WATER LEVEL DETECTOR

PRODUCT CODE: M00270035

DESCRIPTION: This is a water level detector (Empty and Full). But, in fact, this can detect any liquid with dielectric polarity.

READ BEFORE INSTALLATION:

- Put the component on the side of screen printing and solder on the back of PCB without printing.
- Placing direction of component.

1. On component, longer leg is "+".
2. On PCB marking, square pad as Figure 1 is always "+".
3. For diode, please install as Figure 2.

- For any IC, finding out which leg is first leg (FIGURE 4) is important. Also, solder the socket (chair) to the PCB and the IC sit on the top.
- For 9V Battery Adaptor, Red is B+ and Black is B-. Also, please tie a knot after the red and black wire has passed the neighbors hole before soldering. This is similar to Figure 6.

FIGURE 1

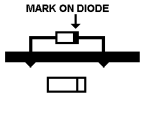

FIGURE 2

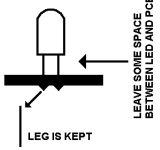

FIGURE 3

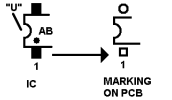

FIGURE 4

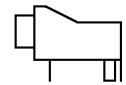

FIGURE 5

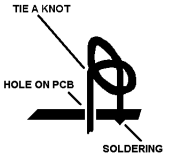

FIGURE 6

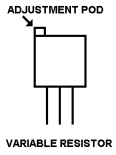

FIGURE 7

FIGURE 8

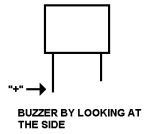

FIGURE 9

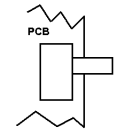

FIGURE 10

CIRCUIT EXPLANATION:
Please read the below together with the circuit diagram in Figure 11.

Before learning of this circuit, you can see Figure 11 that the position of wire "S" (Source) is the almost at bottom of container. "E" (EMPTY) is little higher than "S". "F" (FULL) is almost at the top of container. The PVC outer skin of PVC wire does not need to be taken away before putting this into water for detection (I would explain in below how the plastic can conduct electricity).

Brief Description

The output at "S" gives out AC signal by the gentle PVC wire to the water. The water level decide if this can reach "E" and "F" at other end and tell the player if this is either at "Empty" and "Full" status. Why use AC signal because AC signal can escape from copper wire by the capacitance effect to water with insulation (PVC of PVC wire) in between. No metal contact with water or other liquid can prevent corrosion of copper wire inside.

Explanation at Each Part

- Part 1 is the source of output of AC signal. C5 and R5 decide the frequency of the oscillation. Higher the frequency, easier the AC wave can escape from PVC wire into water. Using the comparator circuit of U1C at Leg 8 and leg 9 finally give out the square wave at leg 14. Q2 and Q3 and C3 can make the square wave swing between "+" and "-" and not "+" and "0". This can make less electrolytes process of liquid to be measured taking place.
- Part 2 is the receiver of AC signal from Part 1 for detecting the "FULL" of water. If the water is not full, leg 7 would be closed to zero voltage because no signal can reach "F". Then this compare with the voltage at Leg 6 due to voltage divider VR1. When Leg 7 is lower than Leg 6, output of Leg 1 would become Low. If signal can reach "F" and finally higher than the signal at leg 6. leg 1 would become high. C4 and D4 are called Clamper Circuit. This can let the whole AC signal to be measured. D3, C6 and R10 are to make the AC signal become DC signal so that this can compare the DC voltage from VR1 easier. VR1 is to adjust the sensitivity of "FULL". If the sensitivity is high, little touching of water or other liquid to wire "F" can trigger the equipment.
- Part 3 work similar to Part 2. This part is to detect the "EMPTY" of water. But now the working logic of comparator reveres. You can see leg 13 would be Low when leg10 is higher than leg 11.
- Part 4 is to control the rate of beeping of buzzer. The working logic is similar to Part 1. But now C2 and R3 are much bigger so that the rate of oscillation is also much lower so that the human ear can hear. When Part 2 is high, Part 4 would give out square wave and let the buzzer beep.
- Part 5 would make the buzzer becoming "ON" (Not "BEEP" ….."BEEP"….) When leg 13 is high.
- Think about Part 1 to Part 5 again and again. You can find out the logic of this small equipment and how this can tell the player when is "FULL" or "EMPTY". When this is "EMPTY", the buzzer would be on "ON" status. When this is between "FULL" and "EMPTY", the buzzer would be silent. When this is on "FULL", the buzzer would be on "BEEPING" status. Three different status of buzzer finally tell the player the status of water level.
- In part 6, this is the buzzer. The diode is to prevent high voltage exists when the buzzer from "ON" to "OFF".
- Part 7 is the sources of power. D1 is just to prevent the reverse of power connection.

INSTALLATION:
Just install the component to the PCB M00260052 according to below table.

ITEM	SYMBOL ON PCB	DESCRIPTION	OUTLOOK	DIRECTION IS IMPORTANT?
1	R1	RESISTOR, 330 ohms	ORANGE, ORANGE BROWN	NO
2	R2	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
3	R3	RESISTOR, 1M ohms	BROWN, BLACK, GREEN	NO
4	R4	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
5	R5	RESISTOR, 100K ohms	BROWN, BLACK, YELLOW	NO
6	R6	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
7	R7	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
8	R8	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
9	R9	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
10	R10	RESISTOR, 100K ohms	BROWN, BLACK, YELLOW	NO
11	R11	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
12	R12	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
13	R13	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
14	R14	RESISTOR, 10K ohms	BROWN, BLACK, ORANGE	NO
15	R15	RESISTOR, 100K ohms	BROWN, BLACK, YELLOW	NO
16	C1	CAPACITOR, 100uF	MARK WITH 100uF OR SAME MEANING OF VALUE	YES
17	C2	CAPACITOR, 22*10E4 pF	MARK WITH 224 OR SAME MEANING OF VALUE	NO
18	C3	CAPACITOR, 22*10E4 pF	MARK WITH 224 OR SAME MEANING OF VALUE	NO
19	C4	CAPACITOR, 22*10E4 pF	MARK WITH 224 OR SAME MEANING OF VALUE	NO
20	C5	CAPACITOR, 10*10E1 pF	MARK WITH 101 OR SAME MEANING OF VALUE	NO
21	C6	CAPACITOR, 10*10E4 pF	MARK WITH 104 OR SAME MEANING OF VALUE	NO
22	C7	CAPACITOR, 22*10E4 pF	MARK WITH 224 OR SAME MEANING OF VALUE	NO
23	C8	CAPACITOR, 10*10E4 pF	MARK WITH 104 OR SAME MEANING OF VALUE	NO
24	Q1	TRANSISTOR, PNP	MARK WITH 9012 AND FIGURE 8	YES
25	Q2	TRANSISTOR, NPN	MARK WITH 9014 AND FIGURE 8	YES
26	Q3	TRANSISTOR, PNP	MARK WITH 9012 AND FIGURE 8	YES
27	Q4	TRANSISTOR, NPN	MARK WITH 9014 AND FIGURE 8	YES
28	D1	DIODE, IN4001	FIGURE 2 (MOSTLY BLACK)	FIGURE 2
29	D2	DIODE, IN4148	FIGURE 2 (MOSTLY TRANSPARAENT RED)	FIGURE 2
30	D3	DIODE, IN4148	FIGURE 2 (MOSTLY TRANSPARAENT RED)	FIGURE 2
31	D4	DIODE, IN4148	FIGURE 2 (MOSTLY TRANSPARAENT RED)	FIGURE 2
32	D5	DIODE, IN4148	FIGURE 2 (MOSTLY TRANSPARAENT RED)	FIGURE 2
33	D6	DIODE, IN4148	FIGURE 2 (MOSTLY TRANSPARAENT RED)	FIGURE 2
34	L1	LED	RED	YES
35	SWITCH	SLIDE SWITCH	SIX LEGS	FIGURE 10
36	DCJACK	3.5mm MONO JACK SOCKET	FIGURE 5	YES
37	B+, B-	9V BATTERY ADAPTOR	RED WIRE, BLACK WIRE	YES
38	U1	DIP 14 SOCKET	14 LEGS	NO
39	VR1	VARIABLE RESISTOR, 1M ohms	FIGURE 7	NO
40	VR2	VARIABLE RESISTOR, 1M ohms	FIGURE 7	NO
41	BZ	BUZZER	FIGURE 9	YES
42	ON TOP OF ITEM 38	IC LM339	14 LEGS	FIGURE 4
43	S	RED WIRE	RED IN COLOR	SEE BELOW
44	F	YELLOW WIRE	YELLOW IN COLOR	SEE BELOW
45	E	BLACK WIRE	BLACK IN COLOR	SEE BELOW

- For installation of PVC wire of "S", "F" and "E", you must tie a knot as in Figure 6. "S" (Source) is installed almost at the bottom of container. "E" (EMPTY) is little higher than "S". "F" (FULL) is almost at the top of container.
- You are no need to take away the PVC plastic of PVC wire and put this under water for detection. If you do in this way, corrosion would take place to the copper wire. In the *Brief Description* of CIRCUIT EXPLANATION, you can see the signal inside the wire can go through the PVC plastic freely.
- After you have installed the PVC wire into water like Figure 11, you need to adjust the VR1 and VR2 into working condition. Now I assume you use water as the liquid you want to measure. Put the water until this cover S and E. Turn VR2 until you hear the buzzer is from "ON" to just "OFF". Now put more water to the container until this cover all, "S", "E" and "F". Turn VR1 until you hear "BEEPING" of buzzer. Now the adjustment is finished.
- After installation, you can use external DC adaptor as power sources. You can use our product M00270013 or other similar adaptor.

CIRCUIT DIAGRAM:

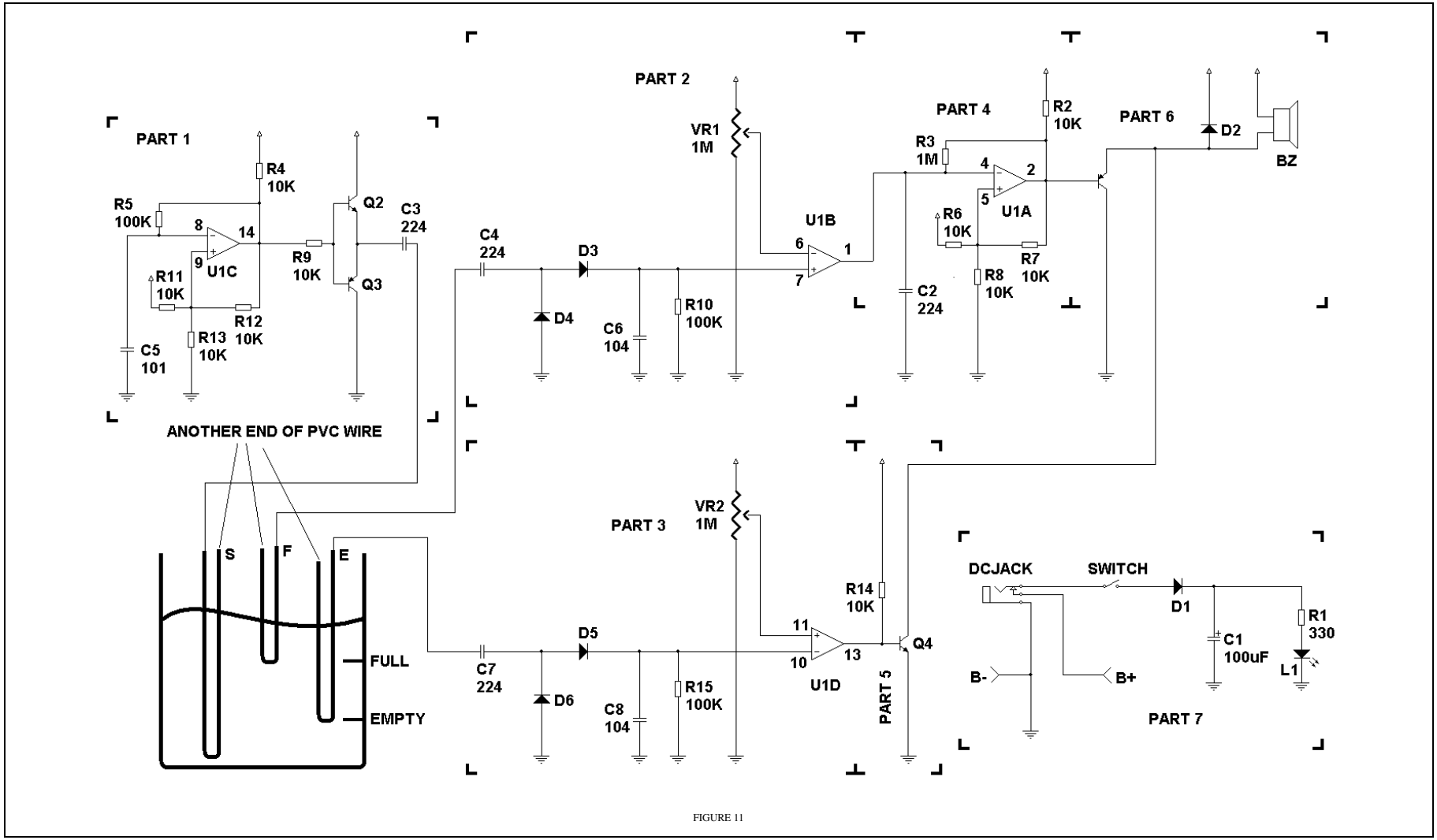

FIGURE 11