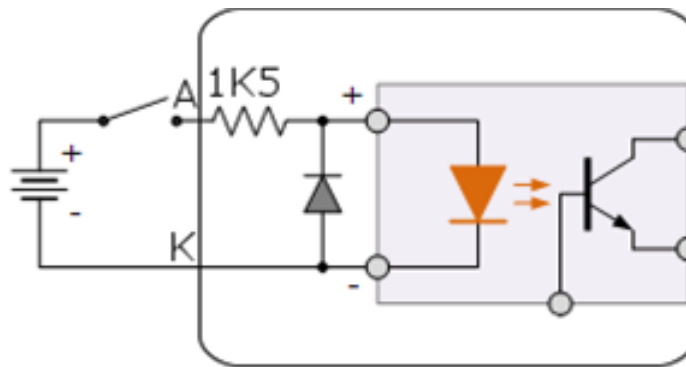
A and K are signals that can found on CTRL1 connector

PROXIMITY WIRING

NPN

PNP

READY TO USE FREE PRESETTABLE FUNCTIONS

- Simple 1-4 channels step-motor drivers with controls by opto-coupled inputs DIR, STEP, ENABLE, HOME.
- 4D Axys fast positioner.
- 4D G-Code 3D printer.
- 4D G-Code CNC.
- Telescope equatorial mount controller plus focuser and dome positioning (LX200 compatible).
- Telescope alt-azimut controller plus focuser or dome positioning.
- Inverted pendulum controller.
- Arbitray user application with dedicated script language (C like).

AVAILABLE DEMOS FOR REMOTE CONTROLS

- USB 2 in Windows environment.
- Wireless RF controls by transparent UART.
- WiFi controls with ESP8266 module.
- Bluetooth controls by Windows or Android with HC-06 module.

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www.officinaturini.com