EHM-C control module

for generators of alternating electric and magnetic fields, DC motors, LED emitters with variable intensity, precise dual-output thermostats

EHM-C module is a control circuit for generators of alternating electric and magnetic fields. Two DC motors can be also connected as an inductive load. Additionally, the scheme is utilized for controlling LED emitters with variable brightness, as well as in the high-voltage/ultrashort-pulses mode. With external temperature sensors LM35/AD592, the module has a functionality of dual-output (heater/cooler) digital thermostat with PID controller. The EHM-C module consists of four parts: the high voltage generator (5-1200V), the controller of inductive load (5-40V, 2A, reversible); the controller of a high current load (5-30V, up to 100A (500A) impulse current) and a microcontroller system for modulating all outputs with up to 5MHz of the carrier frequency and the secondary low-frequency 0.1Hz - 1kHz modulation. The module is powered from USB when the consumed average current is less than 0.5A (0.9A), a higher load current requires an external power supply. The module has an internal 5V to 40V (3A) voltage converter. Heat dissipation capacity is about 2W, an external heat sink is required to dissipate more heat. Management - enabling and disabling outputs, setting voltages and frequencies, programming timers and PID controller to operate in autonomous mode – is possible via USB by using a client program or by ASCII commands. The advantage of this module is the capability to control combined opto- magneto- electric devices, to use standard USB batteries for mobile applications, to operate autonomously without external control. Due to a small size, the EHM-C module can be easily integrated into other devices and systems.

Features

- input voltage: 5-30V
- integrated voltage converter 5V to 40V, 3A
- output voltage E (for electric field emitters): 5-1200V
- output voltage H (for magnetic field emitters or DC motors): 5-40V, 2A, with the possibility of reverse current
- output voltage L (for high power LED emitters, inductive load, various DC devices): 5-40V, up to 100A (500A) impulse current
- Pulse Width Modulation of output voltages with 0-5MHz of currier frequency
- secondary low-frequency modulation 0.1Hz – 1kHz (rectangular pulses) of all outputs
- programmable timers: 100ns-72 hours
- resolution of relative temperature measurement: 0.01°C
- PID controller with adjustable coefficients
- I2C, SPI, UART, USB interfaces
- size: 100x36x8мм

Application

- combined opto- magneto- electric systems and generators
- generators of alternating electric and magnetic fields
- systems for exploring electric and magnetic Aharonov-Bohm effect, the Graham-Lahoza experiment, and similar combined electric and magnetic systems
- experimental generators of magnetic vector potential
- phase-synchronized control of DC motors
- control of LED emitters with variable brightness
- high-voltage/ultrashort-pulses mode for LED emitters
- increasing voltage to 18V/40V or up to 1200V from USB
- switching (on-off, PWM) of different DC devices at up to 40V and a high impulse current
- precise universal thermostats with dual heater/cooler outputs
- remote temperature data loggers