

## Watch Movement Specification and Drawing

### SOLAR SERIES

# Cal. AS87A

Movement Size

**6 3/4 × 8'''**

Casing Diameter

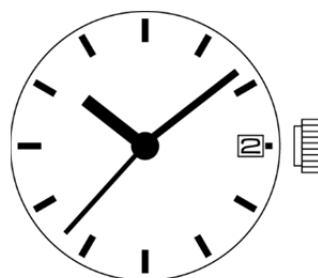
**15.3 × 17.8 mm**

Height

**4.61mm**

Running Time

**Approx. 2 months**



Date: 31/Oct./'16

# Cal. AS87A

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Cal.	AS87A	Date : 24/Apr.'15
	Features	Rev. : 01

**1.Solar-powered watch**

This watch is a solar-powered watch containing a solar cell underneath the dial to convert any form of light into " electrical energy" and store the power in a secondary battery.

**2. Eliminating the need for battery replacement**

Unlike conventional quartz watches, this watch does not use a silver oxide battery, thus eliminating the need for battery replacement.

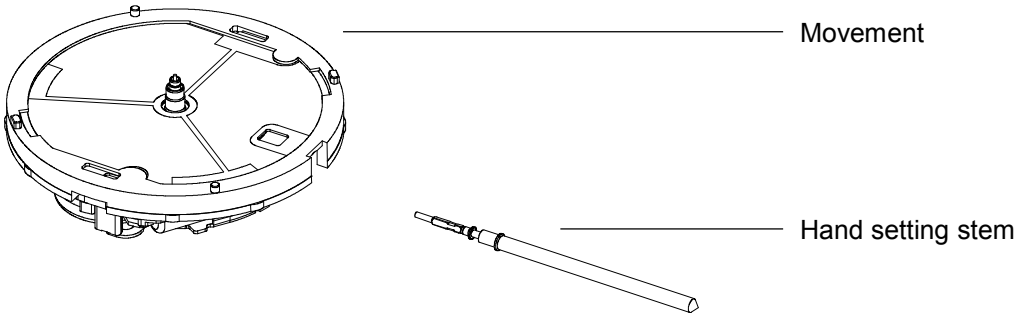
**3. You can use the dial which light transmittance is more than 40%**

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

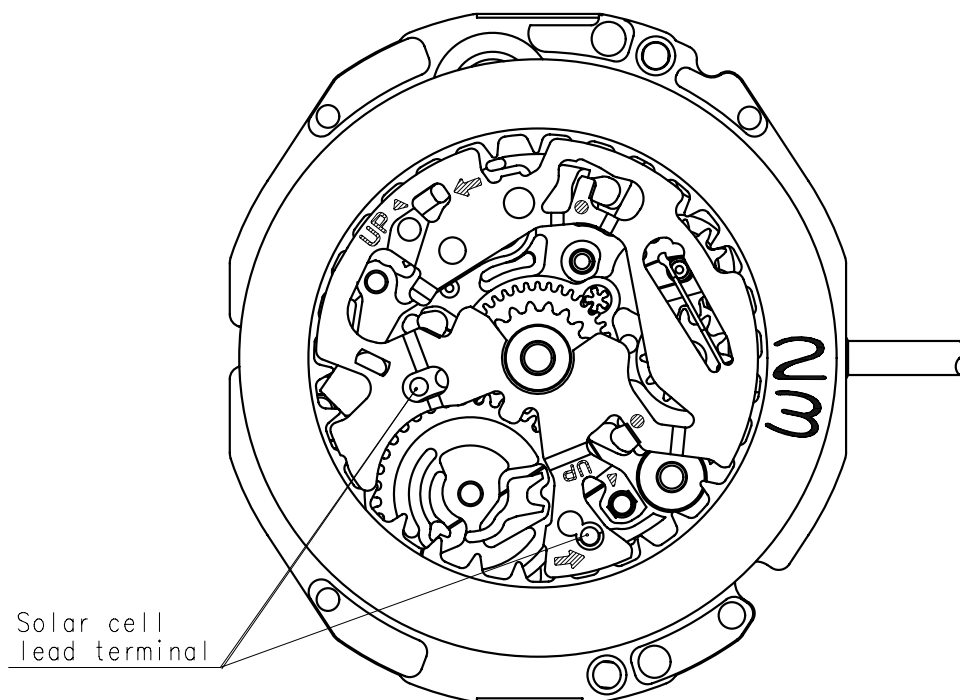
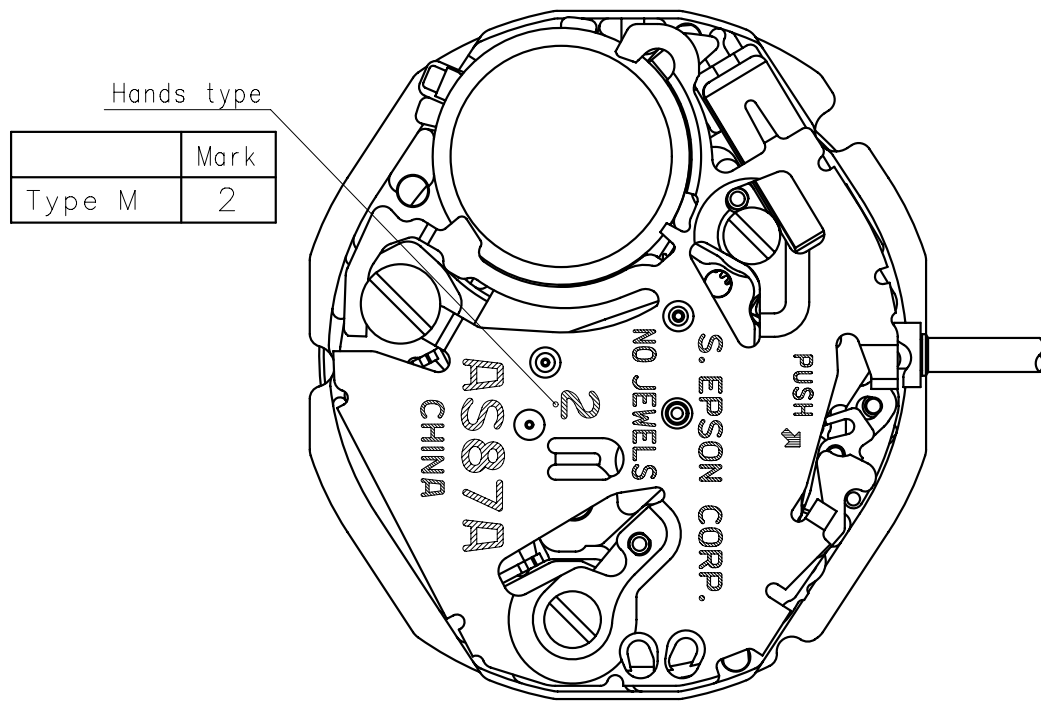
**4. Running time**

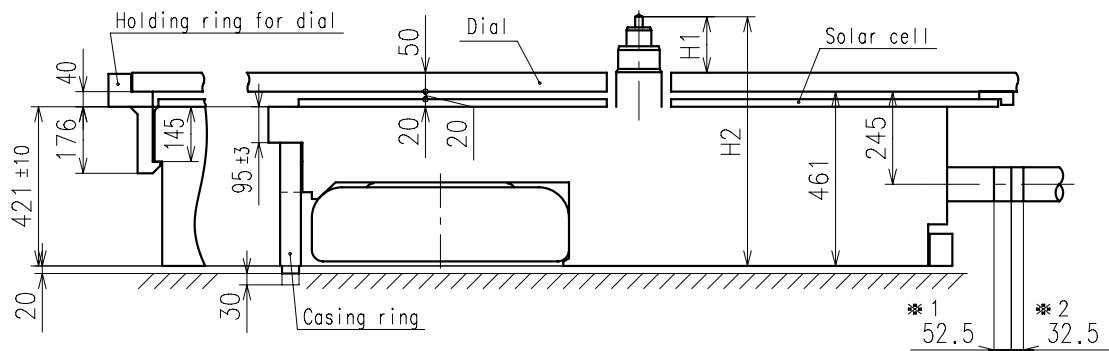
Expected running time from full charge to stoppage will be around 2 months.

**5. Structure of the separated parts**



Cal.	AS87A	Specifications	Date : 24/Apr./'15
			Rev. : 01
Solar Quartz 6 3/4 × 8''' Movement / Three Hands (H/M/S) with Calendar			
1. MOVEMENT DIMENSIONS			
Outside diameter	16.30mm(3-9H) × 18.20mm(12-6H)		
Casing diameter	15.30mm(3-9H) × 17.80mm(12-6H)		
Total height	4.21mm (Including solar cell : 4.61mm)		
2. TIME STANDARD			
Type of quartz oscillator	Tuning fork		
Frequency of quartz oscillator	32,768 Hz		
Accuracy	±20 seconds per month (on wrist)		
Operating temperature range	—5°C to +50°C		
Regulation device	Nil (Pre-adjusted)		
3. INDICATOR / FUNCTIONS			
3 Hands	Hour / Minute / Second		
Calendar	Instant setting device for date calendar		
Reset switch			
Running time	Approx. 2 months (After fully charged)		
Setting mechanism	Crown at normal position : Free		
	Crown pulled out 1st click : Instant date change		
	Crown pulled out 2nd click : Time setting / Reset		
4. FEATURES			
Jewels	0 Jewels		
Anti-magnetism	Over 1600A/m (Direct current magnetic field)		
Driving current consumption	Approx. 1.64 μ A (1.4V)		
Operation stopping voltage	1.2 V		
Solar cell type	Amorphous silicon solar cell		
Maximum unbalance of hands	Second hand : 0.06 μ N•m		
	Minute hand : 0.6 μ N•m		
	Hour hand : 0.5 μ N•m		
Moment of inertia	Second hand : less than 0.6 μ g•m <sup>2</sup>		
5. SECONDARY BATTERY (Installed)			
Type	Titanium-lithium-ion secondary battery		
Size	φ 6.8mm × t 2.15mm		
Nominal voltage	1.5 V		
Capacity	2.5 mAh		
6. SEPARATED PARTS (Parts code)			
Hand setting stem	0351177		
7. TEST OF ACCURACY			
Equipment to be used	SEIKO quartz tester QT-99, Greiner quartz timer-C , Witschi Q-tester 4000		
Duration of measurement	10 seconds		
Microphone to be used	Electromagnetic detection type		
All specifications are subject to change without notice.			

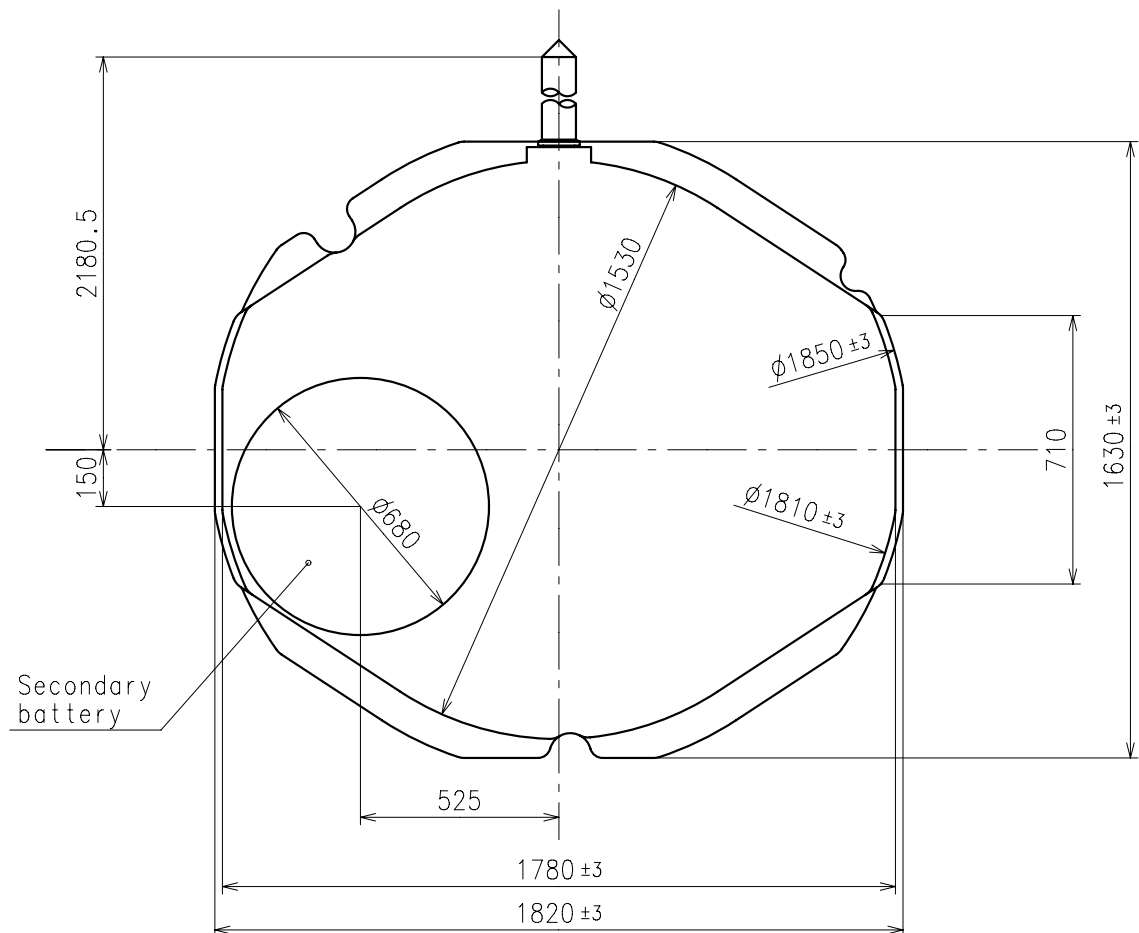




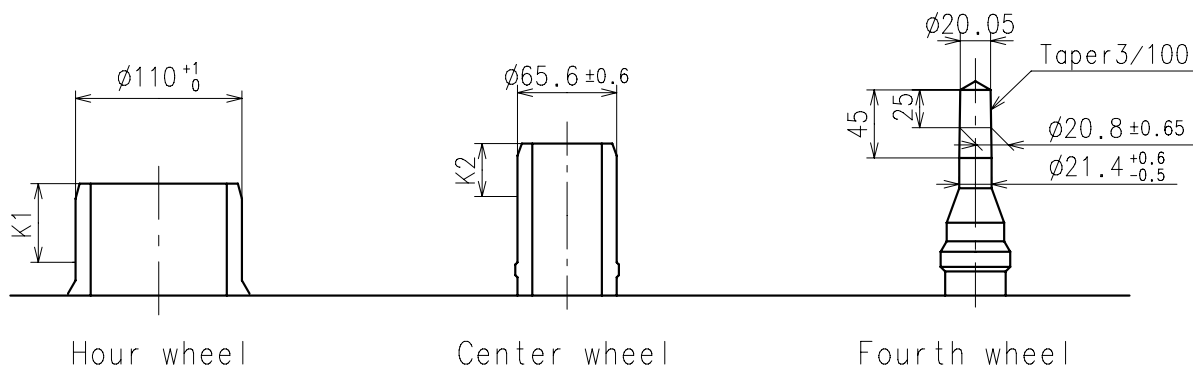
Center post		Type M (2) AS87A**
Maximum height from dial	H1	148
Total height including movement	H2	659

\*\*1:First pullout stroke

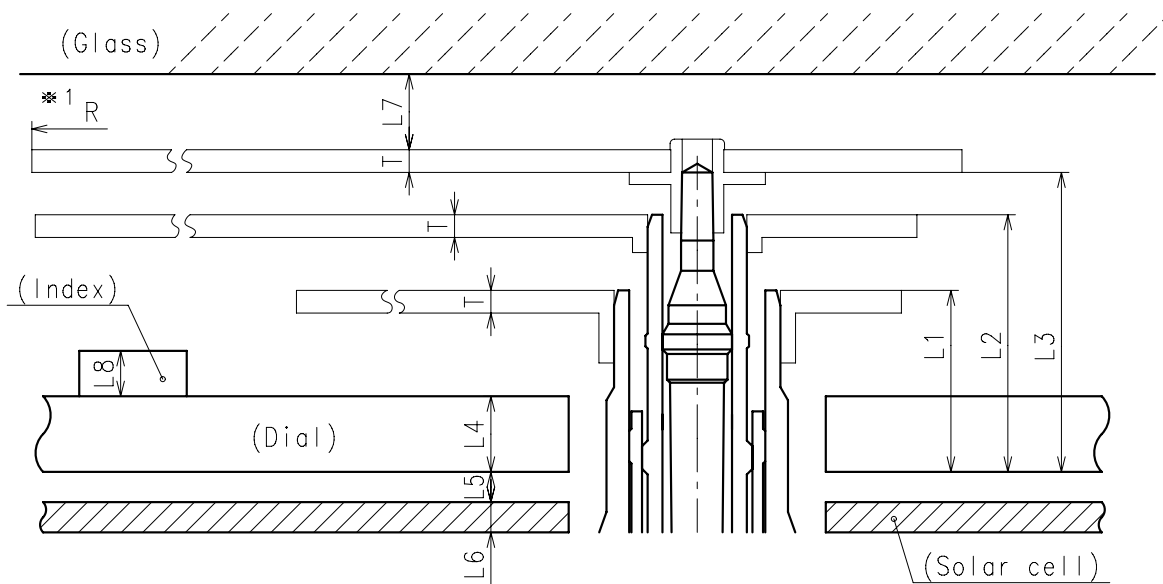
\*\*2:Second pullout stroke



- ※ Unbalance
  - Hour hand  $\leq 0.5\mu \text{ N} \cdot \text{m}$  ( $50\mu \text{ g} \cdot \text{m}$ )
  - Minute hand  $\leq 0.6\mu \text{ N} \cdot \text{m}$  ( $60\mu \text{ g} \cdot \text{m}$ )
  - Second hand  $\leq 0.06\mu \text{ N} \cdot \text{m}$  ( $6\mu \text{ g} \cdot \text{m}$ )
- ※ Moment of inertia
  - Second hand  $\leq 0.6\mu \text{ g} \cdot \text{m}^2$

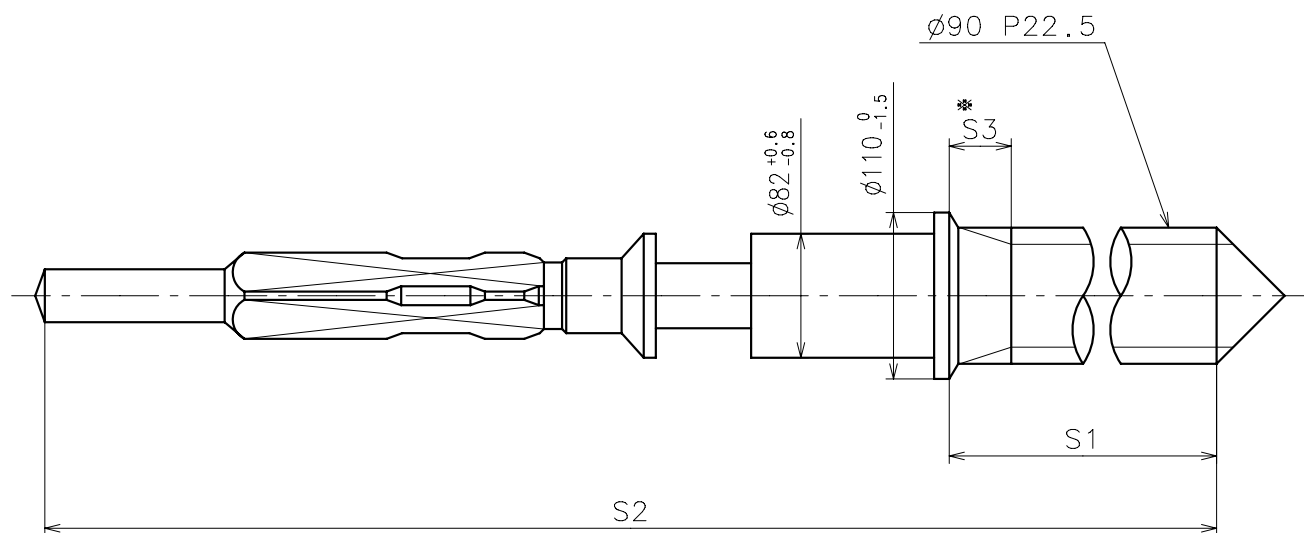


	Parts No.			Dimension	
	Hour wheel	Center wheel	Fourth wheel	K1	K2
Type M (2) AS87A**	0271649	0221654	0241584	60	35



	L1	L2	L3	L4	L5	L6	L7	L8	T	*1 R
Type M(2) AS87A**	120	170	198	50	20	20	MIN: 50	MAX: 30	15	MAX: 1250

※1: It is the size taken into consideration for hands attachment.  
Please observe some standard value specified in unbalance and moment of inertia when using long hands.



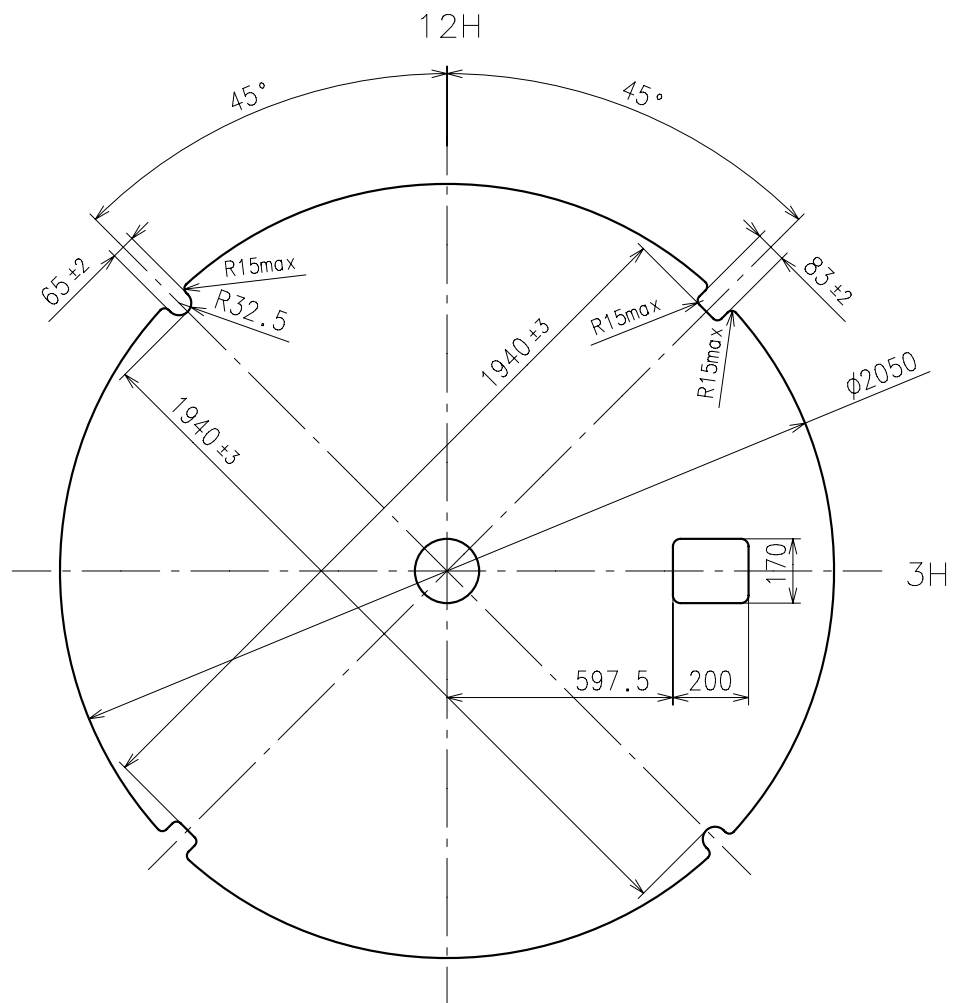
※ Not threaded

	Part No.	S1	S2	※ S3
Standard	0351177	1366	1964	60

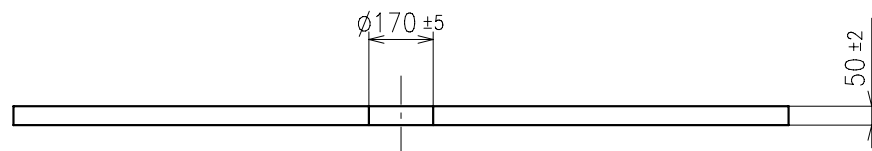
Material : Steel

Hardness : Vickers 600±50





Case body inside diameter:  $\phi 2080$



[Attention]

Each elements of solar cell must be kept the transparency rate of the dial more than 40%.  
Refer to the Fig.[1] or [Solar cell unit-01] page instruction as to the shape of solar cell.

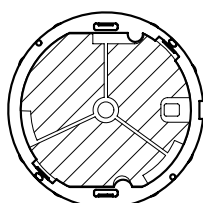
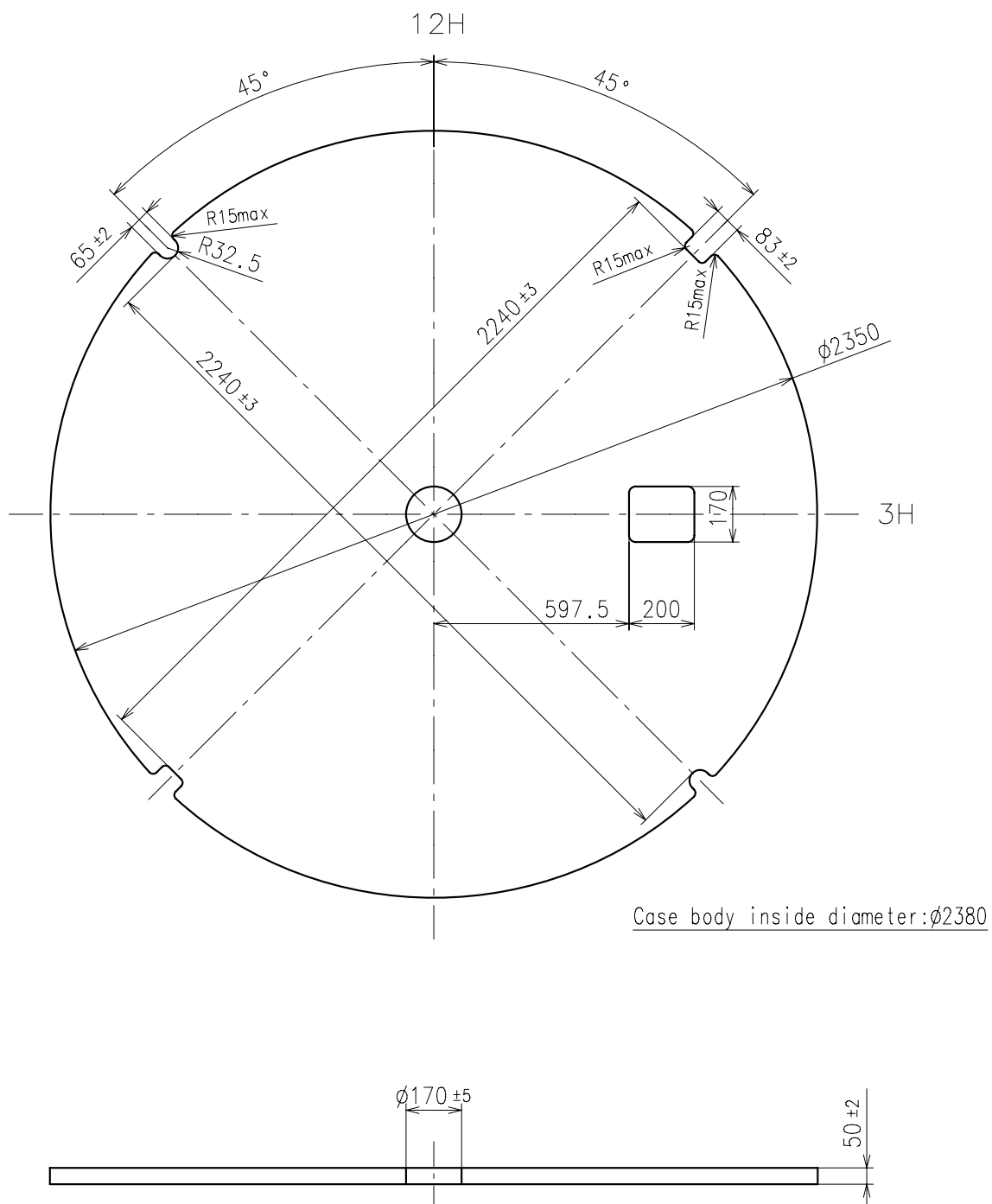


Fig.[1]  elements of solar cell



[Attention]

Each elements of solar cell must be kept the transparency rate of the dial more than 40%.  
Refer to the Fig.[1] or [Solar cell unit-02] page instruction as to the shape of solar cell.

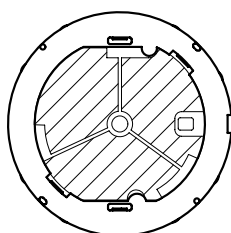
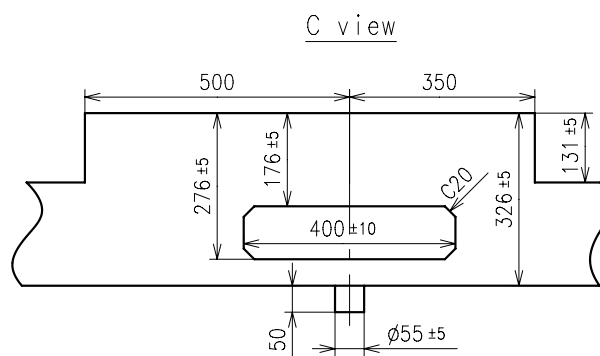
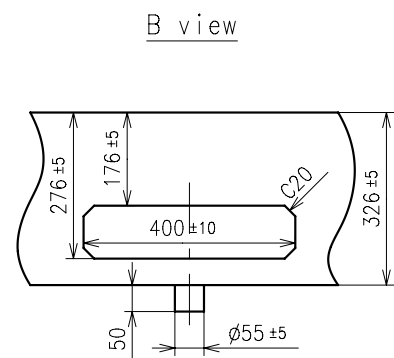
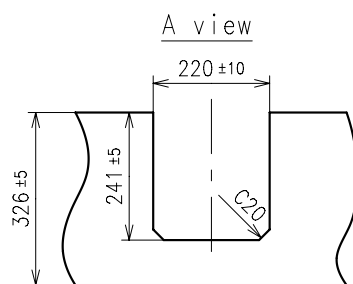
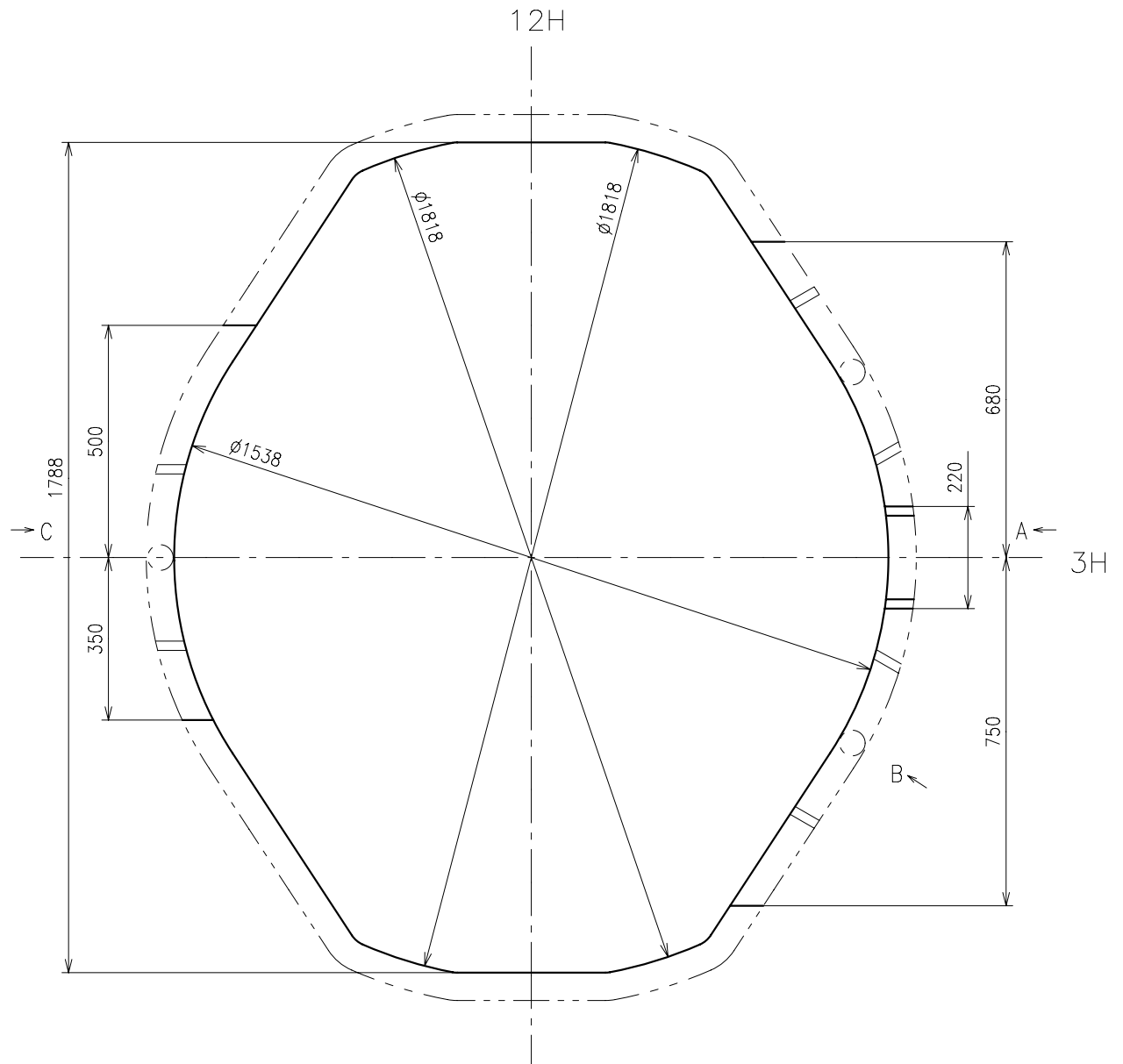
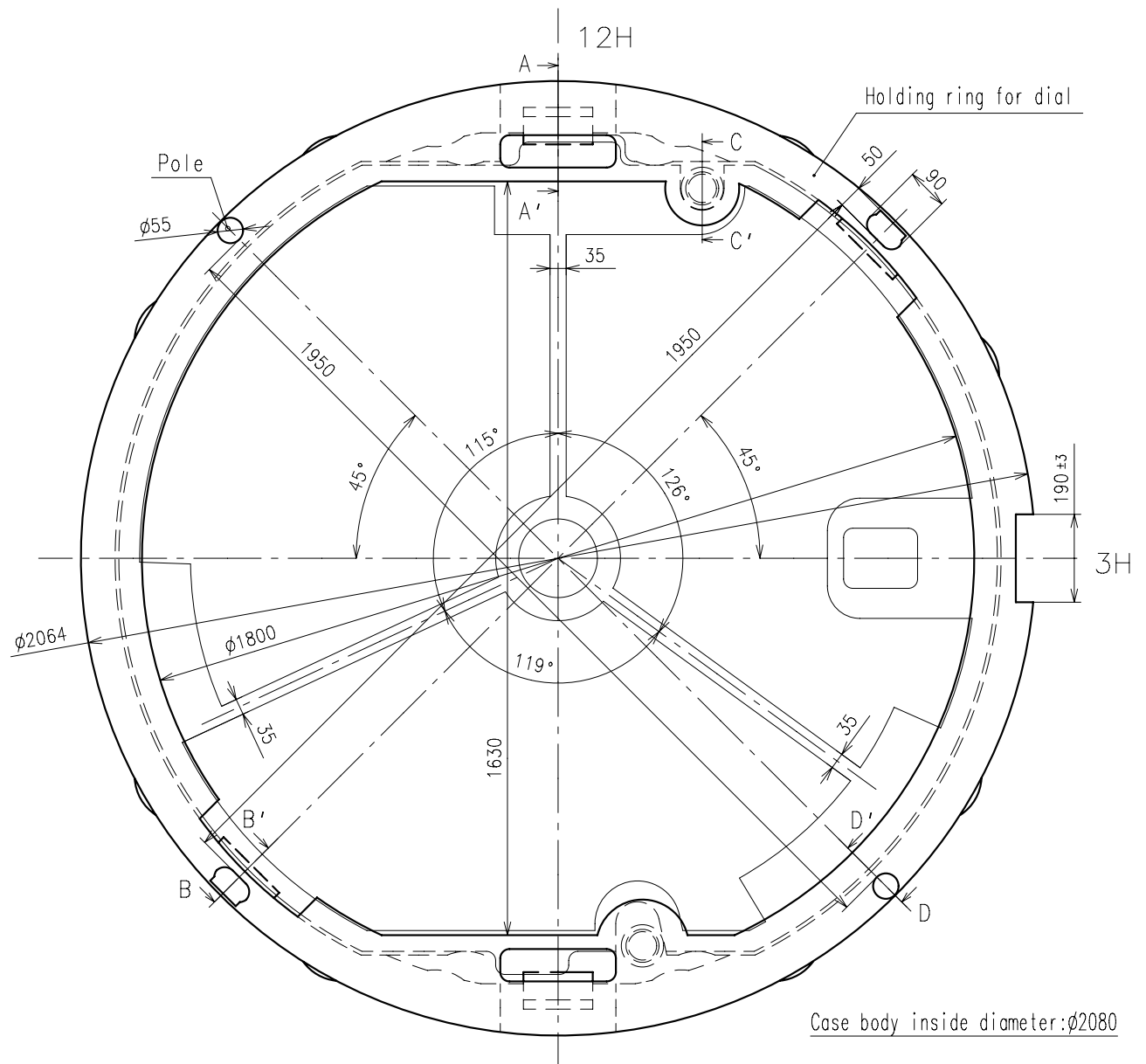


Fig.[1] elements of solar cell

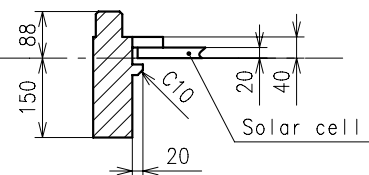
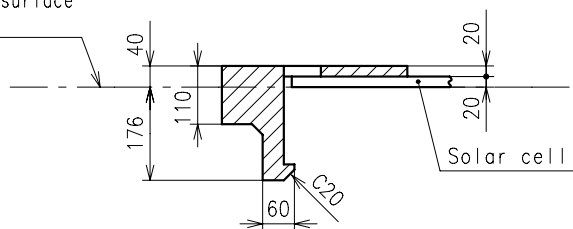




A-A' section

B-B' section

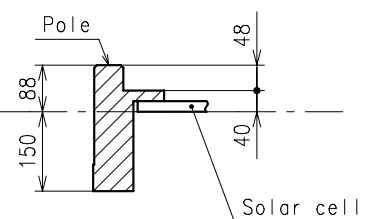
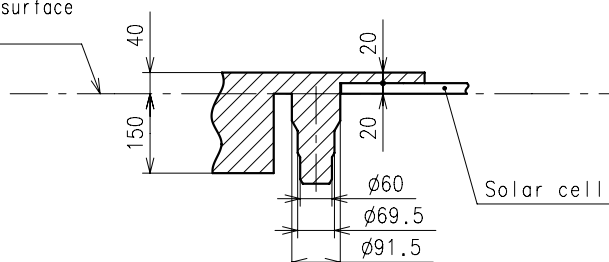
Contacting surface  
of movement



C-C' section

D-D' section

Contacting surface  
of movement





**1. How to remove the setting stem**

When removing the setting stem, put the setting stem at normal position and push the "setting lever" by tweezers. (Refer to the Fig.[0].)

The "setting lever" can not be push if the setting stem is not at normal position.

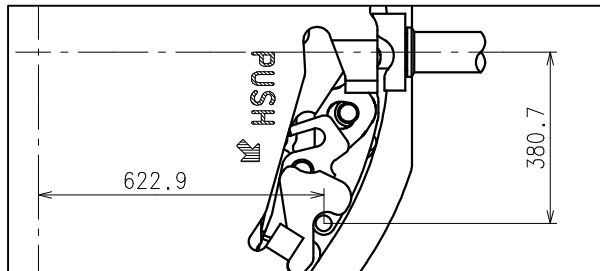


Fig.[0]

**2. Attention for solar cell unit**

Pay attention not to touch and scratch the surface of the solar cell.

**3. Dial transparency rate**

Keep the transparency rate of the dial more than 40%.

(Effective aperture is  $\phi$  19mm)

Each elements of solar cell must be kept the transparency rate.

**4. The guideline of charging time is as in below**

(Dial transparency rate = 40%)

Illumination (Lx)	Source of light	Environment	A (Approx. Hours)	B (Approx. Hours)	C (Approx. Minutes)
700	A fluorescent lamp	Inside the office	—	45	132
3,000		30W 20cm	60	4	33
10,000	Sun light	Cloudy	20	1.5	11
100,000		Fine weather	5	15 minutes	2.5

Condition A : Time required for full charge

Condition B : Time required for steady operation

Condition C : Time to charge 1 day of power

**5. 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.

**6. Attention for the secondary battery unit**

Please set the exclusive secondary battery unit.

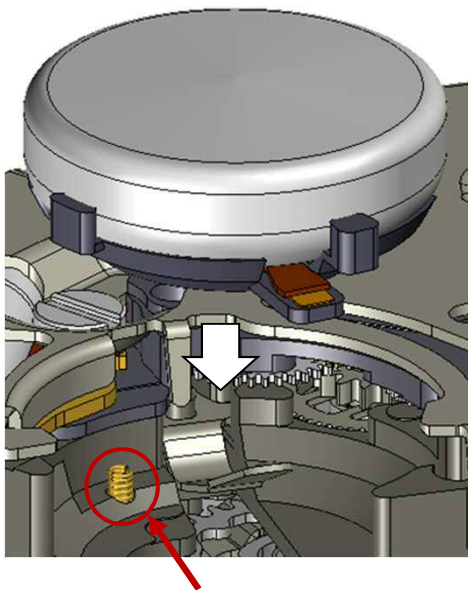
(The secondary battery is Titanium-lithium-ion battery without any environmentally harmful substances.)

If the silver oxide battery is accidentally set and charged, there is a possibility of battery explosion.

To prevent from the battery explosion, it is adopted safety structure not to charge the silver oxide battery even if it is accidentally set.

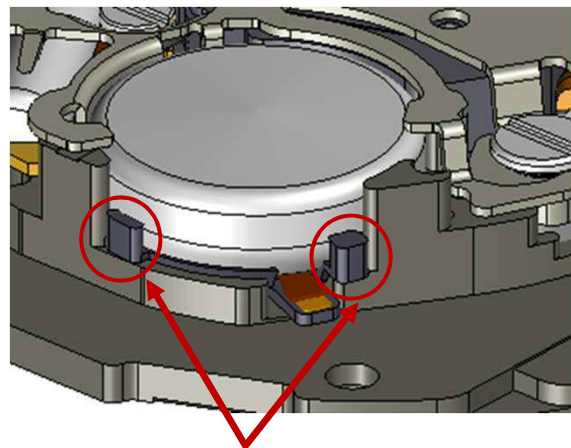
When the secondary battery is assembled, please match the phase in accordance with illustration and push the battery vertical direction. (Refer to the Fig.[1], [2] in below.)

Please pay attention not to bend the solar cell lead terminal.



Solar cell lead terminal

Fig.[1]



Setting position

Fig.[2]

When the secondary battery is disassembled, please broaden the spring of circuit block cover toward the (⇒) direction and remove the battery in accordance with illustration. (Refer to the Fig.[3] in below.)

Please refrain from touching the diode element on the back side of the secondary battery.

(Refer to the Fig.[4] in below.)

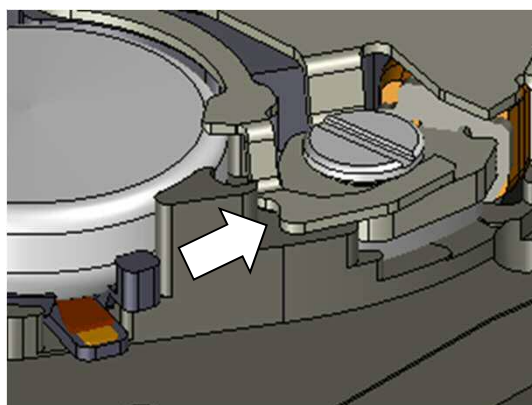


Fig.[3]

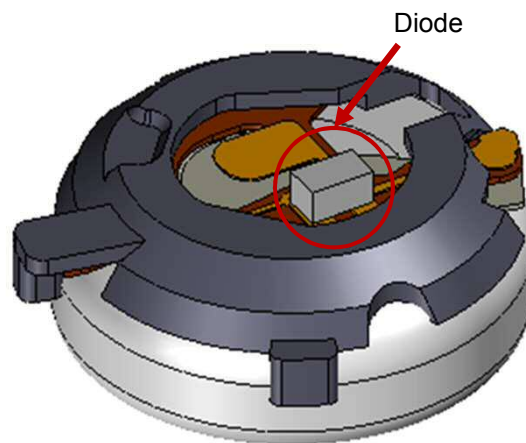
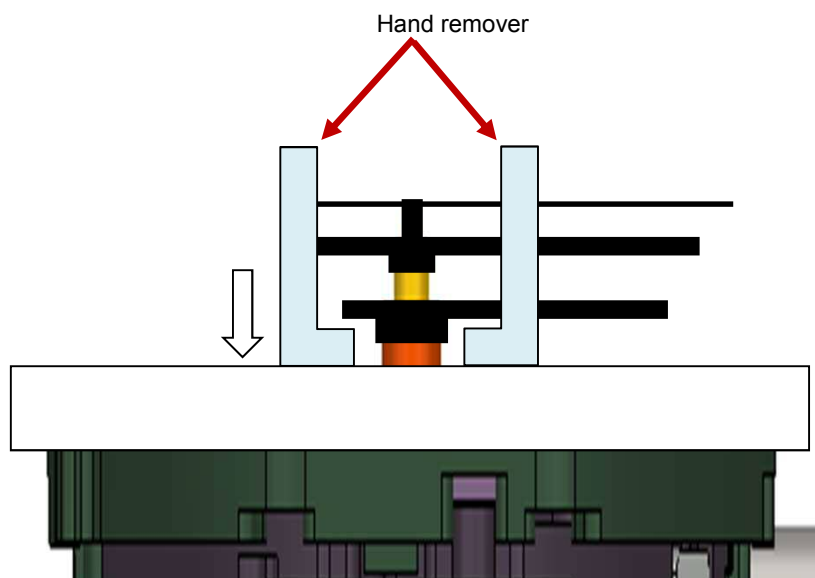


Fig.[4]

**7.Attention for hands disassemble**

When the hand is disassembled, please be sure to hold the dial.

If the hand is disassembled without holding the dial, it may have a possibility to break the movement.

**8. How to set the dial**

The dial is held by the four guide poles on the solar cell unit.

