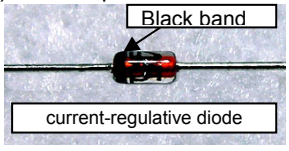
MK-314 Turn On Lighting or Buzzer at Set Weight! Weight Sensor with Relay Kit

This MYCOMKITS.COM's "MK-314 Turn On Lighting or Buzzer at Set Weight! Weight Sensor with Relay Kit" is weight sensor kit what drives the relay in correspondence to weight using a superthin FSR (Force Sensing Register) sensor that changes resistance values in reverse proportion to pressure that is applied. The power of a device of your choosing can be turned on or off with weight that has been set with the relay. You can easily see when the weight that has been set is approaching as an alarm LED lights up when minus 10% of the set weight is being applied.

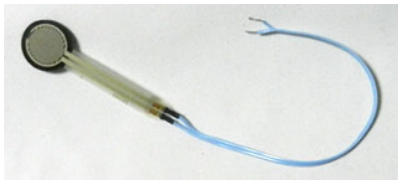
FEATURES:
Easy to assemble as the number of parts is low
100V instruments can be controlled because of the internal relay
The setting of the weight can be done easily with potentiometer.
The weight that can be detected is from about 50 grams to 10 kilograms
Includes a digital-like hysteresis mechanism

Specifications:
Supply Voltage DC12V (300mA or more)
Relay contact AC125V1A, DC30V1A (resistive load)
AC125V0.3A, DC30V0.3A (inductive load)
Detection Weight About 50g to about 10kg
Sensor FSR sensor (FSR402)
(by INTERLINK ELECTRONICS)
Sensor part area - about 12mm in diameter, about 1mm in thickness
Power supply connector 2 types:
DC jack type - 2.1mm in shaft diameter, 5.5mm in external diameter
2 pole terminal block type
Relay output: 3 pole terminal block type
-COM terminal (connect with the NO terminal or NC terminal in accordance with the condition of the common terminals/relay)
-NO terminal: Connect with the COM during a relay drive
-NC terminal: Connect with the COM when not driving the relay

Assembly:
Check to see if all of the parts in the parts list are included before assembly. Assembly is easy as there are not many parts.
Refer to the "Convenient notes for electrical work(PDF)" on the website for details on how to attach components, how to view PCB silk printings, how to interpret resistance values, and so on.
Start soldering parts starting with the shortest (resistance and diodes) and solder the capacitor next.
The current-regulative diode (CRD) is a compact element that is sealed with glass (right photo). It is mounted on the same direction as the black band side (minus) and the band with the printing (the band is illustrated as with standard diodes) on the board. This band side (minus side) is connected to the FSR sensor. Attach the IC, electrolytic capacitor, diode, LED, and transistor with care as they have poles and proper directions.



There are indents in the IC and the Pin 1 side of the socket as well as a silk printing on the PCB that is easy to see
There is a silk printing on the PCB for the pole of the electrolytic capacitor. Confirm it carefully, insert the lead, and solder it.
There is a straight line on the cathode of the LED. The cathode is the short LED lead. Red is mounted in D4 and yellow is mounted in D5 when it is manufactured, but they can be replaced.
Finally, solder the screw terminals, DC jack connector, and relay. Solder 2 narrow cables (the included 2-core flat cables, etc.) on to the FSR sensor (refer to the right photo), which is a weight sensor, and wrap the soldered part with material such as vinyl tape to isolate it (refer to the right photo). Next, connect the 2 cables of the FSR sensor to the terminal block. They are not polar.



Check the polarity of the parts once more before connecting the power.

What To Do If It Does Not Work
If the kit does not operate, check the values and polarity of all the parts once more. Poor soldering is the most likely reason.
Check all solder joints carefully under a good light. Next, check all of the soldering and all cables and lead lines that are connected. Contact us at the email address for support concerning the items below if the causes of the problems are unclear.

How to use:
Connect the DC12V with the DC jack connector (J1. The axis is minus.) or screw terminal (J2. the polarity is inscribed on the board). Connect with one of them. The parallel connection will be made electrically. **Be cautious about the polarity.**
Connect the device to be controlled with the screw terminal (J4) of the relay with the contact output. The COM terminal and NC terminal (both have inscriptions on the board) are connected when there is no relay driving. The COM terminal and NC terminal are disconnected (open) when there is relay driving and the COM terminal and NO terminal will be connected.
Turn the power switch (slide switch) ON ("ON" is inscribed on the board) and set the potentiometer for setting the weight. It will be about 50g when turned to the left and about 10kg when turned to the right. The values fluctuate so place something that will generate a probable weight on the sensor and make settings while checking the LED until the weight that you want is obtained. However, logarithmic calculations are made so that weights of 1kg or below can be smoothly detected. Therefore, the rotation angles of the volume and weight are not linearly proportional. The weight is about 80g at a 1/4 rotation for volume, 400g in the center, and about 2kg at a 3/4 rotation. For example, the LED lights up in yellow when the subject of detection approaches about 400g (about minus 10%) when settings are made in the center. The LED lights up in red, the relay drive starts with a clicking sound, and the COM terminal and NO terminals are connected when the set weight becomes closer. If the weight becomes lighter than 1kg after 1 second or more has elapsed (digital hysteresis mechanism), the relay turns off, the COM terminal and NO terminals are open, and the COM terminal and NC terminals are connected again in reverse.

Circuit Description.
Operation is easy as the number of parts is low.
The weight sensor used with this kit is a resistance type FSR sensor (by Interlink Electronics) and generates resistance that is in reverse proportion to weight (pressure applied). A constant current (0.3mA) is passed to this sensor and the Mycom IC measures the voltage between the terminals of the sensor and compares it with the voltage (corresponding with the detected weight) that has been set with the potentiometer. From these results, a yellow LED is lit up as an alarm when about minus 10% of the set weight is near, a red LED is lit up

when the set temperature is reached next, and the relay is driven at the same time.

Structure of the sensor (important):
Two electrodes are alternately lined up on one side in a comb-like alignment and conductive materials are allocated on the other surface. It is a system where there is then a space of 0.05mm in between and the comb-like electrodes come into contact with the conductive surface and the resistance values change with the surface being suppressed. Next, **make modifications so that the entire detection surface is suppressed for proper detections as the weight is being determined with the resistance values.** Refer to the website of the manufacturer below for details on the FSR sensor.
http://www.interlinkelec.co.jp/products/fsr400.html

Adding a start switch:
The kit does not include a measurement start switch, but the resistance is already implemented so that it can be added. A program is also included. The measurement starts (in a prepared state) when the No. 4 pin of the microcontroller U1 is at a high level, and stops when it is at a low level (connected to the ground). Therefore, the starting (disconnecting) or stopping (connecting) can be controlled by attaching the toggle switch or press button switch to the No. 4 pin and disconnecting or connecting between grounds.

Explanation of the program:
The voltage on both ends of the sensor is read out with the microcontroller AD converter, logarithmic calculations (the results of the logarithmic calculations that have been made beforehand are to be used as array data) are made along with conversions to values that make comparisons easier, and comparisons with the voltage (the threshold, compared with the weight) generated with the volume for setting weights are made. 16 moving averages are calculated and used as measurement data in order to avoid reading errors, the effects of noise, etc. This hysteresis is generally implemented with the sensor switch. This means that the threshold to be on and the threshold to be off can be moved and the nearby slippage can be eliminated. With the MK-314, a time period of about 1 second where there are no detections in the changes between the on-off-on statuses or changes between the off-on-off statuses is allowed without making threshold settings so that slippage can be decreased. The program is publicly available so please check it and feel free to make modifications if necessary.

Changes in weight ranges:
The FSR sensor used in the MK-314 is an element that shows about 10kΩ at 600g and weight from about 50g to 10kg can be measured by passing a current of 0.3mA and detecting weight as voltage. Therefore, the desired weight range may be able to be detected by making a change to an FSR sensor that is appropriate for responding to weight that is lower or weight that is higher, and at the same time, changing the current-regulative diode (CRD) for an outputted weight range of about 0V to a little below 5V and changing the current values to be added.
Use the V=I×R (Ohm's Law - V is for voltage, I is for current, R is for resistance) formula and attach the current-regulative diode (D3) that is consistent with the resistance value of your thermistor.
For detecting weight that exceeds 10kg, weight of up to 30kg may be able to be measured by making a 3-point mounting support tray, distributing the weight equally in 3 locations, and attaching an FSR in one of the seatings. Please give it a try. Please give it a try.

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CONTACT DETAILS
Access the following MYCOMKITS.com website below for related detailed documents.

http://www.mycomkits.com

Contact us at the email address below if you have any questions. **support@mycomkits.com**

Parts List-MK-314

resistor	
10kΩ (brown, black, orange) R2	1
2.2kΩ (red, red, red) R3	1
1kΩ (brown, black, red) R4, 5	2
Capacitor	
0.1uF(104) capacitor C1, 2	2
100uF polar C3	1
Semiconductors	
12F683 microcontroller IC U1(or 12F1822)	1
78L05 regulator IC U2	1
BC548 transistor Q1	1
1N4007diode D1, 2, 6	3
Current regulative diode (CRD) D3 (E-301 or equivalent)	1
LED red D4	1
LED yellow D5	1
Other	
FSR-402 FSR sensor (by INTERLINK ELECTRONICS) (with roughly 15cm-long 2-core flat cables)	1
Relay RLY1 (SRSZ-12D by SONGLE or equivalent)	1
10kΩ semifixed volume R1	1
Terminalblock(screw termonal, 2 pole) J2,3	2
Terminalblock(screw termonal, 3 pole) J4	1
DC jack connector J1	1
IC socket 8 pin	1
Slide switch S1	1
MK-314 PCB (k248)(about 63x43mm)	1

Note: The red and yellow colors of the LED are of the same electrical specifications so yellow can be used for D4 and red can be used for D5.

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