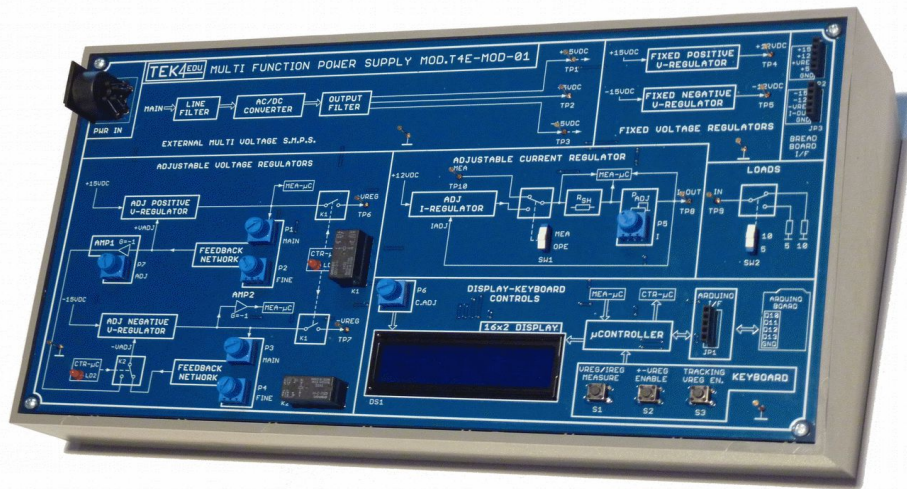


MULTI FUNCTION POWER SUPPLY MOD. T4E-MOD-01



COURSE PROGRAM (cont.1)

The module **Multifunction Power Supply mod.T4E-MOD-01** is a complete power supply that can be used:

- To study the voltage regulators and current regulators (battery charger), fixed and adjustable, positive and negative
 - As a power supply of laboratory to feed experimental circuits.
- The display, the keyboard and the microcontroller allow voltage and current measurements, and several modes of use, as a professional power supply.

There are several interfaces to connect it to the outside.

The **Arduino interface** allows easy connection to an external board **Arduino UNO (not included)**. This configuration allows the use of an Arduino UNO board and Arduino Software (IDE) for:

- Study the code provided in the module
- Change the code and to evaluate the effects
- Update the module code
- Re-program the microcontroller.

The **Breadboard interface** allows easy connection to an external development card (**not included**) to enable its supply with the different voltages provided by the module.

COURSE PROGRAM

Power supply:

- Switching (S.M.P.S.) and linear mode

Voltage regulator:

- fixed and adjustable
- positive and negative polarity

Dual voltage regulator:

- double polarity: positive and negative
- independent control for each polarity
- tracking control: unique setting for both positive and negative polarity

Current regulator:

- constant current regulation
- modification of the shunt resistor
- Effect on the load: increase of the output voltage with increasing load resistance
- Use as charge controller or battery charger

Switching relay on the adjustable outputs:

- Allows the output voltage setting without disconnecting the load

You can enable / disable the outputs by keyboard

Design and dimensioning:

- Electronic components included in the power supply

- Shunt resistor

- Areas of heat dissipation on the printed circuit

Measures:

- input and output voltages to the regulators
- Dropout voltage of the regulator
- Output current with use of shunt
- Shunt resistor
- Power dissipation on the regulator

TECHNICAL SPECIFICATIONS

No.7 Voltage outputs:

- Fixed positive: + 15V (0.5A)
- Fixed positive: + 12V (0.5A)
- Fixed positive: + 5V (2.5A)
- Fixed negative: -15V (0.3A)
- Fixed negative: -12V (0.3A)
- Adjustable positive (+ VREG): +1.25 to + 13V, 0.5A (>10V), 0,25A (5+10V), 0,18A (<5V)
- Adjustable negative (-VREG): -1.25 ÷ -13V, 0.3A (<-10V), 0,25A (-10+/-5V), 0,18A (>-5V)

No.1 Current output (I-OUT):

- Positive, adjustable, 250mAmax

Total power supplied: 25W

No.2 Operational Amplifiers:

- Inverting function, necessary to allow the measurements of negative voltages with the microcontroller
- Used for the tracking function

Characteristics of the adjustable outputs + VREG and -VREG:

- Protective relay that disconnects the outputs at power-up. The operator adjusts the voltages and then enables the outputs
- No.2 potentiometers for adjustment of each voltage: Main and Fine (+/- 0.3V)
- No.1 potentiometer for calibration of the negative voltage when the tracking function is active
- Tracking feature: with a single control allows the adjustment of both the output voltages

No.2 output loads:

- 5 and 10 Ohm
- They can be used to study the characteristics of the current regulator

Voltage dividers:

- Adapt the voltages to be measured into 5V range of the A/D converter

TECHNICAL SPECIFICATIONS (cont.1)

ATmega328P microcontroller:

- The code manages the display, keyboard and adapt the measures displayed by performing the scaling
- 10bit A/D converter used to execute voltage measurements

Display:

- 16 characters x 2 lines
- Blue LCD with white LED backlight
- Contrast adjustment
- Displays the voltage and current measurements

Measurements on the display:

- Measurement of the adjustable output voltages (+ VREG and -VREG)
- Measurement of voltage and current of the adjustable current output (I-OUT)

Keyboard:

- Select the measures shown: outputs + VREG and -VREG or I-OUT
- Enable/disable outputs + VREG and -VREG
- Enable tracking function on the adjustable outputs + VREG and -VREG

Arduino interface:

- No.1 connector type Female Header, 5 Contacts (No.4 for RESET / MISO / MOSI / SCK signals and No.1 on ground)
- Used to connect the module to an Arduino UNO board
- It allows the study of the code provided, or edit it and evaluate its effect on the module operation
- Allows updating / re-programming of the microcontroller code in the module

Breadboard interface:

- No.2 connectors, type Female Header, 5 contacts
- Connector 1: + 15V, + 12V, + VREG, + 5V and ground
- Connector 2: -15V, -12V, -VREG, I-OUT and ground
- Used to power breadboard or external experimental circuits

Quality:

- Test point: brass alloy, surface gold
- Electronic components: RoHS
- PCB: 35µm copper, UL mark, IPC2

Ergonomics:

- Synoptic panel: blue with white silkscreen to ensure contrast and readability, 15° inclination to optimize use and readability

TECHNICAL SPECIFICATIONS (cont.2)

- Controls: mini-slide switches and buttons
- Test points: for use with measuring instruments
- Header female: standards for connection to Arduino UNO board, Breadboard or experimental circuits

Safety:

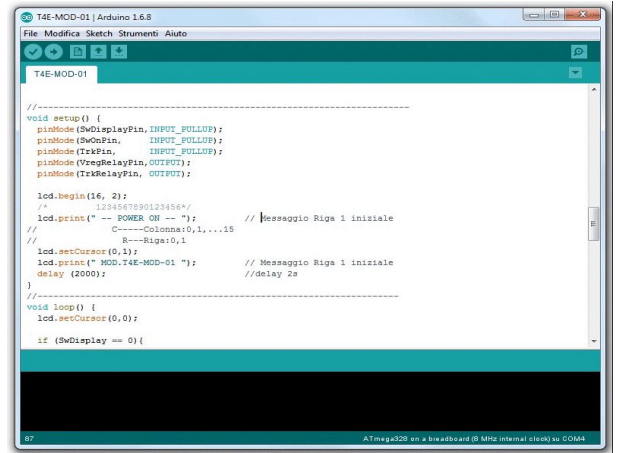
- External power supply: protection for power and temperature overload, and short circuit
- Electronic circuits: sturdy box in ABS that protects the internal circuits making them inaccessible

Accessories included:

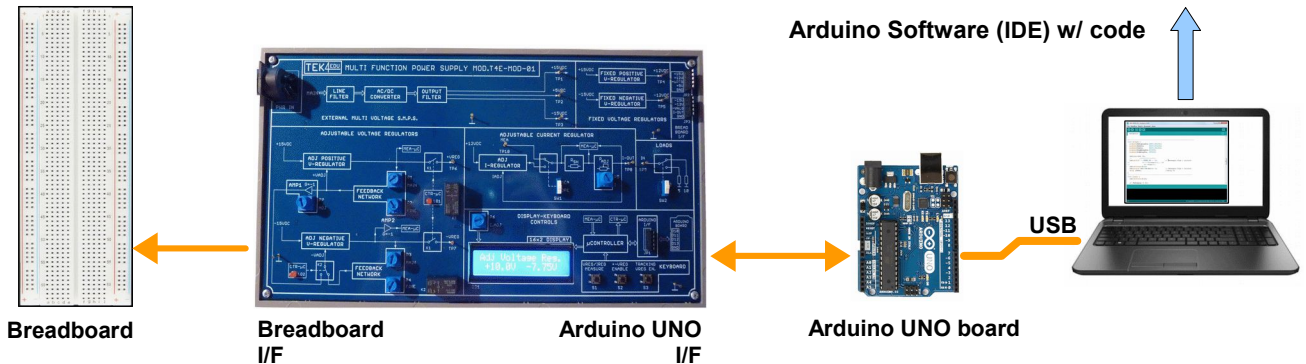
- Student manual: contains exercises that describe how to use the module, the circuit design concepts, the description of the code used in the module
- Power unit: 90-264VAC / 47-63Hz input, with cable and connector
- Mains AC power cable: IEC60320
- No.2 Crocodile clips cable

Dimensions and weight:

- Packaging: 350x230x120 mm
- Front panel: 300x160 mm
- Total weight: 1kg



Example of installation and use



Option:

- PROTOTYPE KIT 1 mod.T4E-ACC-01



Accessories included:

- Student manual
- Power supply unit
- Power cable
- No.2 Crocodile clips cable



Accessories not included:

- Arduino UNO board
- Computer
- Breadboard