Manuals+ — User Manuals Simplified.

velleman K8009 Multifunctional Clock Display Instruction Manual

Contents

velleman K8009 Multifunctional Clock Display

Product Information

The K8009 multifunctional clock display is a versatile device that can display time, date, and temperature. It has a high-quality display with six 36mm high digits and comes with a wireless remote control that allows you to access

all its functions. The device also has a countdown function, a chronometer with a lap function, and a scoreboard function that can count up to 199. Additionally, it has a random generator from 00 to 99, two-digit dice, an hour chime option, a counter display, and a relay output for temperature control or time alarm.

Features:

- Six 36mm high digits
- Time, date & temperature indication
- 1 sec. resolution chronometer with lap function
- Countdown function to a specific date
- Scoreboard function (two players or teams, count up to 199)
- Random generator from 00 to 99
- Two-digit dice
- Hour chime option
- Counter display
- Relay output for temperature control or time alarm
- US or Europe display option: time, date, degrees Celsius or Fahrenheit
- Wireless remote control for all functions (wired remote possible)

Specifications:

- Model: K8009
- Optional enclosure type: B8009
- Optional extra remote type: K6706A, K6706B or K6706G

Product Usage Instructions

1. First, assemble the remote control PCB (P6706A) following the instructions provided.
2. Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
3. Make sure you have the right tools for assembly.
4. Follow the instructions carefully and read and understand the entire step before performing each operation.
5. Perform the assembly in the correct order as stated in the manual.
6. Once assembled, connect the remote control to the K8009 clock display.
7. Use the wireless remote control or wired remote (if used) to access all functions of the clock display.
8. Select the desired display option for time, date, and temperature (US or Europe).
9. Select the desired function, such as chronometer, countdown, scoreboard, random generator, dice, hour chime, or counter display.
10. Use the relay output for temperature control or time alarm if needed.

Multifunctional clock display

Features :

- 6 x 36mm high digits.
- Time, date & temperature indication, selectable with toggle option.

- 1 sec. resolution chronometer with lap function.
- Count down function to a specific date.
- Scoreboard function (two players or teams, count up to 199).
- Random generator from 00 to 99.
- 2 digit dice.
- Hour chime option.
- Counter display.
- Relay output for temperature control or time alarm.
- US or Europe display option: time, date, degrees Celsius or Fahrenheit. R Wireless remote control for all functions (wired remote possible).
- Optional enclosure type B8009.
- Optional extra remote type K6706A, K6706B or K6706G.
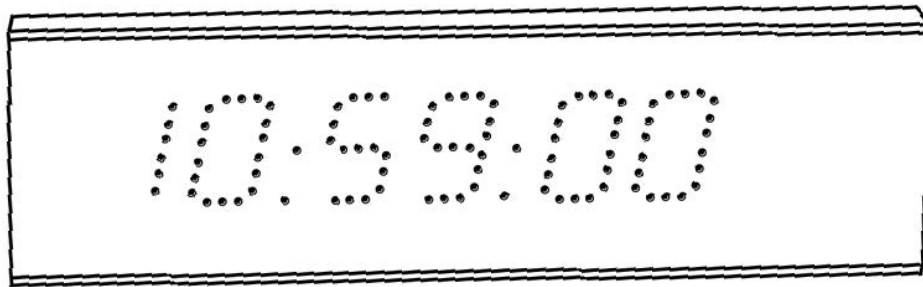
Specifications :

- Fixed 433.92 MHz transmitter frequency, as required by law.
- Key chain remote control included.
- Temperature indication from -20 to +70 ºC (resolution 1º).
- Temperature indication from 0 to +150 ºF (resolution 2º).
- Memory backup option: 9V battery or rechargeable battery T331
- Relay output: 1A / 24V max.
- Supply: 12VDC/300mA power supply (adapter type PS1203).
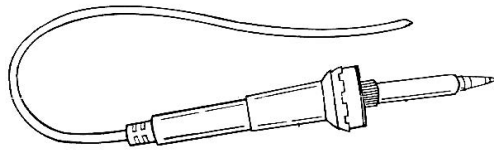- Dimensions : 252 x 80mm (without enclosure).

Modifications reserved

Assembly (Skipping this can lead to troubles !)

Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease.
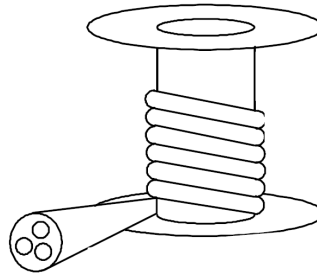
A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.

- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and Philips screwdrivers. A basic range is fine.
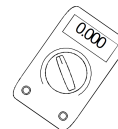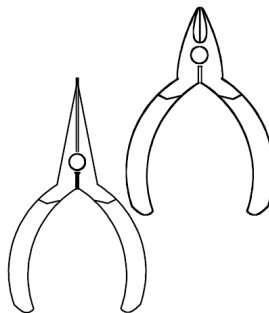
For some projects, a basic multi-meter is required, or might be handy

Assembly Hints :
⇒ Make sure the skill level matches your experience, to avoid disappointments.
⇒ Follow the instructions carefully. Read and understand the entire step before you perform each operation.
⇒ Perform the assembly in the correct order as stated in this manual
⇒ Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
⇒ Values on the circuit diagram are subject to changes.
⇒ Values in this assembly guide are correct*
⇒ Use the check-boxes to mark your progress.
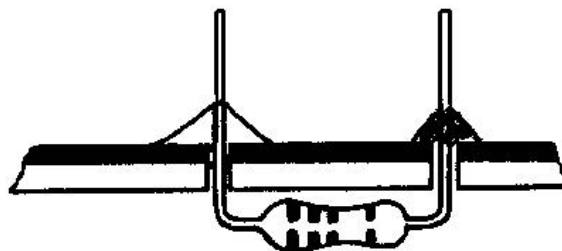⇒ Please read the included information on safety and customer service
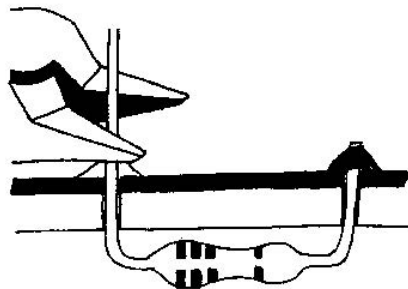
Soldering Hints :

1. Mount the component against the PCB surface and carefully solder the leads
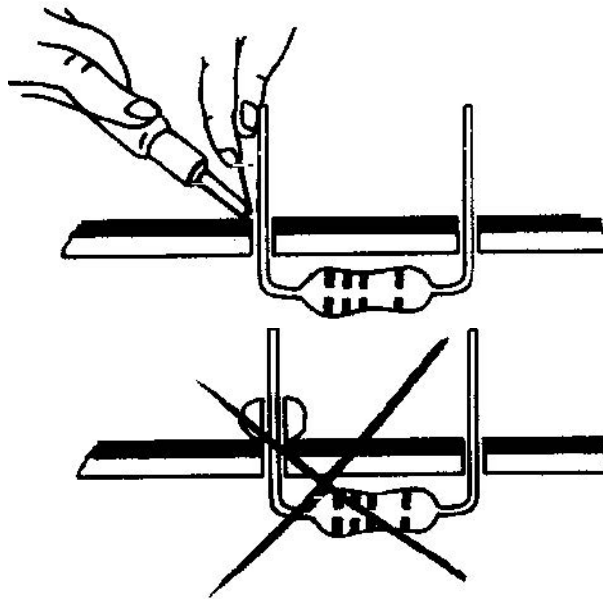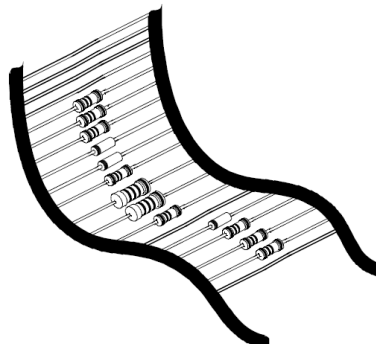

2. Make sure the solder joints are cone-shaped and shiny

3. Trim excess leads as close as possible to the sol-der joint

AXIAL COMPONENTS ARE TAPED IN THE CORRECT MOUNTING SEQUENCE !

REMOVE THEM FROM THE TAPE ONE AT A TIME !

Velleman hereby certifies that the device K8009 meets the essential requirements and all other relevant stipulations of directive 1999/5/EG and 1995/5/EC.

For the complete conformity declaration check out :
http://www.velleman.be/downloads/doC/CE_K8009.pdf

5%

4K7=(4 - 7 - 2 - B)

1%

4K7 = (4 - 7 - 0 - 1 - 1)

COLOR= 2...

– +
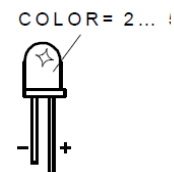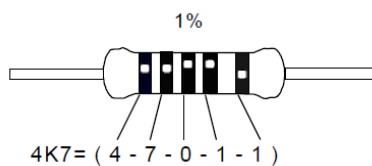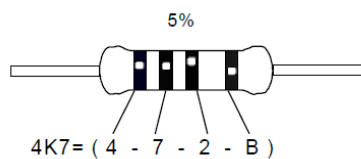
COLOUR CODE	
0	Black
1	Brown
Red	
3	Orange
Yellow	
5	Green
Blue	
7	Purple
Grey	
9	White
Silver	
B	Gold

IMPORTANT
First the remote control PCB is assembled, P6706A:
The remote control can be build for wireless remote operation or for "wired" remote operation (no need for battery in the transmitter). In case of a wired remote, only a few components are mounted, see further.
Before mounting the components on the PCB, first check that the PCB fits in the housing. Watch the small notch next to LD1. Should it not fit, then grind the edges of the PCB carefully.
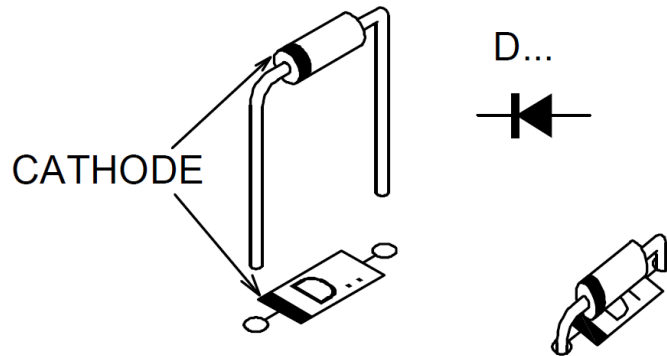Mount only the components marked with "#" if wired remote is wanted.
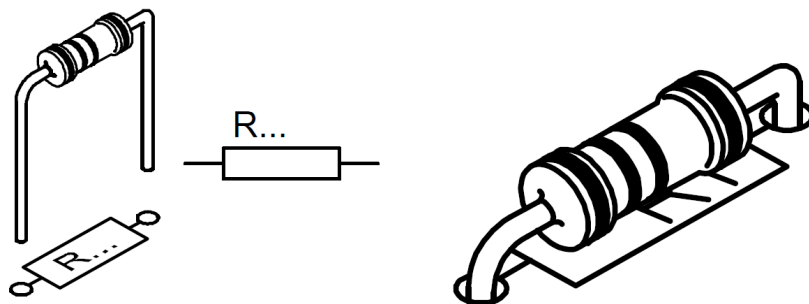
1. Jumperwire

   J1 #

2. Diodes (Check the polarity)

CATHODE

D...
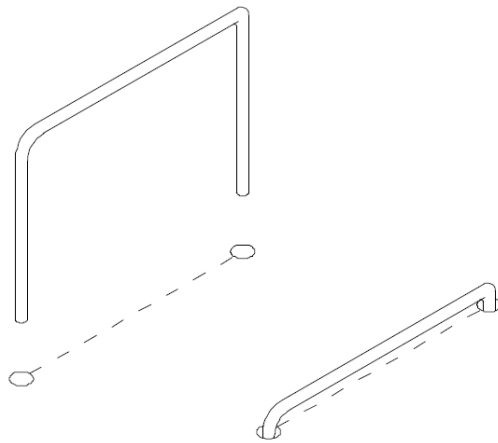
D1 : BAT85 #

D2 : BAT85 #

3. 1/4W Resistors

R...
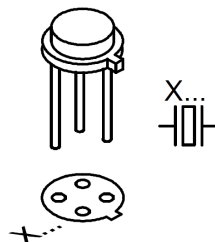
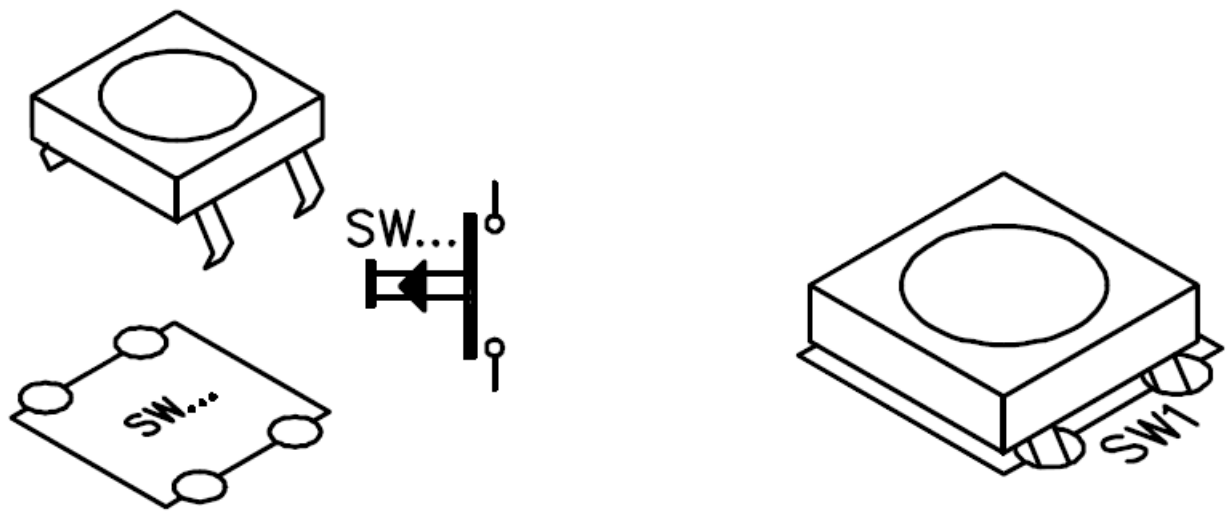R4 : 33K (3 – 3 – 3 – B)

R5 : 100K (1 – 0 – 4 – B) #

4. SAW resonator

(Watch the position of the notch)
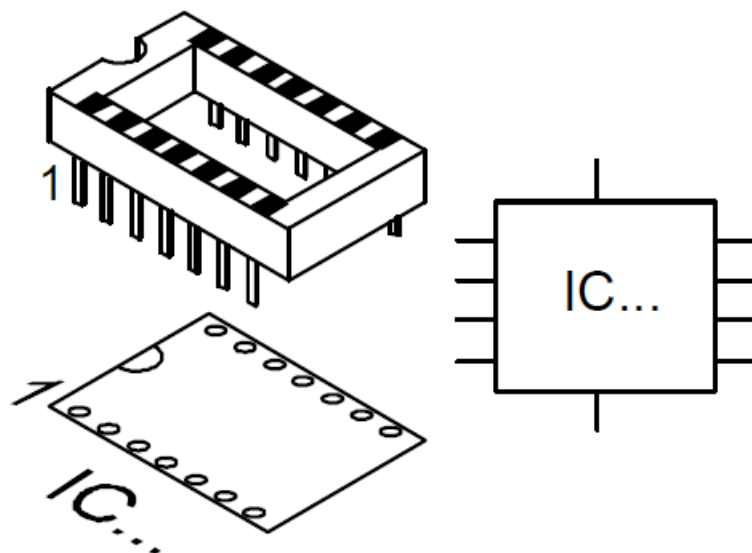
X...

X1 : SAW433

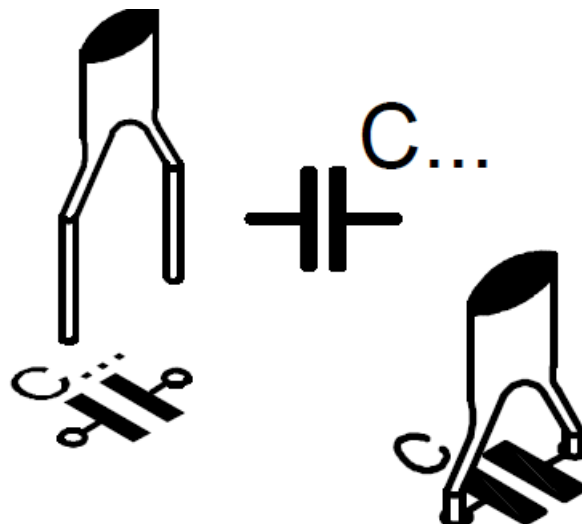5. Push buttons

SW...

SW1 : KRS0611 #

SW2 : KRS0611 #

6. IC socket

(Watch the position of the notch)

1

IC...

IC...

IC1 : 18p #

7. **Capacitors**

C...

C...

C1 : 100pF (101)

C2 : 1pF small type !

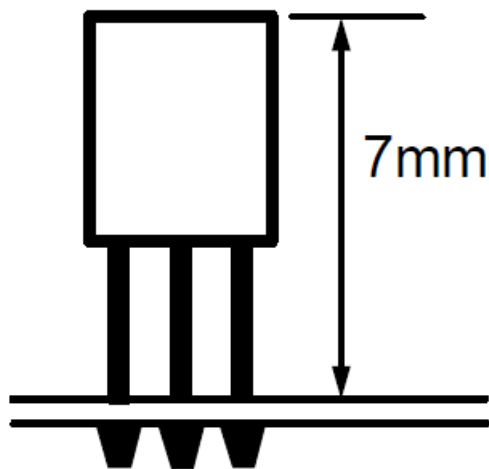C3 : 56pF

C4 : 4,7pF (4p7, 4.7)

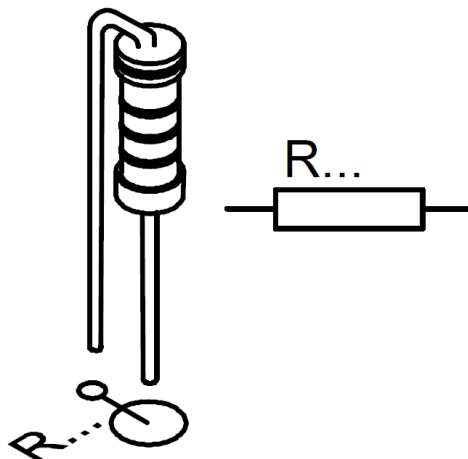C5 : 56pF

C6 : 470pF (471) #

8. Transistor
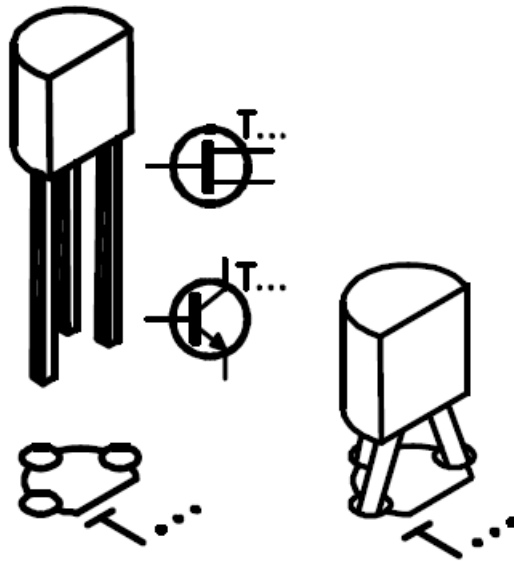
T1 : MPSH10

Check the minimum height ! :

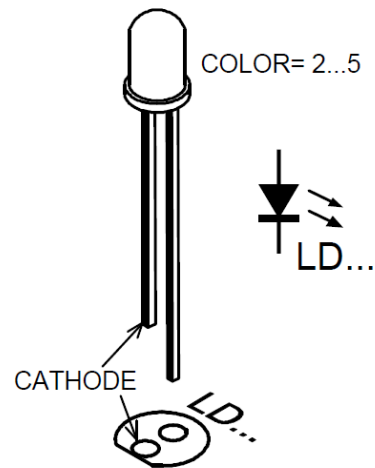7mm

9. 1/4W Resistors (check the color code)

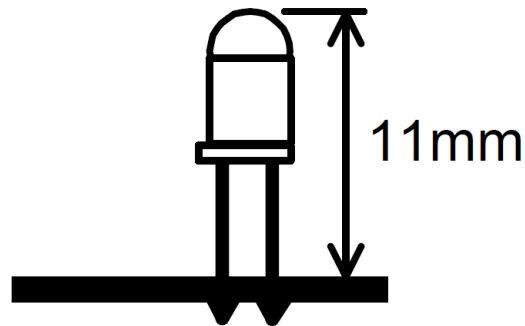R...

R1 : 33K (3 – 3 – 3)

R2 : 47 (4 – 7 – 0)
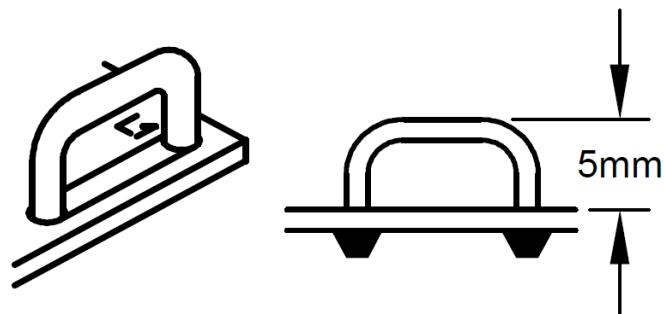
R3 : 220 (2 – 2 – 1)

10. **LED (check the polarity)**

COLOR= 2...5

LD...

CATHODE

LD...

LD1 : 3mm (2)

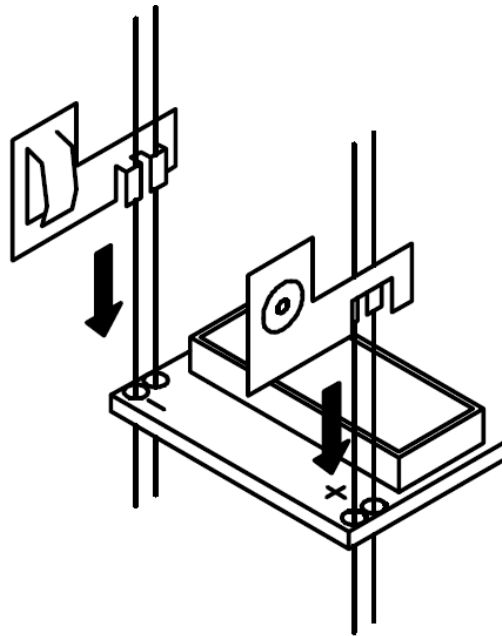**Mount at the indicated height :**

11mm

11. Coil

A simple air core coil has to be made as shown in the diagram using the jumper lead supplied
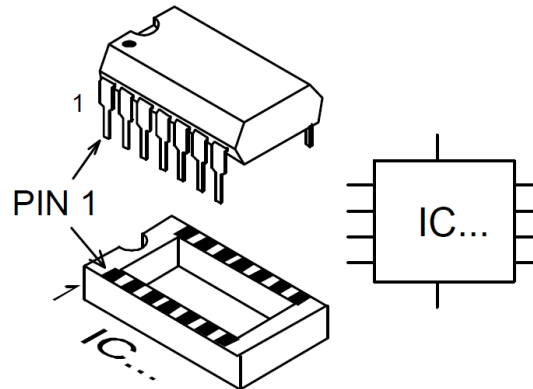
5mm

12. **Battery contacts**

Check for good attachment of the solder to the contacts.

Mount them as straight as possible!

13. **IC (Watch the position of the notch !)**

IC1 : UM3758 #

Create your code

Your own individual code can be set for a transmitter/clock combination. There is a row of nine code pads that are the closest to IC1, only one code connection is used. The code can be set by linking the code pad to a neighboring "-" pad or "+" pad by using a jumper lead. JC1 and JC2 are located on the main PCB P8009.

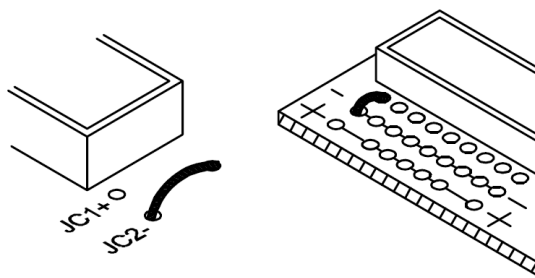**There are 3 different combinations possible:**

1. JC1 and JC2 are not mounted on the main PCB, then do not mount code jumpers on the transmitter.
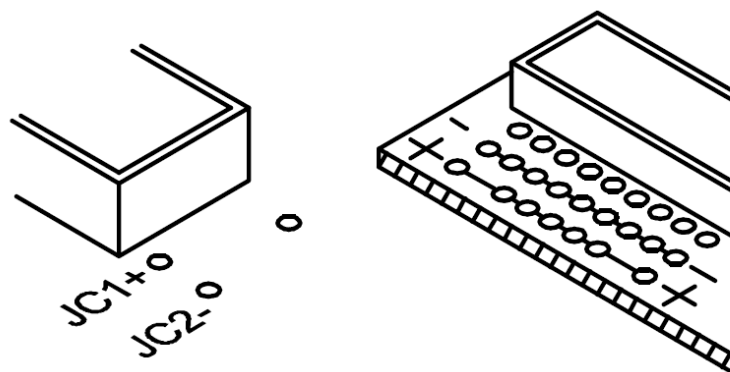
2. JC1 is mounted on the main PCB, Mount a jumper like in the drawing:
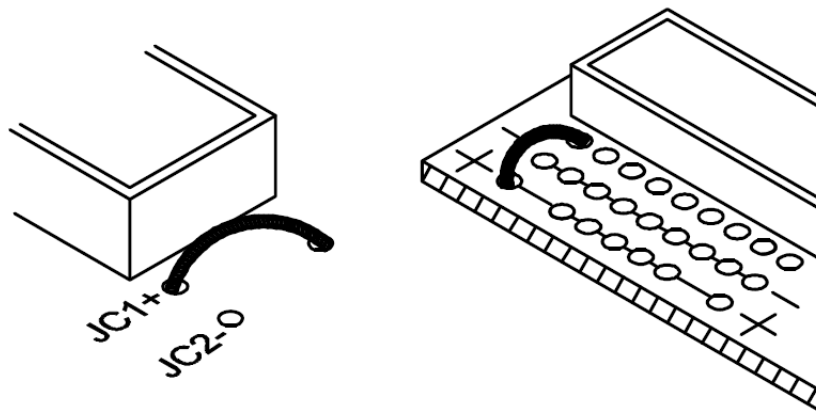
3. JC2 is mounted on the main PCB, Mount a jumper like in the drawing:

In case of a "wired" remote, continue the assembly.

In case of a wireless remote, the transmitter PCB can be placed in his enclosure. Fit a new 12V battery type V23GA or GP23A. Check the polarity which is shown in the enclosure.
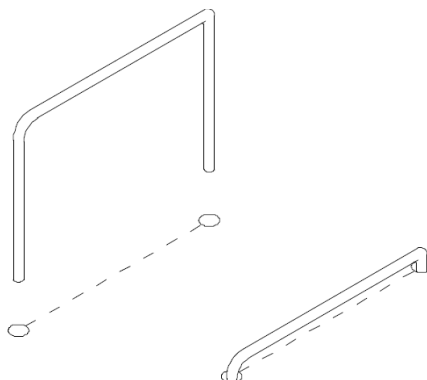
REMARK: If the buttons do not "click", please check the position of the PCB. It is also possible that the first time, you have to press firmly the button cap before they work properly.

Sticker
Affix the supplied sticker to the housing.

Assembly of the main PCB P8009

1. Jumperwires

J1
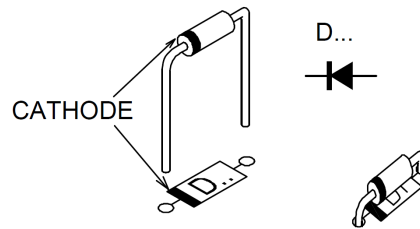
J2

J3

J4

J5

J6

J7

J8

J9

J10

J11

J12

J13

J14

J15

J16

J17

J18

J19

J20

J21

J22

J23

J24

J25

J26

J27

J28

J29

J30

J31

J32

J33

J34

J35

J36

J37

J38

J39

J40

J41

J42

J43

J44

J45

J46

J47

2. **Diodes (Check the polarity)**

D1 : 1N4007

D2 : 1N4148
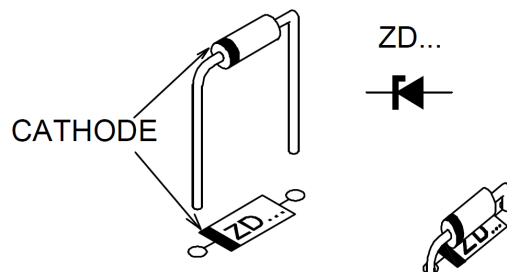
D3 : 1N4148

D4 : BAT85

D5 : BAT85

D6 : 1N4148

D7 : 1N4148

D8 : 1N4148

D9 : 1N4148

3. **Zener diode (Check the polarity)**
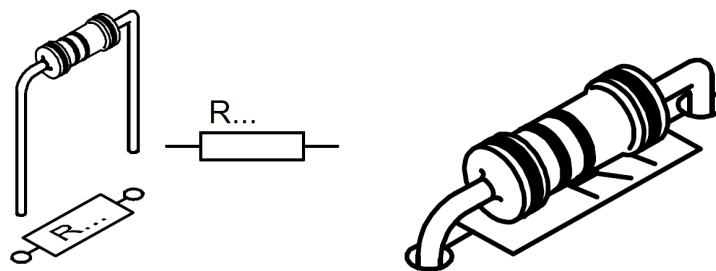

ZD1 : 6V2

ZD2 : 3V3

ZD3 : 4V7

ZD4 : 4V3

ZD5 : 5V1

ZD6 : 9V1

4. **1/4W Resistors**

R1 : 100K (1 − 0 − 4)

R2 : 270 (2 − 7 − 1)

R3 : 270 (2 − 7 − 1)

R4 : 4K7 (4 − 7 − 2)

R5 : 270 (2 − 7 − 1)

R6 : 5K6 (5 − 6 − 2)

R7 : 2K7 (2 − 7 − 2)

R8 : 2K2 (2 − 2 − 2)

R9 : 10K (1 − 0 − 3)

R10 : 100K (1 − 0 − 4)

R11 : 10K (1 – 0 – 3)

R12 : 4K7 (4 – 7 – 2)

R13 : 10K (1 – 0 – 3)

R14 : 100K (1 – 0 – 4)

R15 : 47K (4 – 7 – 3)

R16 : 2K2 (2 – 2 – 2)

R17 : 150 (1 – 5 – 1)

R18 : 100K (1 – 0 – 4)

R19 : 4K7 (4 – 7 – 2)

R20 : 10K (1 – 0 – 3)

R21 : 270 (2 – 7 – 1)

R22 : 100K (1 – 0 – 4)

R23 : 100K (1 – 0 – 4)

R24 : 270 (2 – 7 – 1)

R25 : 270 (2 – 7 – 1)

R26 : 100K (1 – 0 – 4)

R27 : 100K (1 – 0 – 4)

R28 : 100K (1 – 0 – 4)

R29 : 100K (1 – 0 – 4)

R30 : 100K (1 – 0 – 4)

R31 : 100K (1 – 0 – 4)

R32 : 4K7 (4 – 7 – 2)

R33 : 10K (1 – 0 – 3)

R34 : 270 (2 – 7 – 1)

R35 : 270 (2 – 7 – 1)

R36 : 100K (1 – 0 – 4)

R37 : 4K7 (4 – 7 – 2)

R38 : 10K (1 – 0 – 3)

R39 : 100K (1 – 0 – 4)

R40 : 100K (1 – 0 – 4)

R41 : 100K (1 – 0 – 4)

R42 : 10K (1 – 0 – 3)

R43 : 10K (1 – 0 – 3)

R44: 10K (1 – 0 – 3)

R45 : 10K (1 – 0 – 3)

R46 : 10K (1 – 0 – 3)

R47 : 4K7 (4 – 7 – 2)

R48 : 100K (1 – 0 – 4)

R49 : 560 (5 – 6 – 1)

R50 : 100K (1 – 0 – 4)

R51 : 2K2 (2 – 2 – 2)

R52 : 4K7 (4 – 7 – 2)

R53 : 2K2 (2 – 2 – 2)

R54 : 2K2 (2 – 2 – 2)

R55 : 1K (1 – 0 – 2)

R56 : 1K (1 – 0 – 2)

R57 : 6M8 (6 – 8 – 5)

R58 : 6K8 (6 – 8 – 2)

R59 : 18K (1 – 8 – 3)

R60 : 270 (2 – 7 – 1)

R61 : 33K (3 – 3 – 3)

R62 : 18K (1 – 8 – 3)

R63 : 10K (1 – 0 – 3)
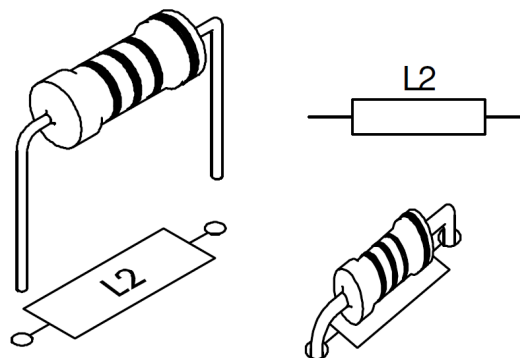
R64 : 10K (1 – 0 – 3)

R65 : 5K6 (5 – 6 – 2)

R66 : 2K7 (2 – 7 – 2)

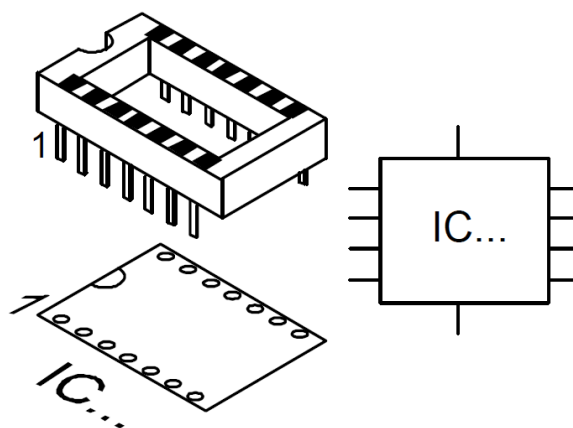R67 : 100K/1% (1 – 0 – 0 – 3)

R68 : 270K/1% (2 – 7 – 0 – 3)

5. **Axial coil**

L1 : 1µH (1 – 0 – B)

6. **IC socket**
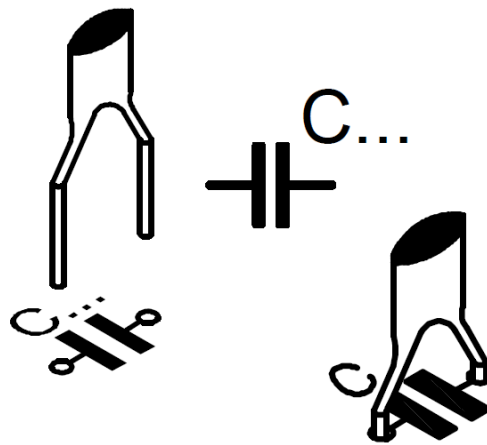
(Watch the position of the notch)

IC1 : 8p

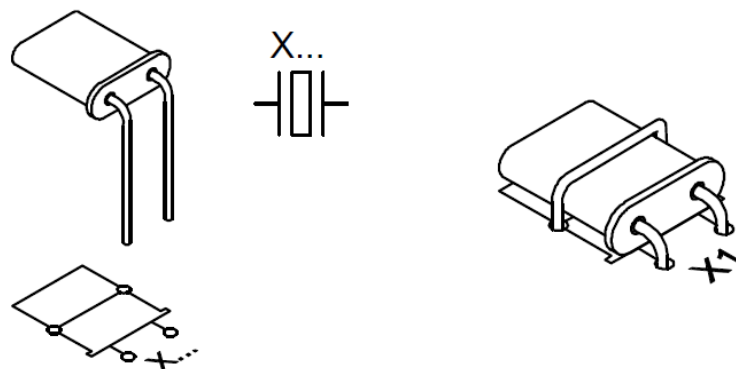IC2 : 18p

IC3 : 18p

IC4 : 18p

IC5 : 16p

IC6 : 8p

7. **Capacitors**

C1 : 470pF (471)

C2 : 470pF (471)

C3 : 100nF (104, µ1)

C4 : 100nF (104, µ1)

C5 : 100nF (104, µ1)

C6 : 2pF (2.2, 2p2)

C7 : 12pF

C8 : 330pF (331)

C9 : 330pF (331)

C10 : 22pF

C11 : 330pF (331)

C12 : 1pF

C13 : 2pF

C14 : 82pF
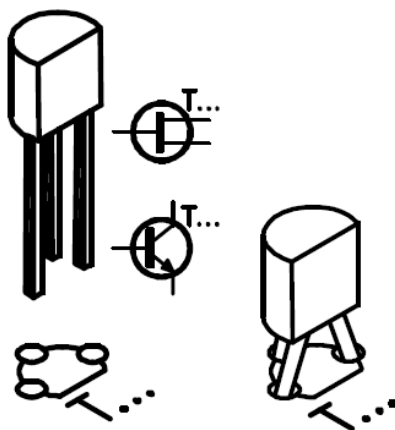
C15 : 330pF (331)

C16 : 100nF (104, µ1)

8. **Quartz crystal**
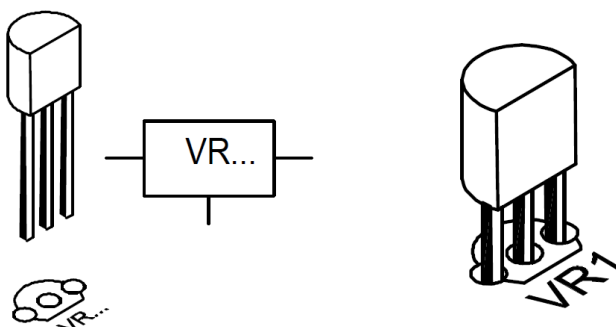

X1 : 4.194304

Fix the quartz crystal by means of a jumpwire.
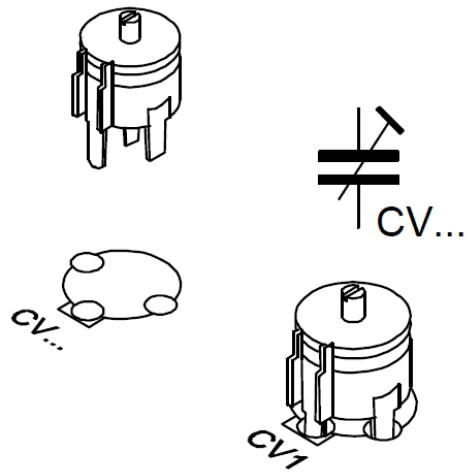
9. **Transistors**

T1 : BC547C

T2 : BC547C

T3 : BC547C

T4 : BC547C

T5 : BC547C

T6 : BC547C

T7 : BC547C

T8 : BC547C

T9 : BC547C

T10 : BC547C

T11 : BC547C

T12 : BC547C

T13 : BC547C

T14 : BC547C

T15 : BC547C

T16 : BC547C

T17 : BC557

T18 : BC557

T19 : BC557

T20 : BC557

T21 : BC557

T22 : BC557
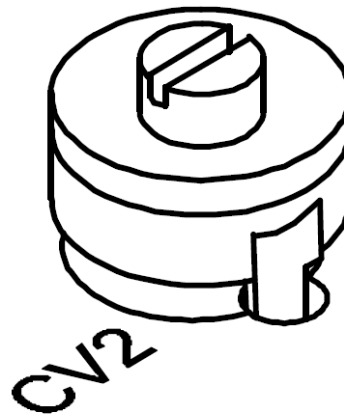
T23 : BC557

T24 : BF199

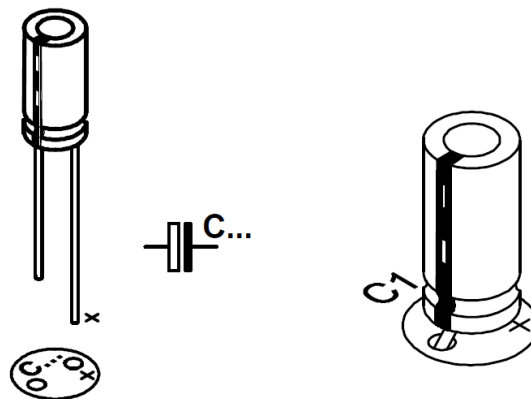10. **Voltage regulator**

VR1 : 78L05

11. **Trim capacitors**

CV1 :Trim 22p (Green)
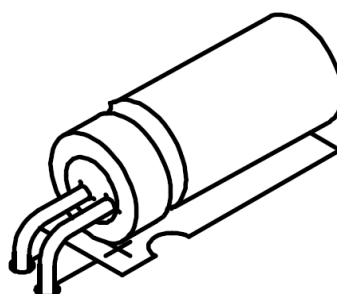
CV2 : TRIM 5p5

12. Electrolytic capacitors
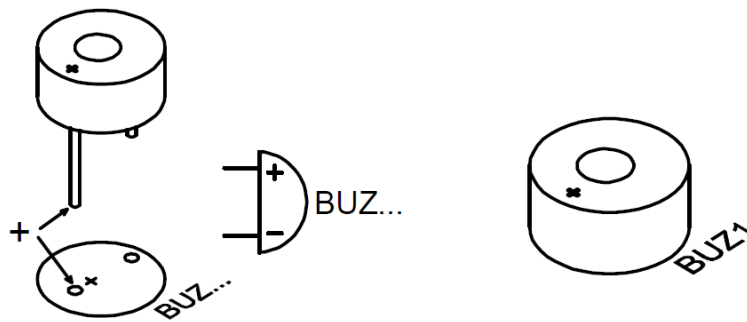
C17 : 1µF

C18 : 100µF / 16V
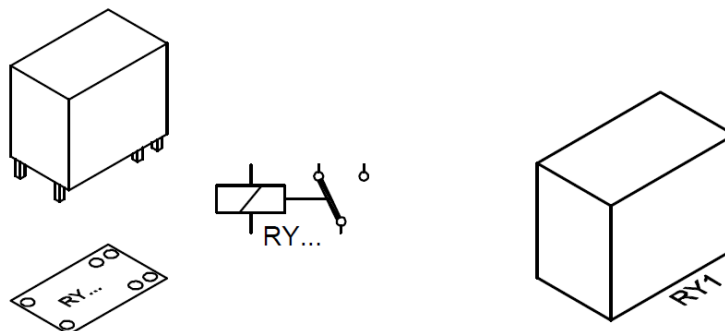
C19 : 1µF

C20 : 10µF

C21 : 1µ

C22 : 470µF / 25V

13. **Buzzer (check the polarity)**
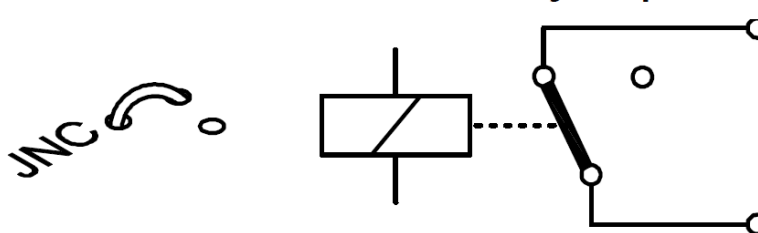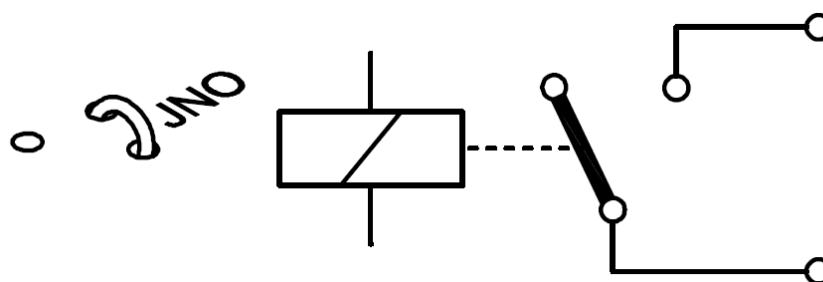

BUZ1 : SV4 / 12-S

14. **Relay**

RY1 : VR3D121C

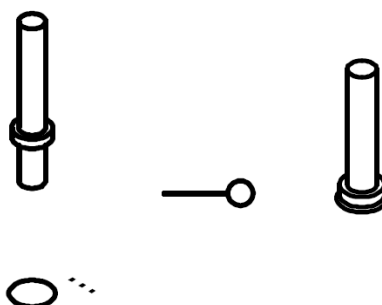A selection is possible for a normal closed contact output, or a normal open contact output :

For normal closed, mount jumper JNC

For normal open, mount jumper JNO

15. PCB pin. Mount only if you have access to a frequency counter.
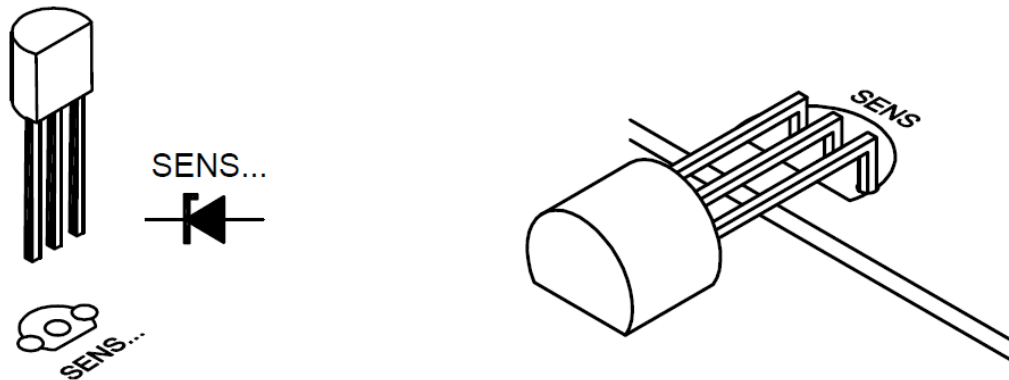

- **GND**

- Testpin for time calibration 15.625ms (64Hz)

  This testpin can be used to calibrate the clock (see chapt. 22) by means of a counter.
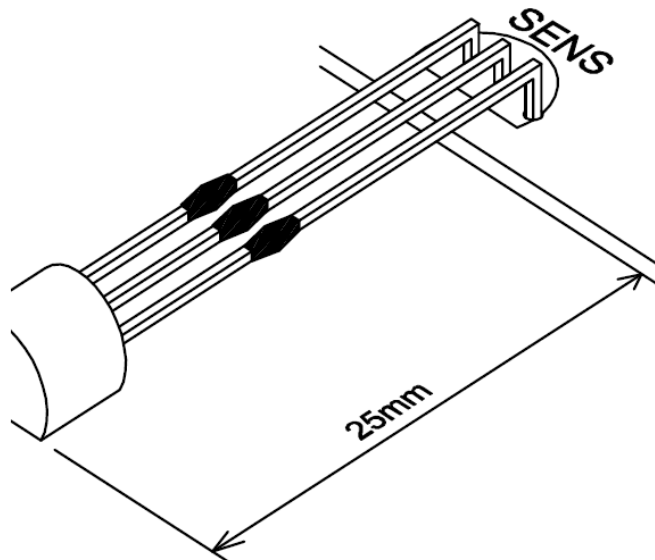
  Adjust CV1 for a period measurement of 15.625ms or 64Hz frequency.

16. **Temperature sensor**

SENS: LM335

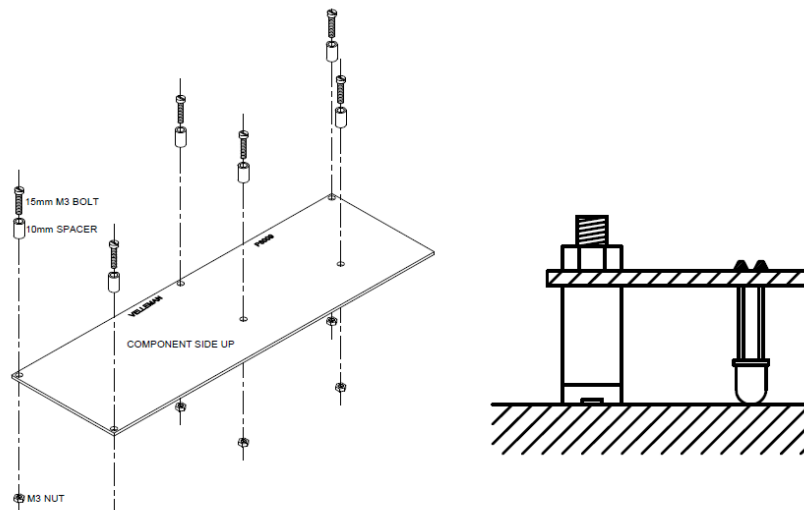Make the connections longer when using an enclosure like our optional enclosure type B8009 (use blank jumpwires)
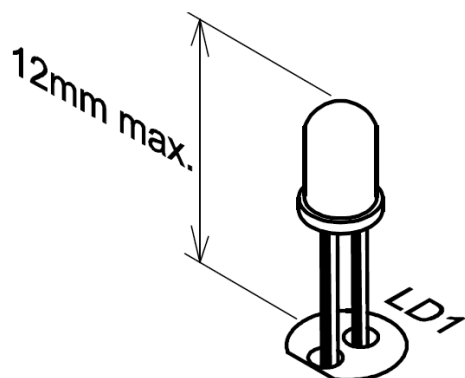

17. **LED mounting**

To mount all the LED's at the same Hight, we are going to use some spacers. Mount the spacers on the PCB:

Mount about five LED's, then turn over the PCB and solder ONE connection of each LED. Now correct the position of the LED's and solder the other connection of each LED.
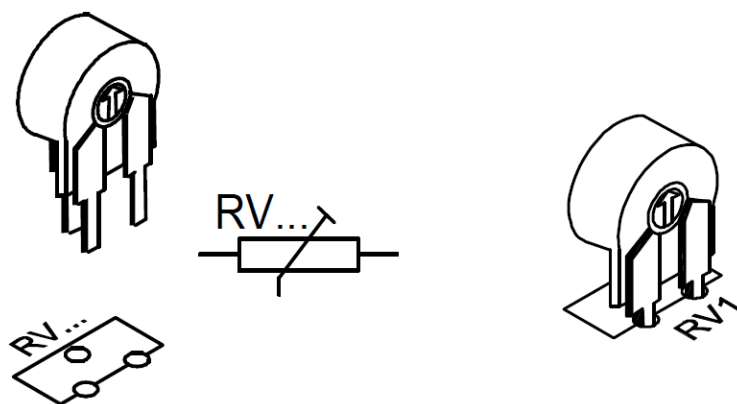
Continue mounting all the LED's as above.

It is important that when our optional enclosure B8009 is used, that the maximum hight is respected !
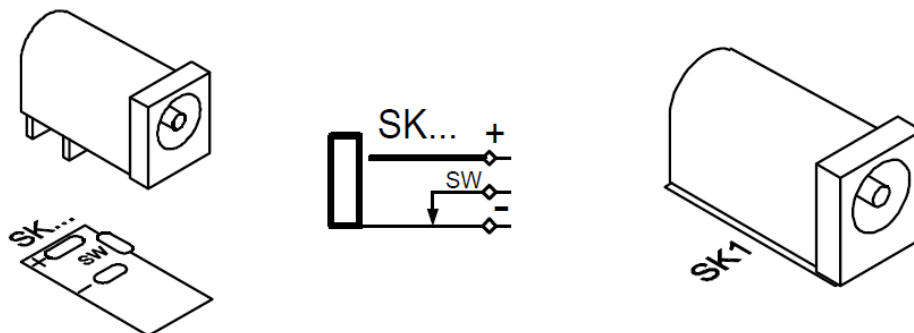
LD1… LD132: 3mm LED.
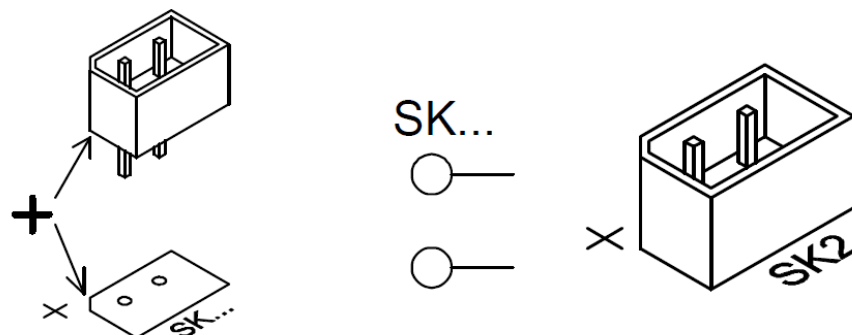
Now the spacers can be removed.

18. **Resistor trimmer**

RV1 : 500E (470)

19. **Connectors**

SK1 : DJ005

SK2 : BATCON
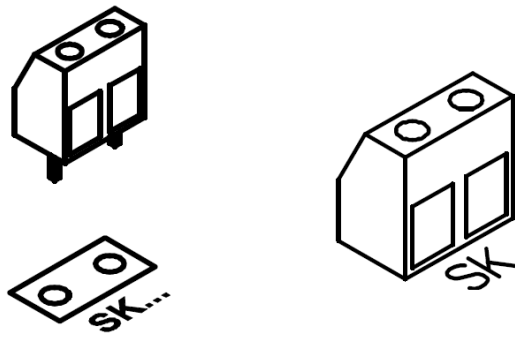
SK3 : SCREW02

If a 9V block battery is used for the memory backup, then the following snap can be connected:

RED
BLACK
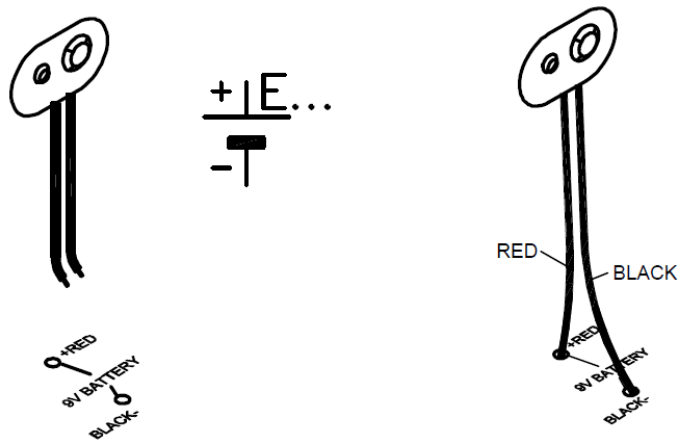
Check the polarity !

20. **IC's**

(Watch the position of the notch !)

PIN 1
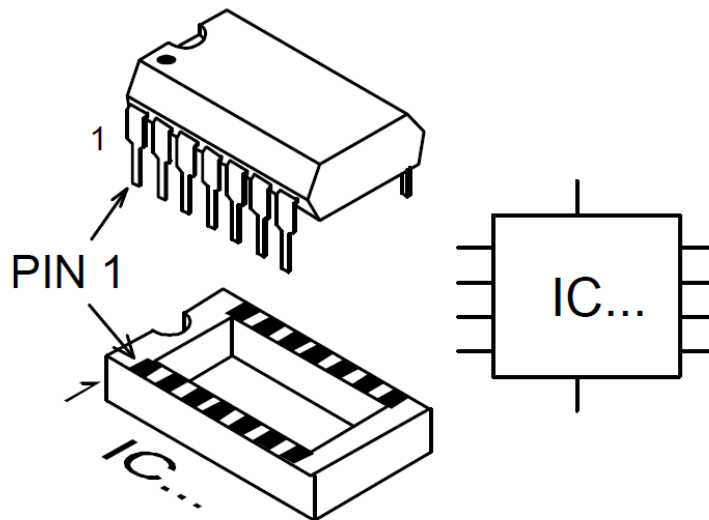
IC1 : CA3160

IC2 : VK8009 (PIC16C715) q IC3 : UM3758

IC4 : UM3758

IC5 : CD4017

IC6 : LM258

21. **Connecting the wired remote control**

Only three wires are used to connect the transmitter with the display.

Connect one wire between the + from the display and the + of the transmitter

(connection next to R5)

Connect one wire between the – from the display and the – of the transmitter

(connection next to C5)

Connect one wire between C on the display and the connection at R1 on the transmitter (see drawing).

Before mounting the transmitter PCB in the enclosure, make a small slot in the bottom enclosure to pass the wires.

CUT OUT

Now the transmitter can be placed in his enclosure.

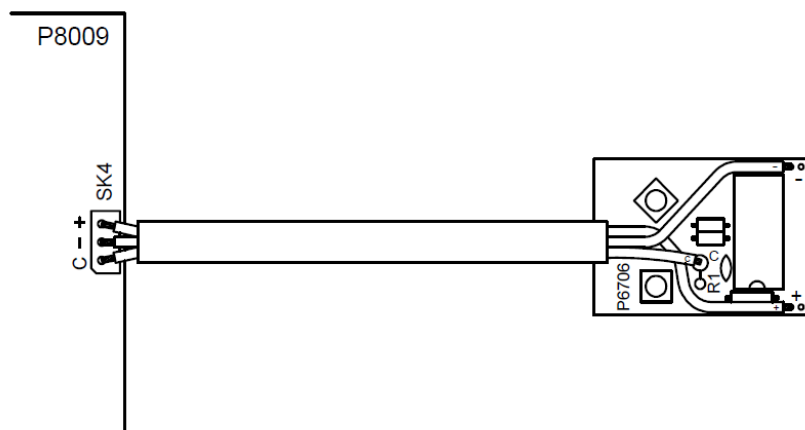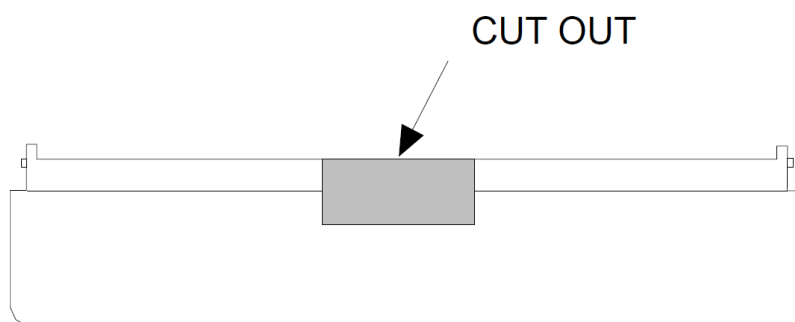**REMARK:** If the buttons do not "click", please check the position of the PCB. It is also possible that the first time, you have to press firmly the button cap before they work properly.

Test and adjustment
First we will test if the display works properly:

- Connect a 12VDC / 300mA adapter (check the polarity and the connector type) to the display.
  The display should indicate the time 00:00:00 (HH:MM:SS) and the (HH) should blink.
  Next step is adjusting the displays- receiver to the transmitter. (skip this step if a wired transmitter is used).

  ① ②   >Remote control button code.
- Hold the transmitter about one meter (one yard) away from the display.
- Press button 1 on the transmitter, the LED on the transmitter should blink rapidly.
- Now adjust the trimmer capacitor CV2 (RECEIVER ADJUST) on the display using the supplied plastic tuning screwdriver, until the receiver LED (REC), blinks at the same rate as the transmitter.
- If a maximum range between transmitter – display is wanted, then it is advisable to repeat the above adjustment with the transmitter at about 10m (10 yard).
- If the adjustment is OK, then the HH of the display should increase each time button 1 is pressed.
  Remark : Hold the display away from large metal objects.

**Next step is to calibrate the temperature indication :**

- Disconnect the power supply from the display.
- Reconnect the power supply to the display.
- Put a known good thermometer next to the display temperature sensor.
- Press repeatedly button 2 on the transmitter until the display shows dAtE blinking.
- Now press button 1 until rEGIOn is blinking.
- Next press button 2, Eu will blink. Use button 1 to choose between Eu (Europe) or uS (USA) display format for time, date and temperature.
- Confirm your choice by pressing button 2.
- Now press the left button until dEGrEE is displayed and confirm with but-ton 2.
- Now adjust the trim potentiometer RV1 (TEMP. CALIBRATION) until the dis-played temperature corresponds with the "reference" thermometer.

  Repeat the above adjustment after the display is warmed up for a few hours.

Next step is to calibrate the clock time base
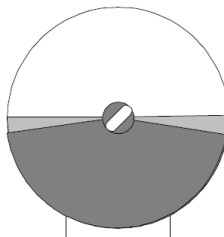The processor has an internal oscillator that is used to run the clock.
By means of CV1(TIME CALIBRATION), it is possible to adjust the oscillator frequency if the clock does not run correctly.

1. Start by setting the trim capacitor in his center (50% overlap) position:
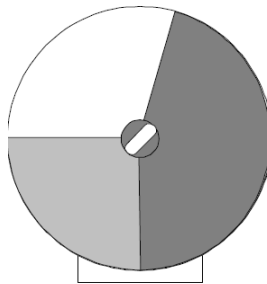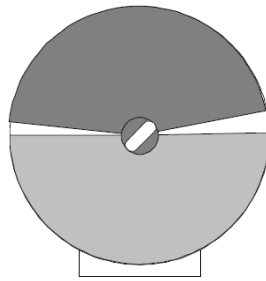

50%

2. Should the clock run too fast, then turn the capacitor more in the maximum (100% overlap) direction:


100%

3. Should the clock run too slow, then turn the capacitor more in the minimum (no overlap) direction:

0%

Mounting the display into the optional enclosure B8009

- Remove the display window and the side panels from the enclosure.
- Slide the PCB into the lower slot of the enclosure.
- At the left hand side two holes must be made in the small cover, one for the power supply plug*, and one for the temperature sensor.
  * Alternatively a hole can be made at the back of the enclosure to pass the power supply plug.
- Mount the two side panels.
- At the right hand side there is space for a battery, a 9V battery or a 3.6V re-chargeable battery type T331 can be used. Connect the battery to the appropriate connector.
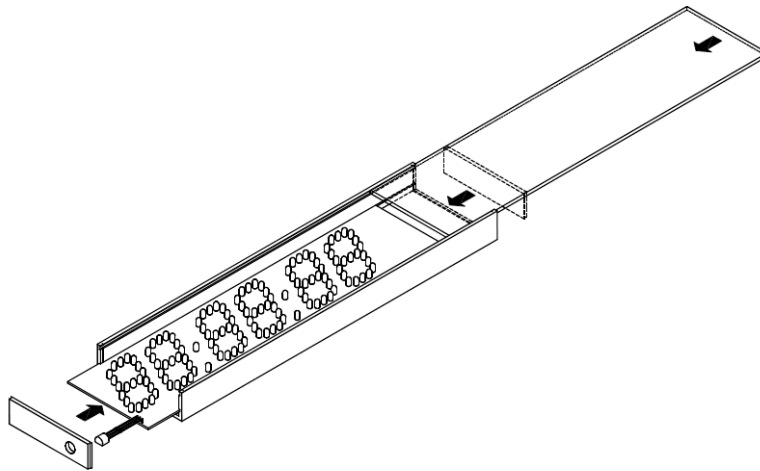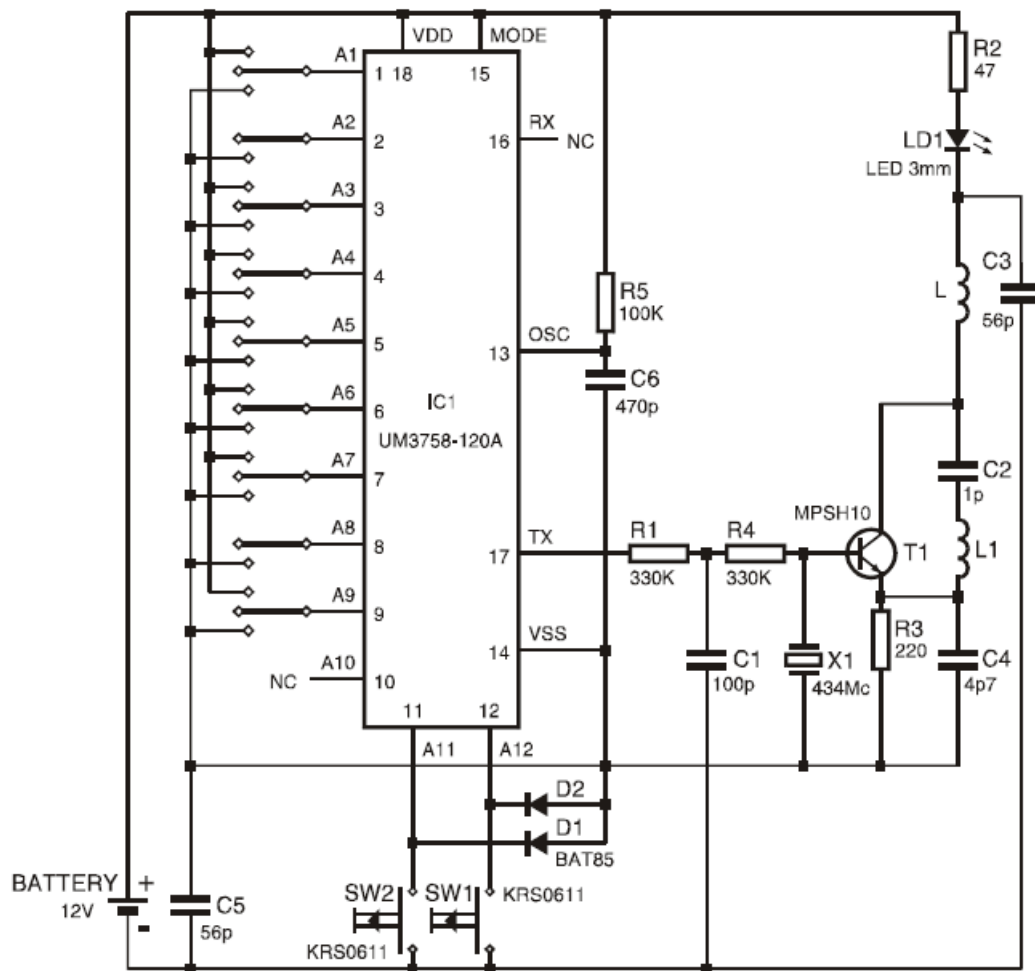

After connecting the power supply plug, the display window can be mounted.

REMARK : It is important that the temperature sensor body is outside the enclosure otherwise the temperature readout will be faulty.
Keep the display out of direct sunlight.

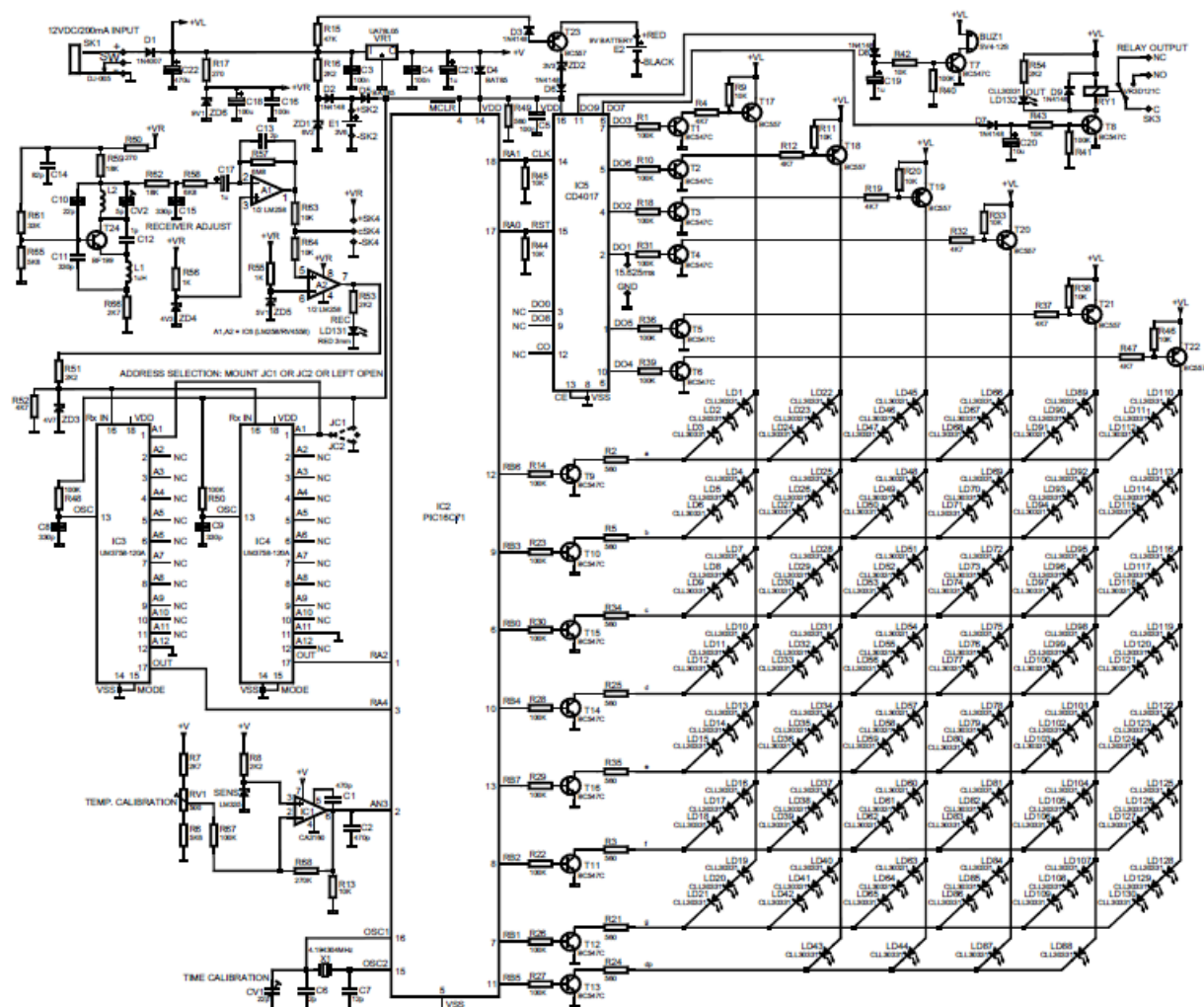See the user manual for further instructions.

PCB & DIAGRAMS

Transmitter PCB

Transmitter diagram

modifications reserved

For use with old version of receiver K6707 replace C1 by 1pF on the receiver P.C.B. and readjust the receiver.

Display diagram

VELLEMAN COMPONENTS NV Legen Heirweg 33
9890 Gavere
Belgium Europe
Info & support: **www.velleman.be**

Documents / Resources

	velleman K8009 Multifunctional Clock Display [pdf] Instruction Manual K8009 Multifunctional Clock Display, K8009, Multifunctional Clock Display, Clock Display, Display

References

- **Ⓥ Velleman â€" Wholesaler and developer of electronics**