

BJA009 Solar movement

Specification

Revision A1

Module Diameter

Ø36.00 mm

Height

4.60mm

Running Time

Approx. 3 months



1. Features -----	1
2. Specifications -----	3
3. Appearance -----	4
4. Module Size -----	5
5. Hand Fitting -----	6
6. Dial -----	7
7. Insulation sheet and marking -----	8
8. Key Operation -----	9
9. Attentions -----	11

1.1 Solar-powered watch movement

This movement is a solar-powered containing a solar cell on top to convert any form of light into “electrical energy” and store the power in a secondary battery.

1.2 No replacement chargeable battery

There is a Li-Mn rechargeable battery ML920 inside as the secondary battery which can store the power from solar cell.

1.3 You can use the dial which light transmittance is more than 30%

It is possible to assemble the dial which transmits light on the solar cell. It enable to cover the solar cell color, and you can design variety colors of dials

1.4 Running Time

Expected running time from full charge to stoppage will be around 3 months

1.5 Primary Digital Time and Date display

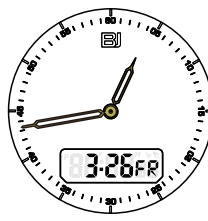
Except the analog time, there are two digital time of primary and secondary. both digital time can be selected with 12H or 24H format.

For primary one, the display can be selected as time or date display.

The analog time is synchronized with primary digital time.



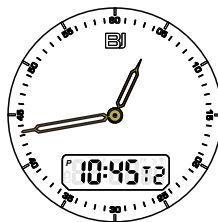
Primary Digital Time



Digital Date

1.6 Secondary digital time display

The secondary time can only display Hour and Minute information. It can be different with primary digital time.



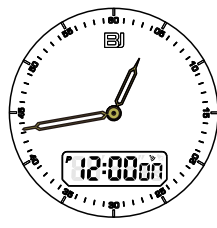
Secondary Digital Time

1.7 Alarm Function

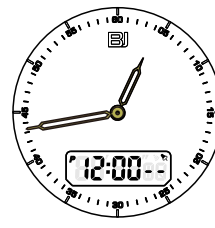
There are two types of alarm function, one is daily alarm and another is hourly chime. It can be easily set by press button [START]



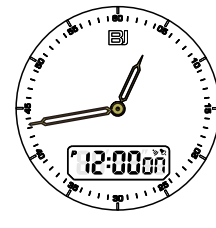
Both off



Only Daily Alarm On



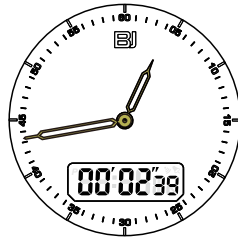
Only Chime On



Both On

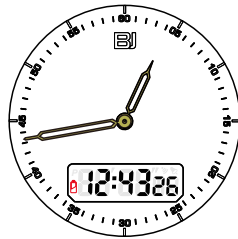
1.8 Chronograph function

There is a digital chronograph in Minute, Second and Centisecond display. maximum time range is 100 minutes and the resolution is 1/100 seconds.



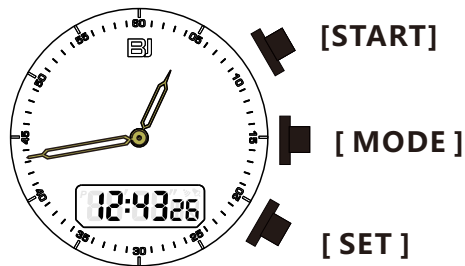
1.9 Battery Low Detection

When secondary battery voltage is less than 2.0V, there is a Icon display on digital screen to reminder user put the watch under strong light to charge the battery.



1.10 Three buttons operation

There are three buttons [START], [MODE] and [SET] are used for change digital picture, set time/date, calibrate the analog hand or active other applications.



2.1 Module dimensions

Module diameter	Ø36.00 mm
Module diameter (Include protrusion)	Ø36.20 mm
Module height (Include Solar cell)	4.60 mm

2.2 Time Standard

Type of quartz oscillator	Tuning fork
Frequency of quartz oscillator	32,768Hz
Accuracy	+/- 30 seconds per month
Operating temperature range	-5°C to +50°C
Regulation device	Nil (Pre-adjusted)

2.3 Indicator / Functions

2 Hands	
Dual digital time in 6 Digits	
Daily Alarm	
Hourly Chime reminder	
100 minutes chronograph	
Power depletion warning function	(Battery Low Icon in digital screen is shown when battery voltage is less than 2.0V)
Running time	Approx. 3.0 months (After fully charged)

2.4 Features

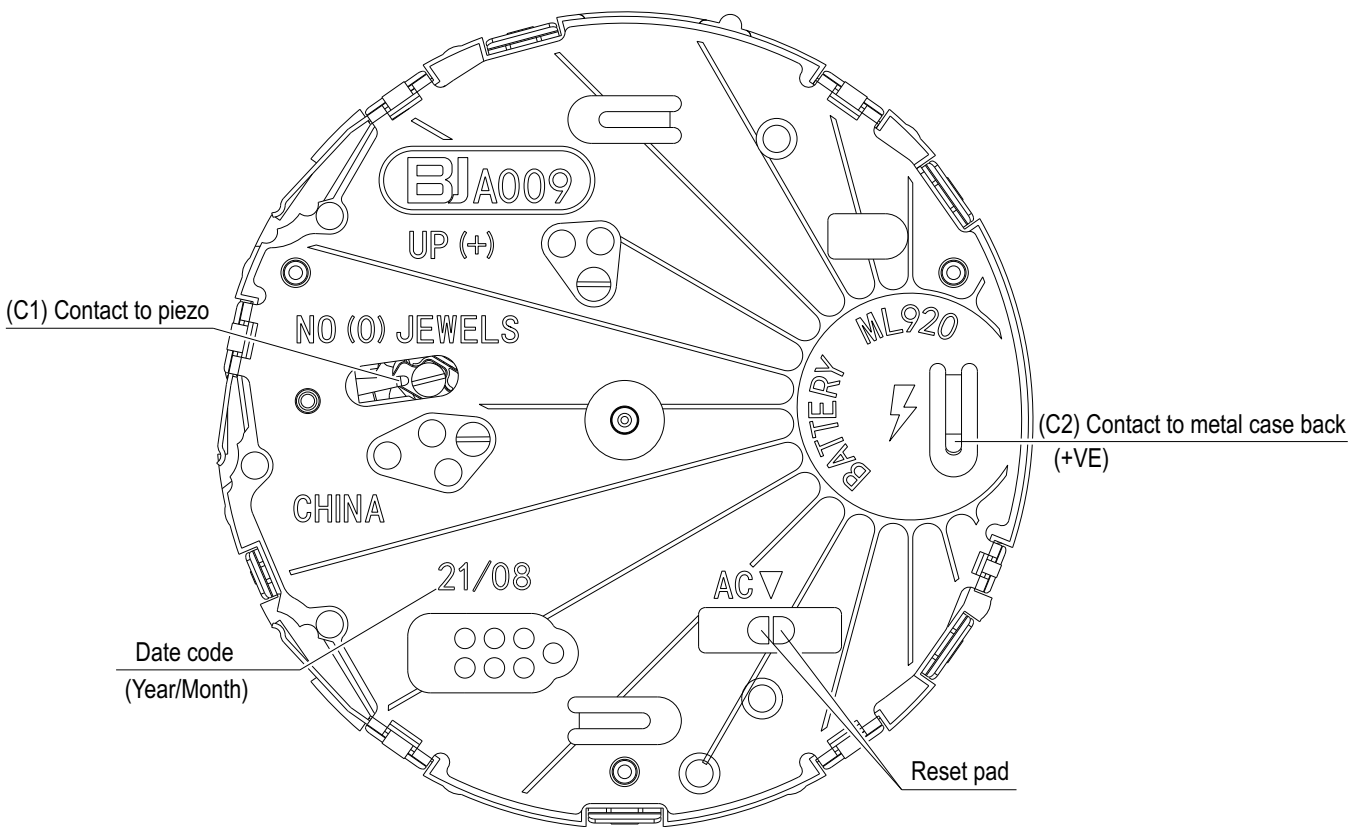
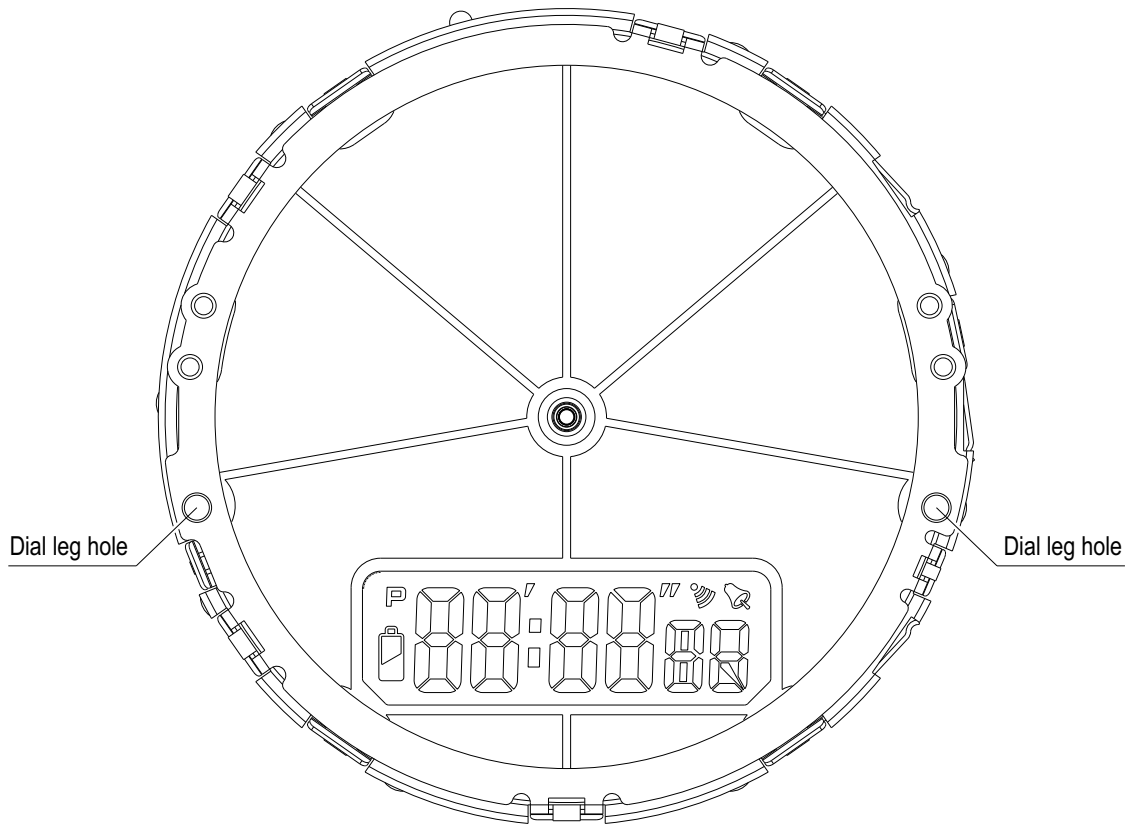
Jewels	0 Jewels
Anti-magnetism	Over 1600A/m (Direct current magnetic field)
Driving current consumption	Approx. 4.0uA (3.0V)
Operation stopping voltage	2.0V
Solar cell type	TDK Amorphous silicon solar cell
Maximum unbalance of hands	Minute hand: 0.60 μ N.m Hour hand: 0.60 μ N.m

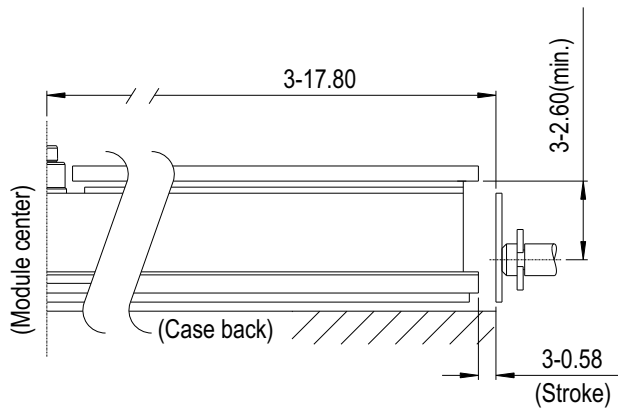
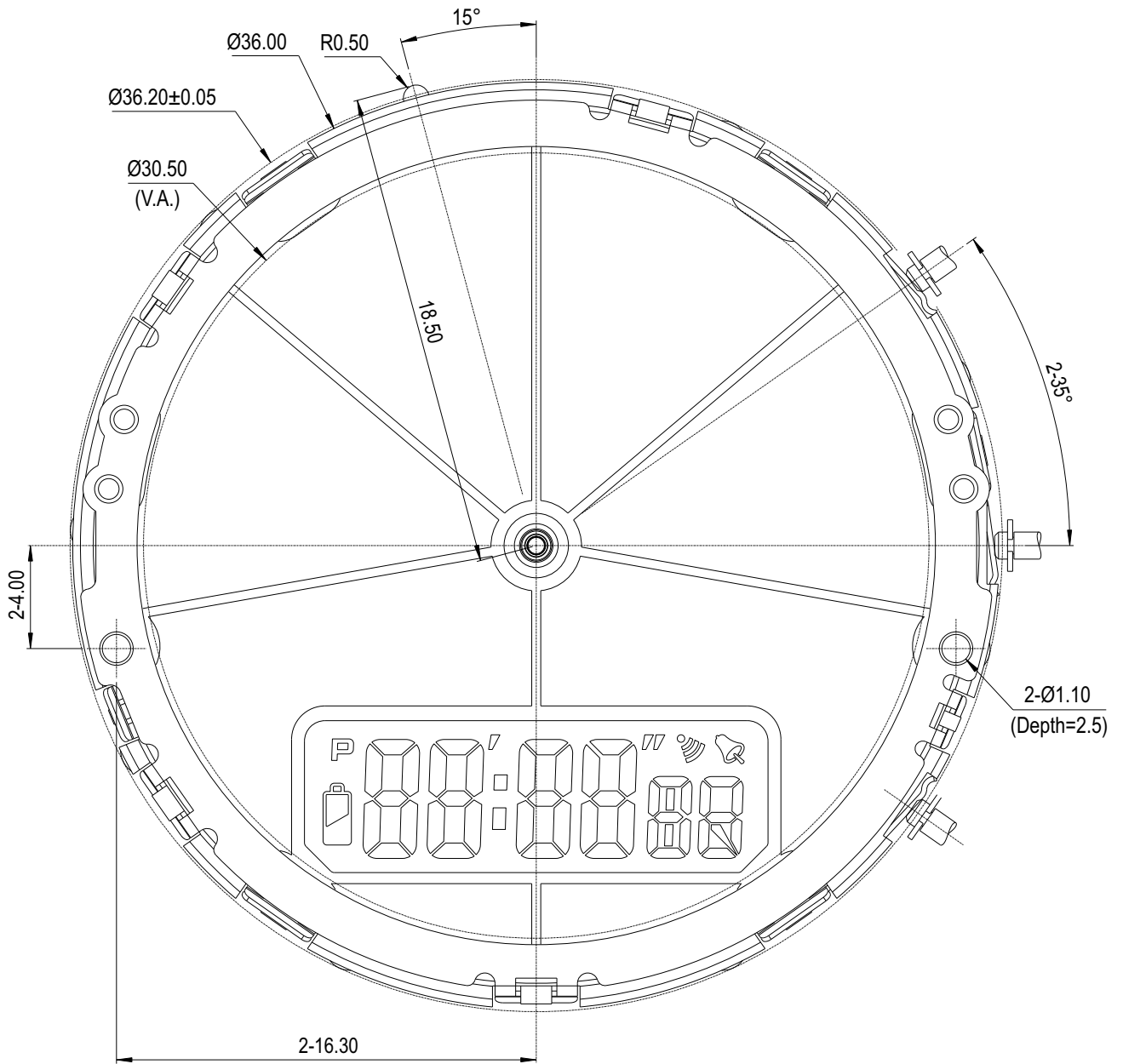
2.5 Secondary Battery (Installed)

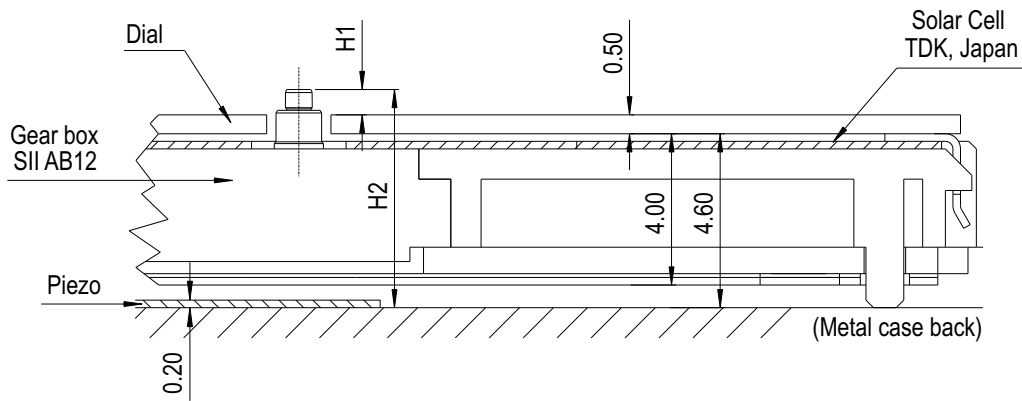
Type	Panasonic Manganese Lithium Battery ML920
Size	Ø9.50 * 2.0 mm
Nominal voltage	3.0 V
Capacity	11 mAh

2.6 Test of Accuracy

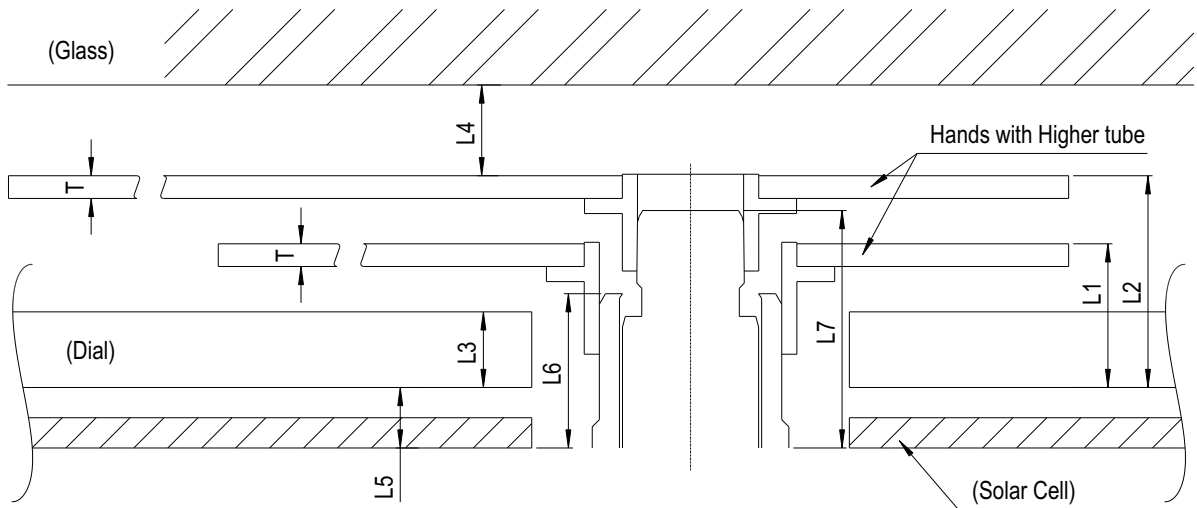
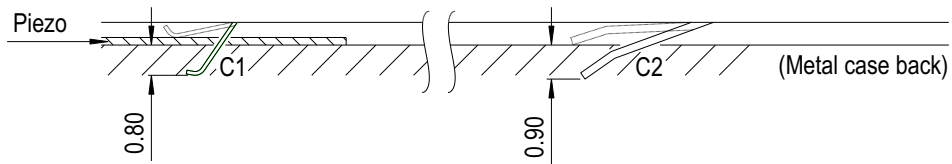
Equipment to be used	Witschi Q-test 6000
Duration of measurement	10 seconds
Microphone to be used	Electromagnetic detective type







Maximum height from dial	H1	0.67mm
Total height	H2	5.77mm



	L1	L2	L3	L4	L5	L6	L7	T
Height (mm)	0.95	1.40	0.50	0.60	0.40	1.02	1.57	0.15

Unbalance:
 Hour Hand: 0.6μN.m max. (60μg.m max.)
 Minute Hand: 0.6μN.m max. (60μg.m max.)

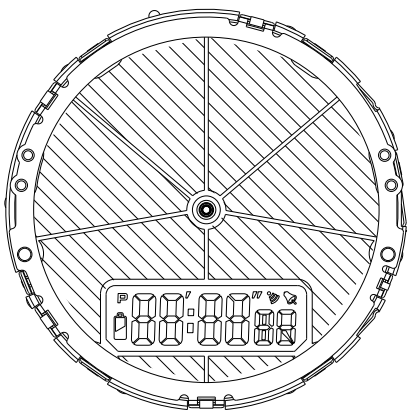
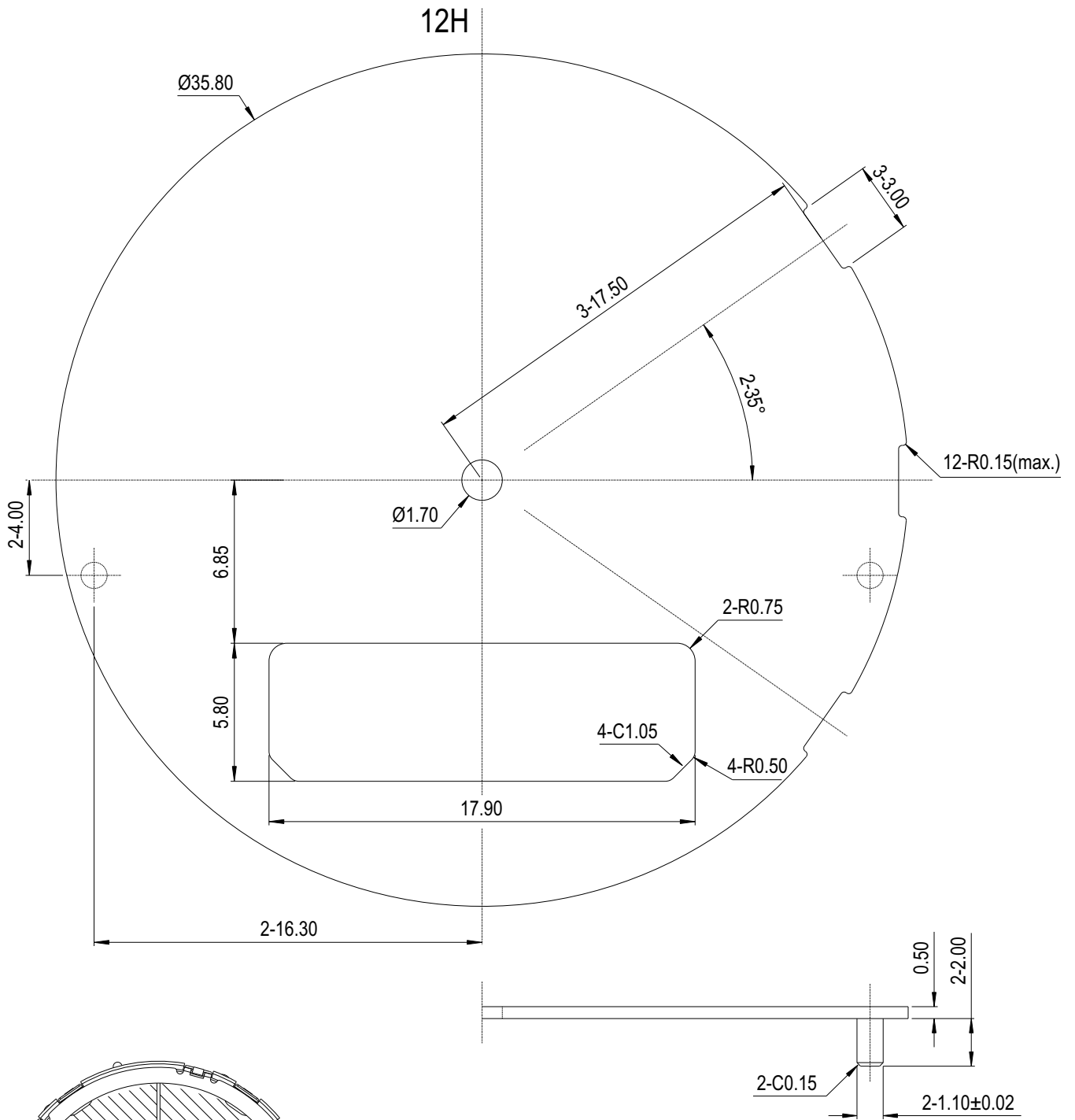

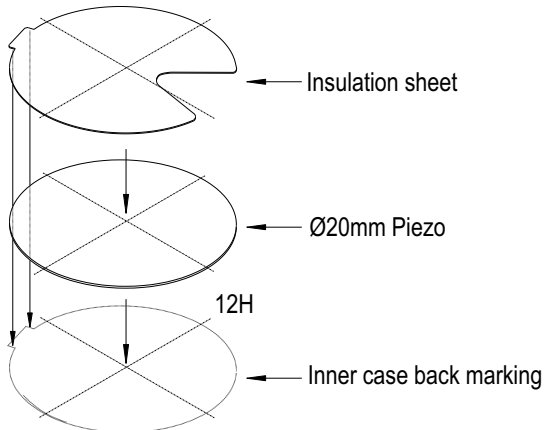
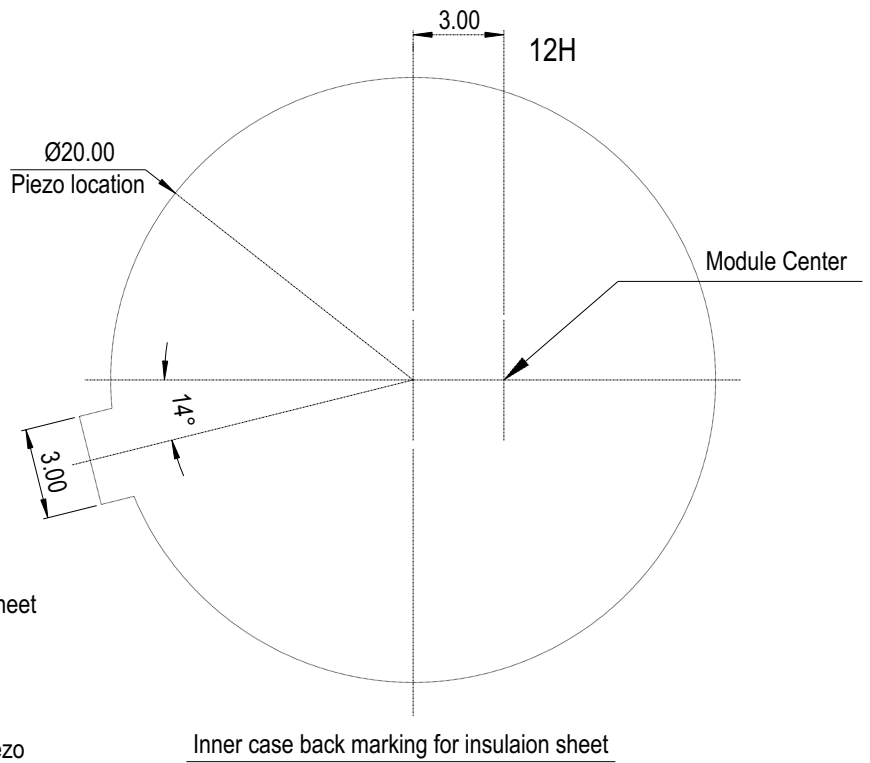
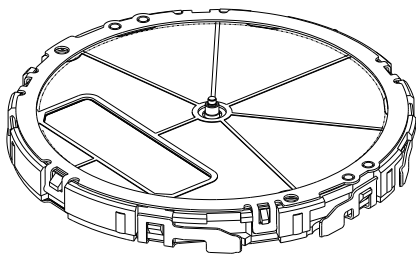
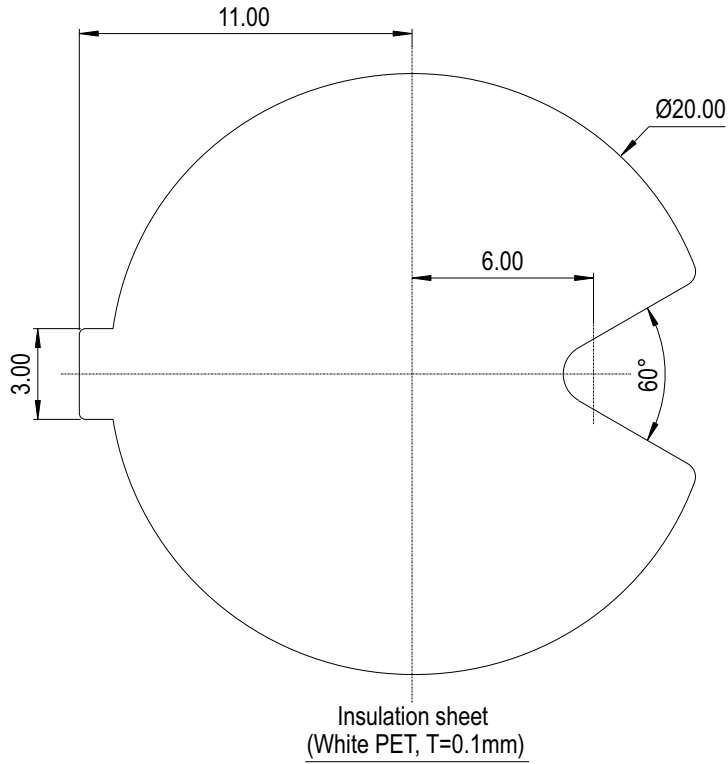


Fig.[1]  elements of solar cell

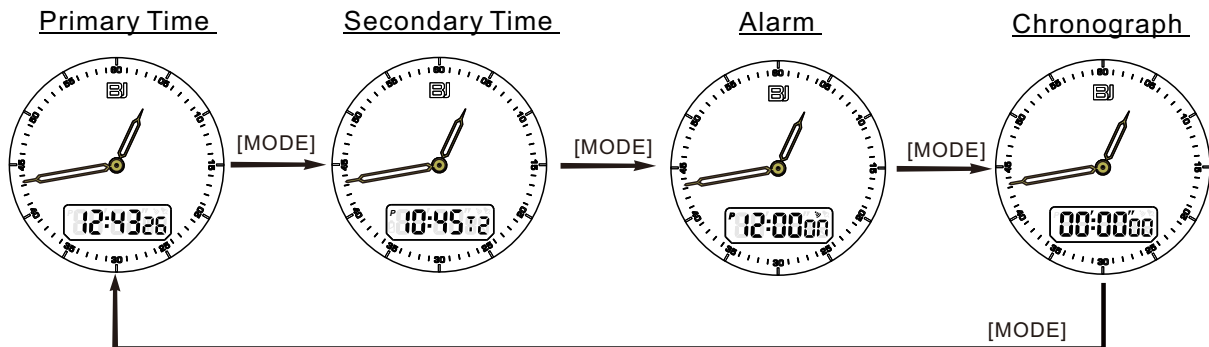
[Attention]

Each elements of solar cell must be kept the transparency rate of the dial more than 30%. Refer to the Fig.[1] as to the shape of solar cell.



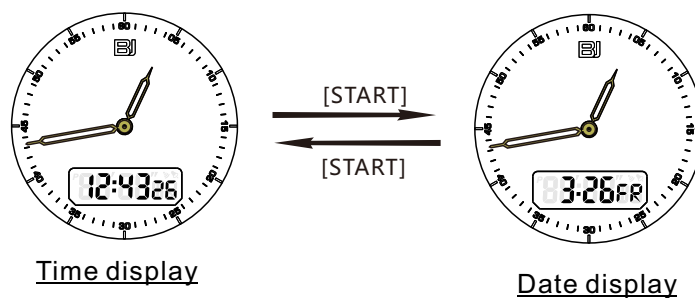
8.1 How to change the function mode

Button [MODE] can be used to change current function mode between Primary Time, Secondary time, Alarm and Chronograph.



8.2 How to change the display between Time and Date in primary time mode

User can press button [START] to change the digital screen between Time and Date display.



8.3 How to set Time and Date in primary time mode

- 8.3.1 In primary time mode, press button [SET] and hold for 3 seconds will enter time set state, the first set item is Hour and Hour digits are blinking.
Press button [START] can increase hour and press button [SET] can decrease hour, long press button [START] or [SET] will fast increase or decrease hour value. (Same action of button [START] and [SET] for adjust the setting value in following items.)
- 8.3.2 Press button [MODE], Minute digits are blinking. Button [START] and [SET] are used to adjust minute value.
- 8.3.3 Press button [MODE] again, Second digits are blinking, button [START] and [SET] are used to adjust second value to zero.
- 8.3.4 Press button [MODE] again, will start to set Hour format, button [START] and [SET] are used to change Hour format between 12H and 24H.
- 8.3.5 Press button [MODE] again, Year digits are blinking, button [START] and [SET] are used to adjust year value.
- 8.3.6 Press button [MODE] again, Month digits are blinking, button [START] and [SET] are used to adjust month value.
- 8.3.7 Press button [MODE] again, Date digits are blinking, button [START] and [SET] are used to adjust date value.
- 8.3.8 Press button [MODE] continue will repeat the set from first set item Hour .
- 8.3.9 After finish time / Date setting, long press button [MODE] will confirm all set and exit to time display, at the same time, the analog hand will fast run to correct position with same time of digital.

8.4 How to set Time in secondary time mode

- 8.4.1 In secondary time mode, press button [SET] and hold for 3 seconds will enter time set state, the first set item is Hour and Hour digits are blinking.
Press button [START] can increase hour and press button [SET] will decrease hour, long press button [START] or [SET] will fast increase or decrease hour value.
- 8.4.2 Press button [MODE], Minute digits are blinking. press button [START] can increase minute and press [SET] button will decrease minute value. Long press button [START] or [SET] will fast increase or decrease minute value.
- 8.4.3 Press button [MODE] continue will repeat the set of hour and then minute .
- 8.4.4 After finish time setting, long press button [MODE] will confirm all set and exit to time display.

(Note: the second value of secondary time is the same with primary time)

8.5 How to set Alarm Time

- 8.5.1 In Alarm mode, press button [SET] and hold for 3 seconds will enter alarm time set state, the first set item is Hour and Hour digits are blinking.
Press button [START] can increase hour and press button [SET] will decrease hour, long press button [START] or [SET] will fast increase or decrease hour value.
- 8.5.2 Press button [MODE], Minute digits are blinking. press button [START] can increase minute and press [SET] button will decrease minute value. Long press button [START] or [SET] will fast increase or decrease minute value.
- 8.5.3 Press button [MODE] continue will repeat the set of hour and then minute .
- 8.5.4 After finish alarm time setting, long press button [MODE] will confirm all set and exit to alarm time display.

8.6 How to turn on / turn off Alarm

In Alarm mode, the button [START] is used to set the alarm switch. repeatedly press of this button, the alarm switch will be set as the sequence. (Assume the initial state is all switch off)

- 8.6.1 Press button [START], Daily Alarm is on, Chime is off
- 8.6.2 Press button [START] again, Daily Alarm is off, Chime is on
- 8.6.3 Press button [START] again, both Daily Alarm and Chime are on
- 8.6.4 Press button [START] again, both Daily Alarm and Chime are off
- 8.6.4 Press button [START] continue, repeat the switch set from 8.6.1

8.7 How to operate of Chronograph

- 8.7.1 In Chronograph mode, press button [START], Chronograph is start to run.
- 8.7.2 Press button [START] again, the chronograph is stopped.
- 8.7.3 When chronograph is stopped, press button [START] again, chronograph is restart to run.
- 8.7.4 When chronograph is stopped, Press button [SET] and hold for 3 seconds, chronograph run time is clean.

8.8 How to calibrate analog hands

Once the time of analog and digital are not the same, user can adjust the hand position to keep these two time are consistent.

- 8.8.1 In primary time mode, long press button [MODE] for 5 seconds, when "HR" is displayed, hour and minute hand are fast go back to original position, when all hand are stopped, the hour hand is enable to adjusted now. Press button [START] can adjust hour hand clockwise and press button [SET] can adjust hour hand counterclockwise.
- 8.8.2 When hour hand is aligned to 12 o'clock position, hour hand calibration is done.
- 8.8.3 Press buttons [MODE], "MI" is shown, minute hand is enable to adjust now. Press button [START] can adjust minute hand clockwise and press button [SET] will adjust minute hand counterclockwise.
- 8.8.4 When minute hand is aligned to 12 o'clock position, minute hand calibration is done.
- 8.8.5 Press button [MODE] again, will exit of hands calibration state, hour and minute hands are fast run to correct time position (Time is synchronized with primary digital time).

9.1 Attention for solar cell unit

Don't touch or scratch the surface of the solar cell.

9.2 Dial transparency rate

Possible place a dial on top of solar cell, but please make sure the transparency rate of the dial is not less than 30% (Diameter of effective area is 30.5mm)

9.3 The guideline of charging time is as in below

(Inside backup battery: **ML920 3.0V/11.0mAh**)

(Assume dial transparency rate = 30%)

Illumination (Lx)	Source of Light	Environment	A (Approx. Hours)	B (Approx. Hours)	C (Approx. Minutes)
700	A fluorescent lamp	Inside the office	---	66	206
3000		30W 20cm	118	10.2	42
10,000	Sun light	Cloudy	62	4.8	18
100,000		Fine weather	24	38 minutes	5

Condition A: Time required for full charge

Condition B: Time required for steady operation

Condition C: Time required for one day of power

9.4 Caution

When charging the watch, do not place it too close to fluorescent lamp or other light sources as the watch temperature will become extremely high, causing damage to the parts inside the watch.