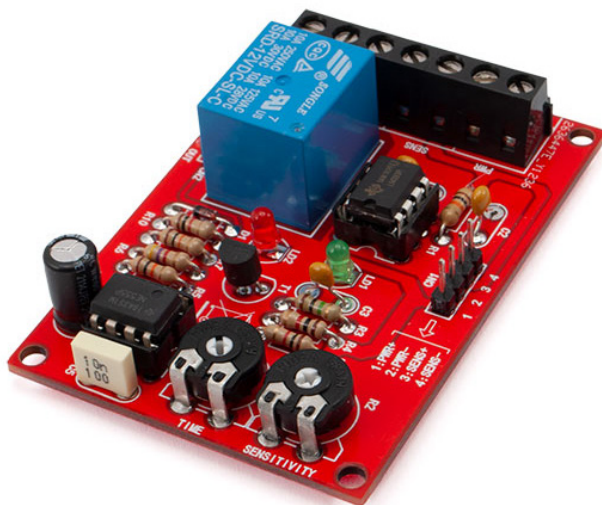# AUTOMATION FOR MOTORIZED BLINDS *(cod. FK013)*

This board, when paired with a rain sensor and connected through a relay, can control the closure of an outdoor blind or a motorized shutter to prevent rainwater from affecting your fixtures. The device features two trimmers that allow you to adjust sensitivity and activation duration.

Operating this system is straightforward. To detect rain, we use a simple sensor based on a single-sided printed circuit board with interdigitated traces. One side is connected to a pad, and the other side is connected to another pad, with channels carved out in between to allow excess water to flow. When water droplets wet the copper-clad surface of the board, a water film forms, connecting the traces.

The more water and the larger the wetted area of the traces, the lower the electrical resistance between them. Therefore, when the rain sensor (RN01) is dry, it presents

Technical Specifications

- ■ **Power supply voltage: 12 VDC**
- ■ **Relay operation: monostable**
- ■ **Pulse duration adjustment trimmer: 0.11 to 11.1 seconds**
- ■ **Sensitivity adjustment trimmer**
- ■ **Relay rating: 10A 250VAC/30VDC**
- ■ **Dimensions: 69x49x18 mm**

Diagram circuit
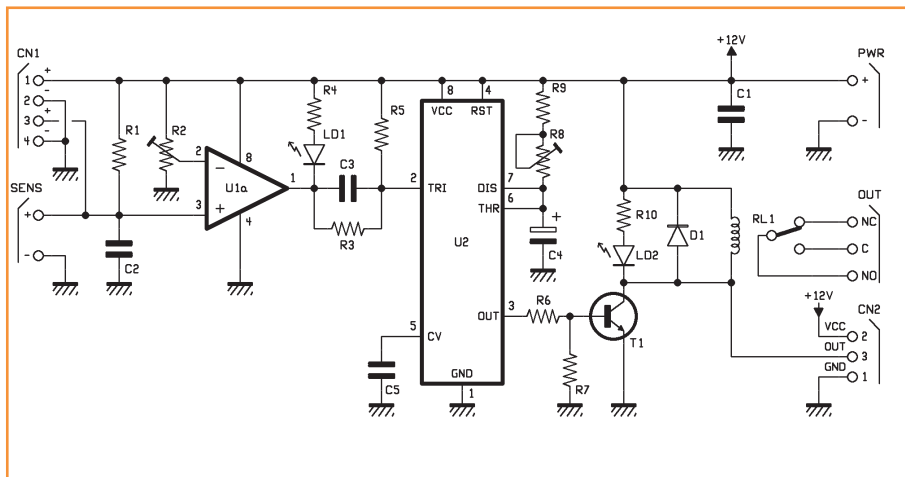
an open circuit (infinite resistance) at its output contacts. As water gradually covers the copper surface of the board, the resistance decreases.

By connecting the two pads to the input of the circuit, specifically to a voltage comparator's input, which is powered by a resistor forming a voltage divider with the sensor's resistor, we can obtain a voltage level when it's raining. More precisely, the comparator switches its output state when the sensor is wet, and it controls a monostable circuit. The monostable circuit, in turn, activates a relay, whose contacts will trigger the motor of the motorized shutter or blind for a specific duration. The monostable is designed to ensure that the relay contact closure occurs for a set period, regardless of the comparator's output state that triggers the monostable.

If rain intermittently wets the sensor, each

time the comparator switches, it will result in a new pulse at the monostable's output, provided the output is not already activated.

Please follow these instructions carefully to set up and configure the rain sensor and associated components for your outdoor blinds or motorized shutters.

Implementation and installation
All the required components are of the through-hole type.

Start with the resistors, silicon diode D1, the two trimmers, and the non-polarized capacitors. Then, proceed with the sockets for the LM393 and 555 ICs (both require 4+4 pin DIP sockets). Mount the ICs only after soldering all other components. Move on to the two LEDs (remember that their cathode is the electrode with the flat side of the packa-

[Assembly Plan
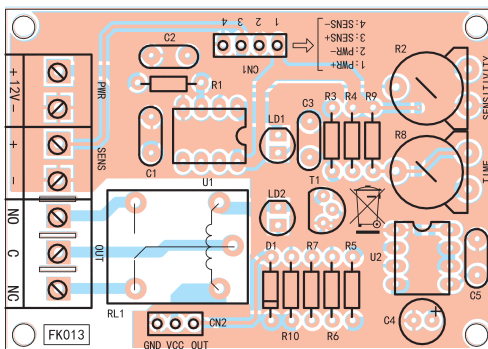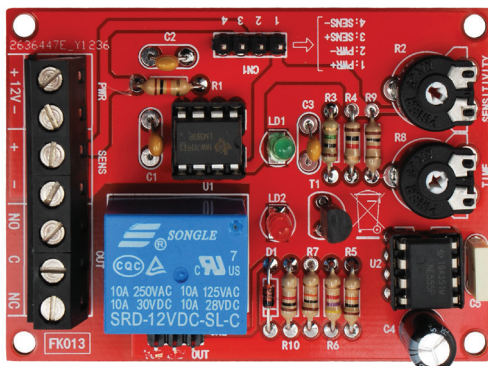
Component list:

R1, R5, R7: 10 kohm
R2: 10 kohm Trimmer (MO)
R3: 1 Mohm
R4, R9, R10: 1 kohm
R6: 4.7 kohm
R8: 100 kohm Trimmer (MO)
C1, C2, C3: 100 nF ceramic
C4: 100 µF 16V electrolytic
C5: 10 nF ceramic
D1: 1N4148
LD1: 3 mm green LED
LD2: 3 mm red LED
RL1: 12V/10A Relay

T1: BC547
U1: LM393
U2: NE555

Various:
2-way terminal block with a 5 mm pitch (2 pieces)
3-way terminal block with a 5 mm pitch
4+4 Pin Socket (2 pieces)
Male 3-way pin strip
Male 4-way pin strip
PCB FK013 (69x49 mm)

The board connected to the rain sensor
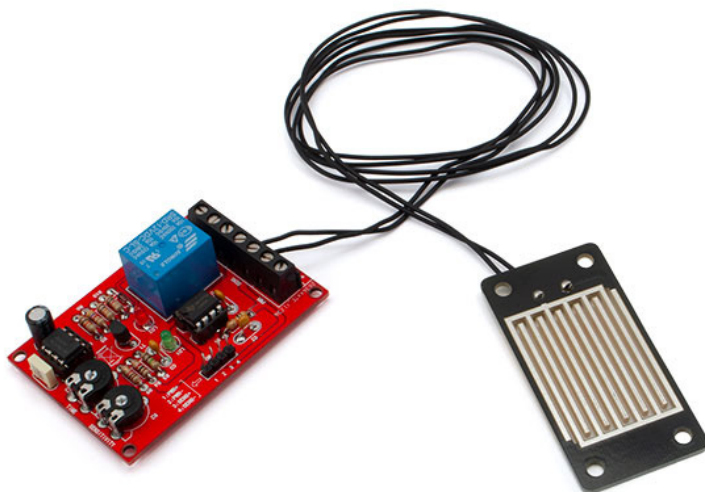
ge) and the three 5mm pitch terminal blocks that you will use to connect the sensor (SENS, bipolar), power supply (PWR, bipolar), and relay contacts (C, NO, NC, tri-polar). Insert and solder the electrolytic capacitor and pin-strip connectors to create CN1 and CN2. For the orientation of polarized components, refer to the assembly diagram available on page 3. Once assembly is complete and verified for accuracy, use a suitable length of two-conductor cable to connect the RN01 sensor board to the SENS terminal block. Be sure to create a loop facing downward to prevent water from

reaching the PCB in case the cable gets wet. Then, connect the output of the 12V DC power supply (with a minimum output of 100mA) to the PWR terminal block while observing the indicated polarity. Perform an initial test by initially setting trimmer R2 to the midway point and leaving R8 at the minimum. Try wetting the sensor and verify that LED LD1 lights up. If it doesn't, adjust the R2 trimmer until it does. In such a case, you should also hear the relay click, which will release once the time set by R8 has elapsed. If everything goes as indicated, your device is ready for installation.

The complete article of the project has been published in: Elettronica In issue number 274.