EPSON

Watch Movement Specification and Drawing

CHRONOGRAPH

Cal. YM87A

Movement Size

12’’’

Casing Diameter

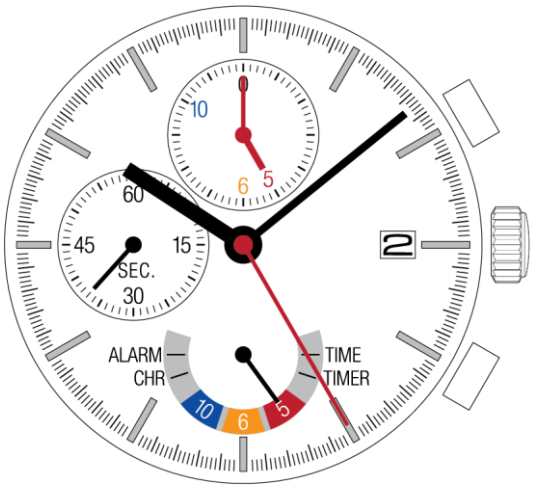
Ø 27.0mm

Height

3.70mm

Battery Life

3 years



Date: 22/Aug./'23

Cal. YM87A

Cal. YM87A	Specifications	Date : 22/Aug./'23
		Rev. : 03

Analog Quartz 12''' Yacht Timer Movement

1. MOVEMENT DIMENSIONS

Outside diameter	ϕ27.60mm (12H-6H) × 24.00mm (3H-9H)
Casing diameter	ϕ27.00mm (12H-6H)
Total height	3.70mm (including battery)

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℃ to +50℃
Regulation device	Nil (Pre-adjusted)

3. INDICATOR / FUNCTIONS

3 Hands	Hour / Minute / Center (Center)
Small hands	Mode (6H) / Small second (9H) / Small watch hour and minute (12H)
Calendar	Instant setting device for date calendar
Reset switch	
System-reset switch	
Power depletion warning function (BLD) (Small second hand moves at 2-second intervals)	
Chronograph	The chronograph can measure up to 12 hours in 1/5 second increments.
Timer	The countdown timer can be set 10 minutes.
Yacht timer	
Alarm	

4. FEATURES

Jewels	0 Jewels	
Anti-magnetism	Over 1600A/m (Direct current magnetic field)	
Maximum unbalance of hands	Small second hand	: 0.03 μN・m
	Mode hand and Small watch minute hand	: 0.03 μN・m
	Center hand	: 0.06 μN・m
	Minute hand	: 0.70 μN・m
Moment of Inertia	Center hand	: less than 0.2 μg・m²

5. BATTERY

Type / Size	Silver oxide battery / ϕ9.5mm × t 2.73mm
Recommended battery	SR927W
Nominal voltage	1.55 V
Battery life	Approx. 3 years (6 hours yacht timer, 10 minutes timer, 60 minutes chronograph, 20 seconds single time alarm and 20 seconds regular alarm operation per day)
Driving current consumption	Approx. 0.80 μA
Operation stopping voltage	0.9 V

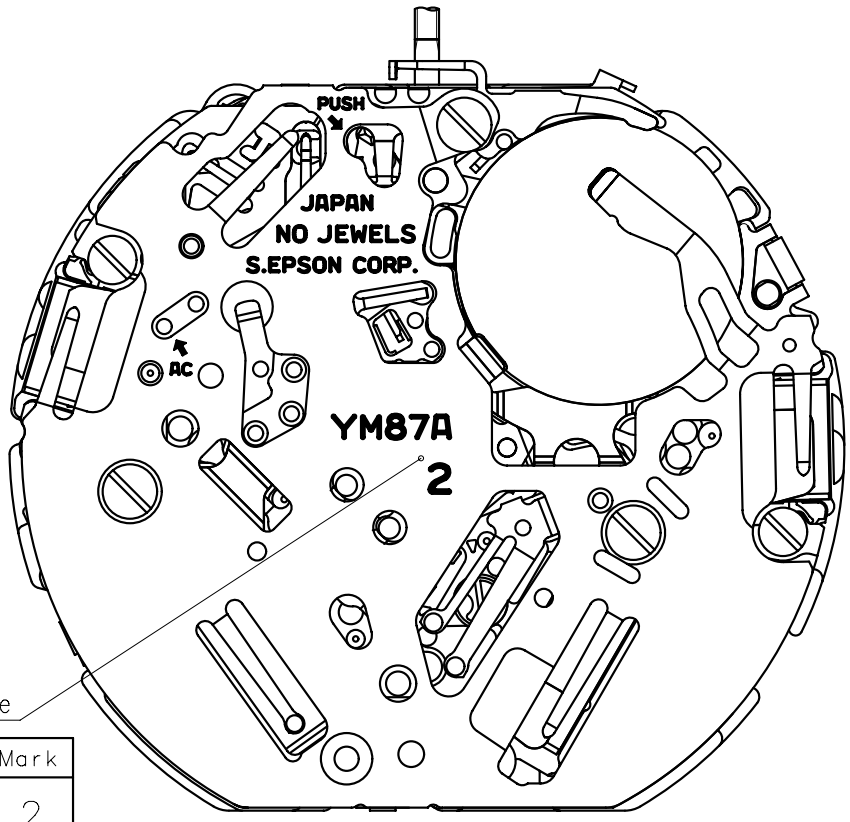
6. SEPARATED PARTS (Parts code)

Hand setting stem	0351584 (Standard)
Holding ring for dial	0866650 (Standard)
Battery	SR927W
Magnetic shield plate	4259519
Piezoelectric element	4589801
A.C. comment seal	0110705

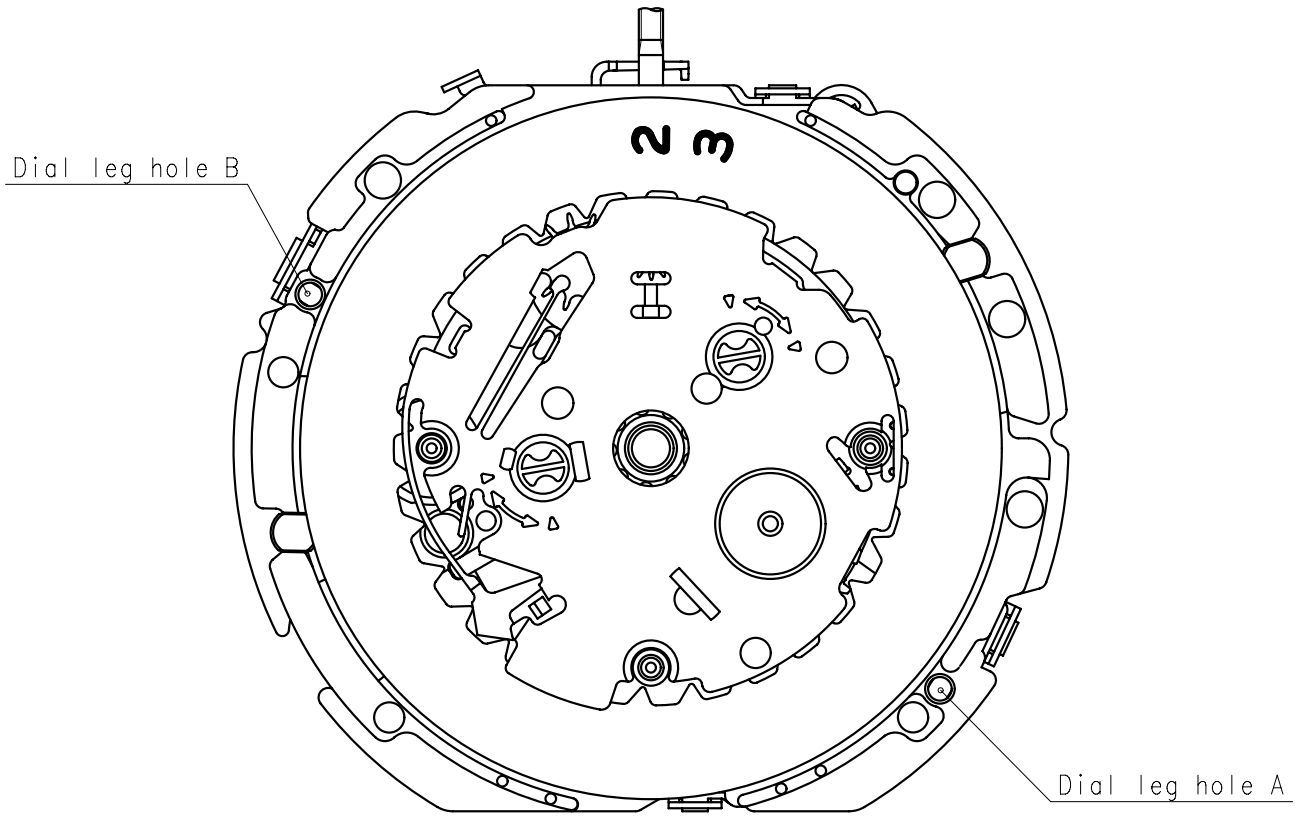
7. TEST OF ACCURACY

Equipment to be used	SEIKO quartz tester QT-99, QT2100 Greiner quartz timer-C , Witschi Q-tester 4000
Duration of measurement	10 seconds
Microphone to be used	Electromagnetic detection type

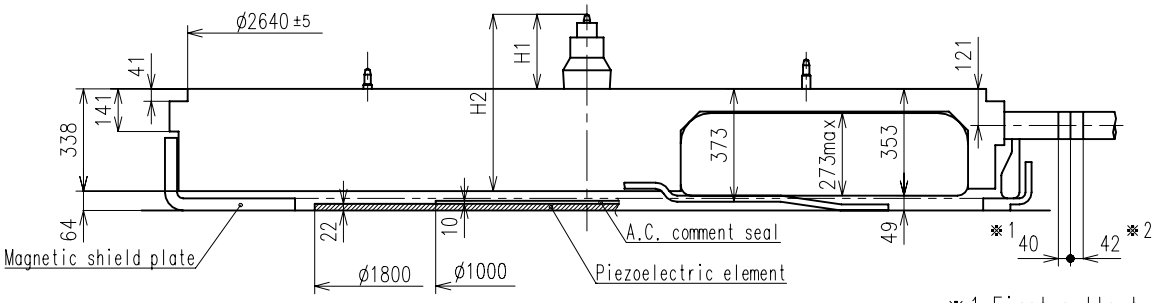
All specifications are subject to change without notice.



	Mark
Type(M) YM87A**	2

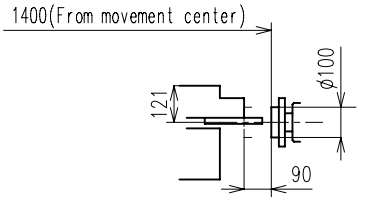


Cal. YM87A	Casing	Date:22/Aug./'23
		Rev.:05

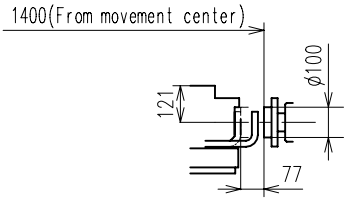


※1:First pullout stroke
※2:Second pullout stroke

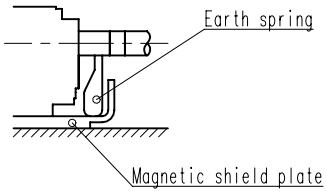
Center post		Type M (2) YM87A**
Maximum height from dial support	H1	246.5
Total height including movement	H2	584.5

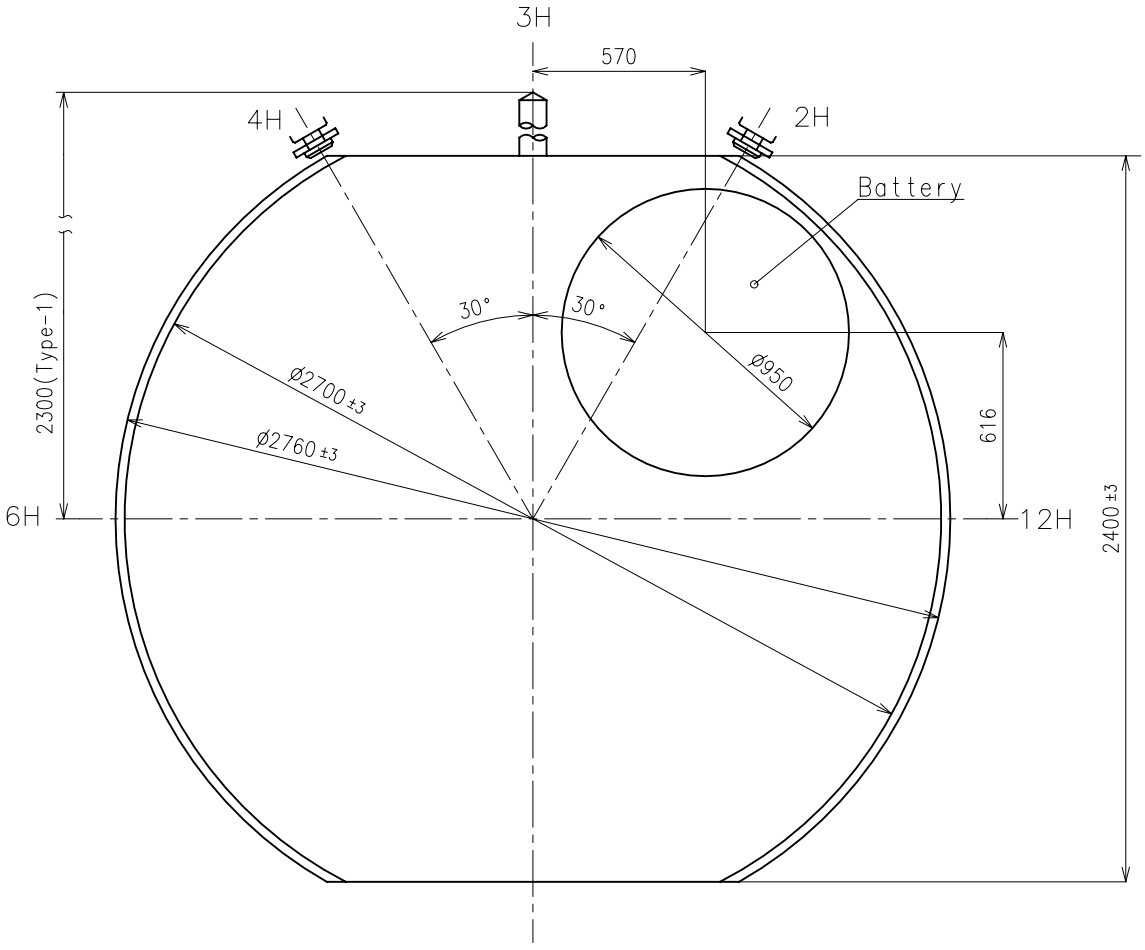


4H Button stroke



2H Button stroke





Unit : 1=1/100mm

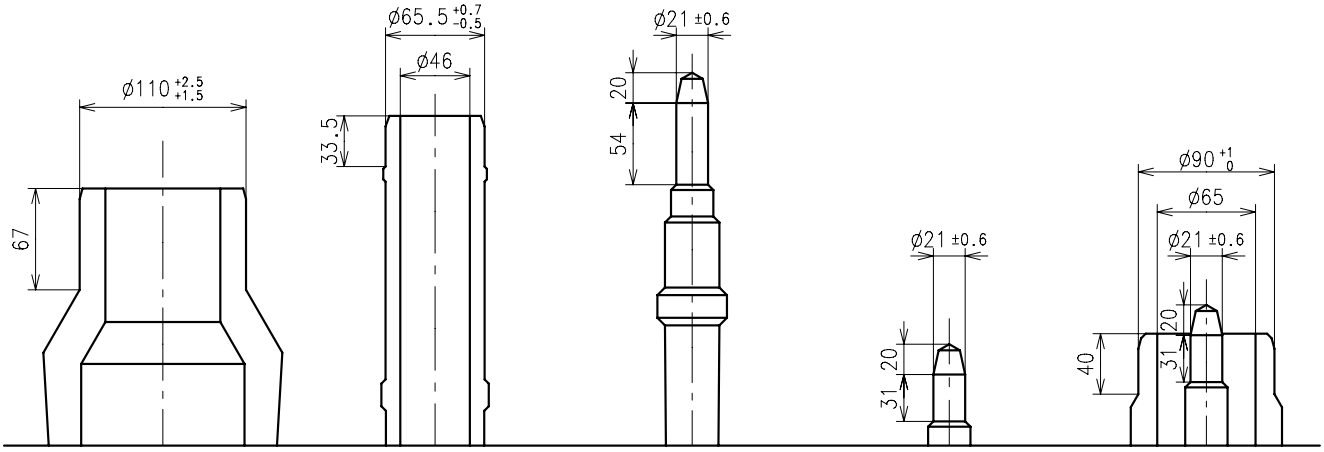
Cal. YM87A	Hand fitting	Date:11/Jan./'19 Rev.:03

※Unbalance

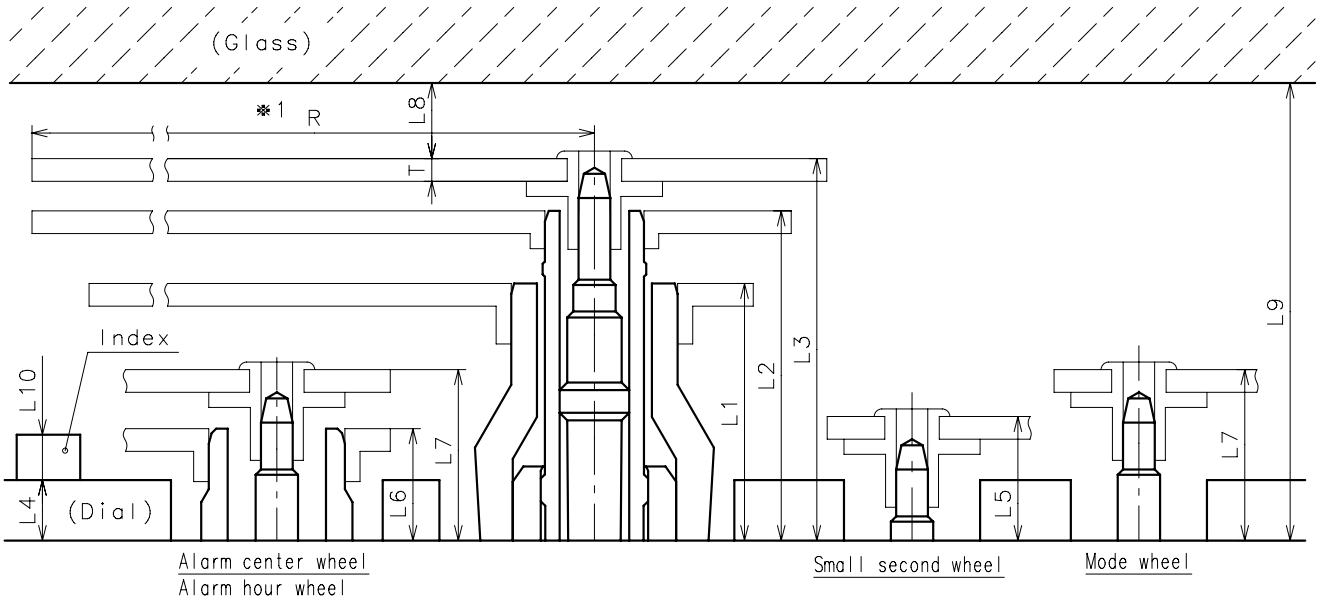
- Small second hand ≦ 0.03μ N・m (3μ g・m)
- Small watch minute hand ≦ 0.03μ N・m (3μ g・m)
- Mode hand ≦ 0.03μ N・m (3μ g・m)
- Center hand ≦ 0.06μ N・m (6μ g・m)
- Minute hand ≦ 0.70μ N・m (70μ g・m)

※Moment of inertia

- Center hand ≦ 0.2μ g・m²



	Parts No.						
	Hour wheel	Center wheel	Timer center wheel	Small second wheel	Mode wheel	Alarm center wheel	Alarm hour wheel
Type M (2) YM87A**	0271588	0221583	0888582	0240580	0270582	0270582	0271583

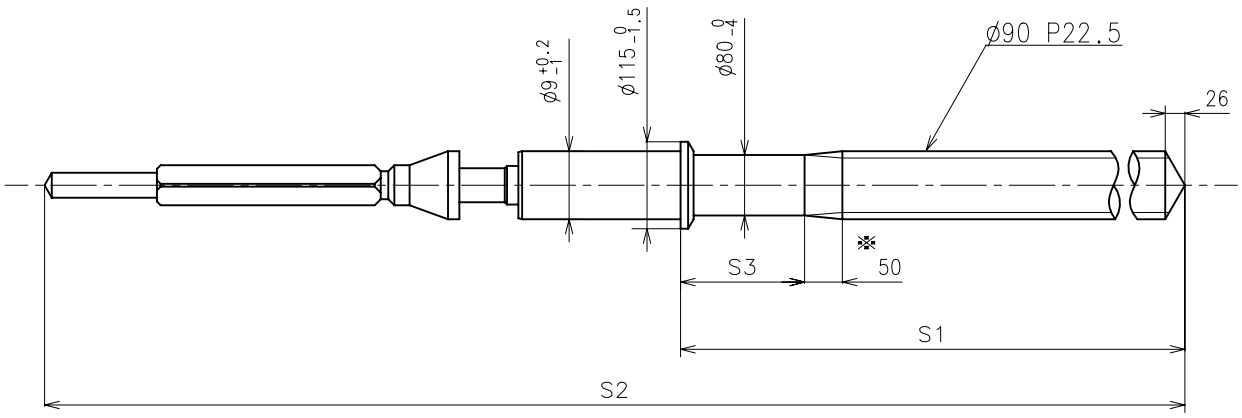


	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	T	※1 R
Type M (2) YM87A**	170	218	252.5	40	77	74	113	MIN: 50	MIN: 302.5	MAX: 50	15	MAX: 1250

※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.

Unit : 1=1/100mm

Cal. YM87A	Hand setting stem	Date:22/Aug./'23 Rev.:03



※ Not threaded

	Part No.	S1	S2	S3
Type-1 (Standard)	0351584	1164	2005.5	164

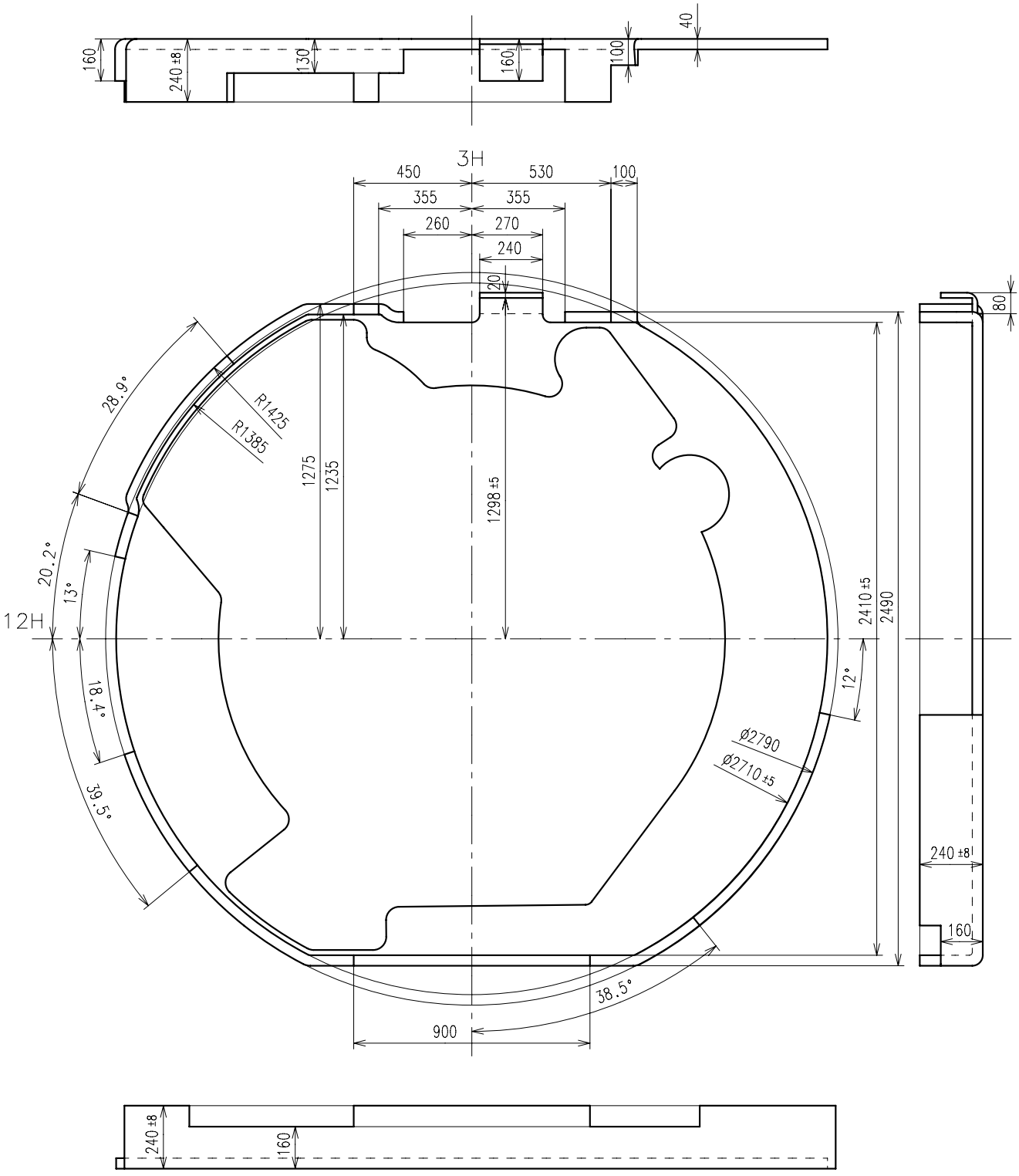
Material : Steel

Hardness : Vickers 600±50

Unit : 1=1/100mm

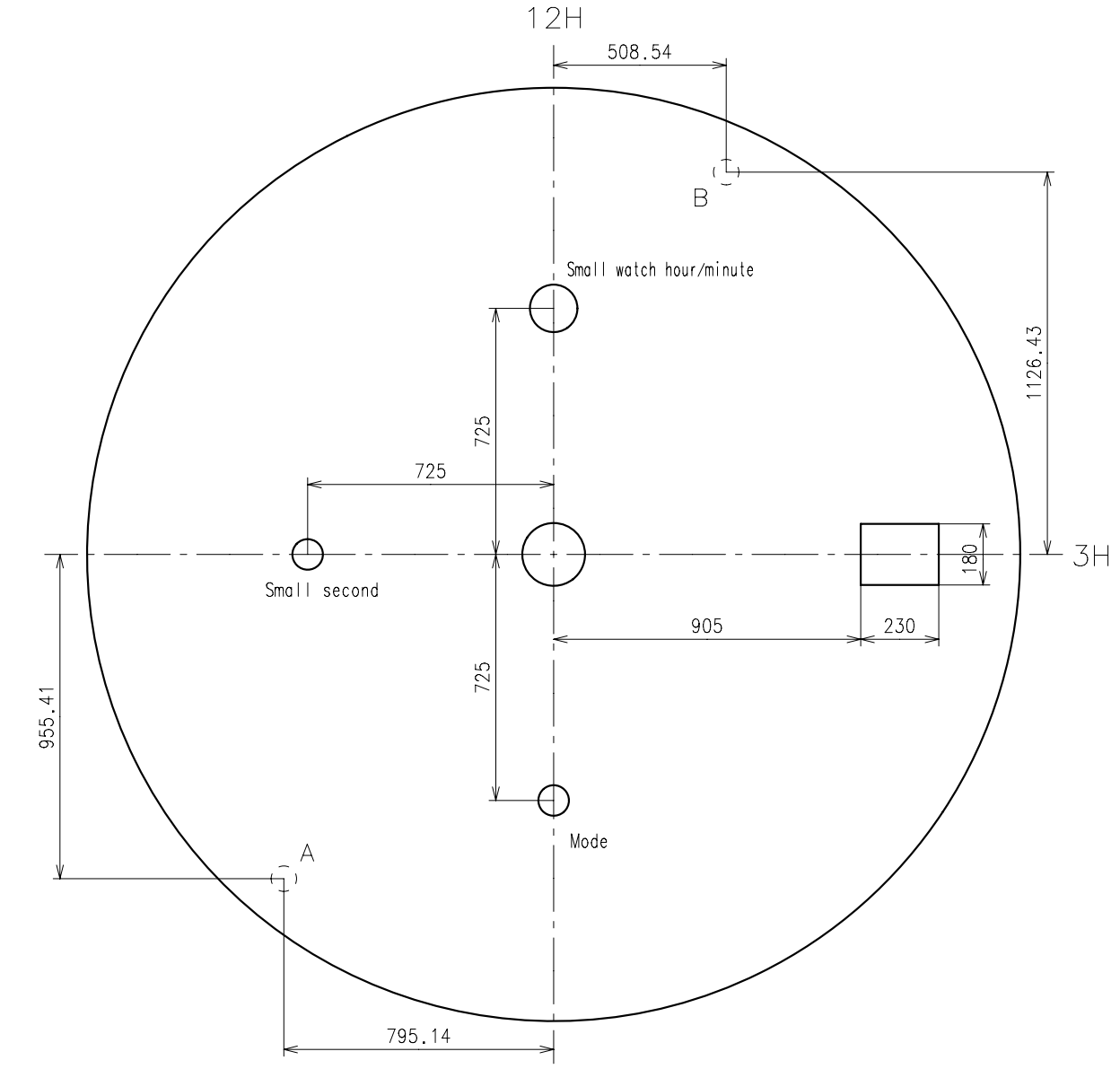
Cal. YM87A	Magnetic shield plate	Date:30/Jan./'15 Rev.:01

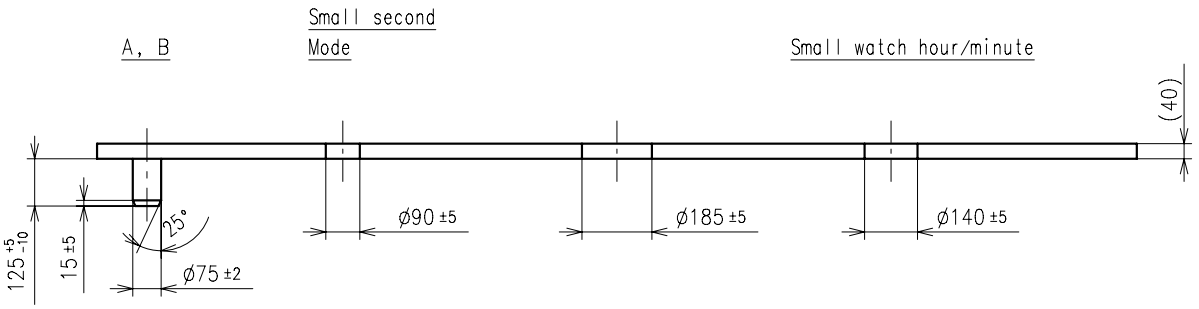
Part No. : 4259519



Unit : 1=1/100mm

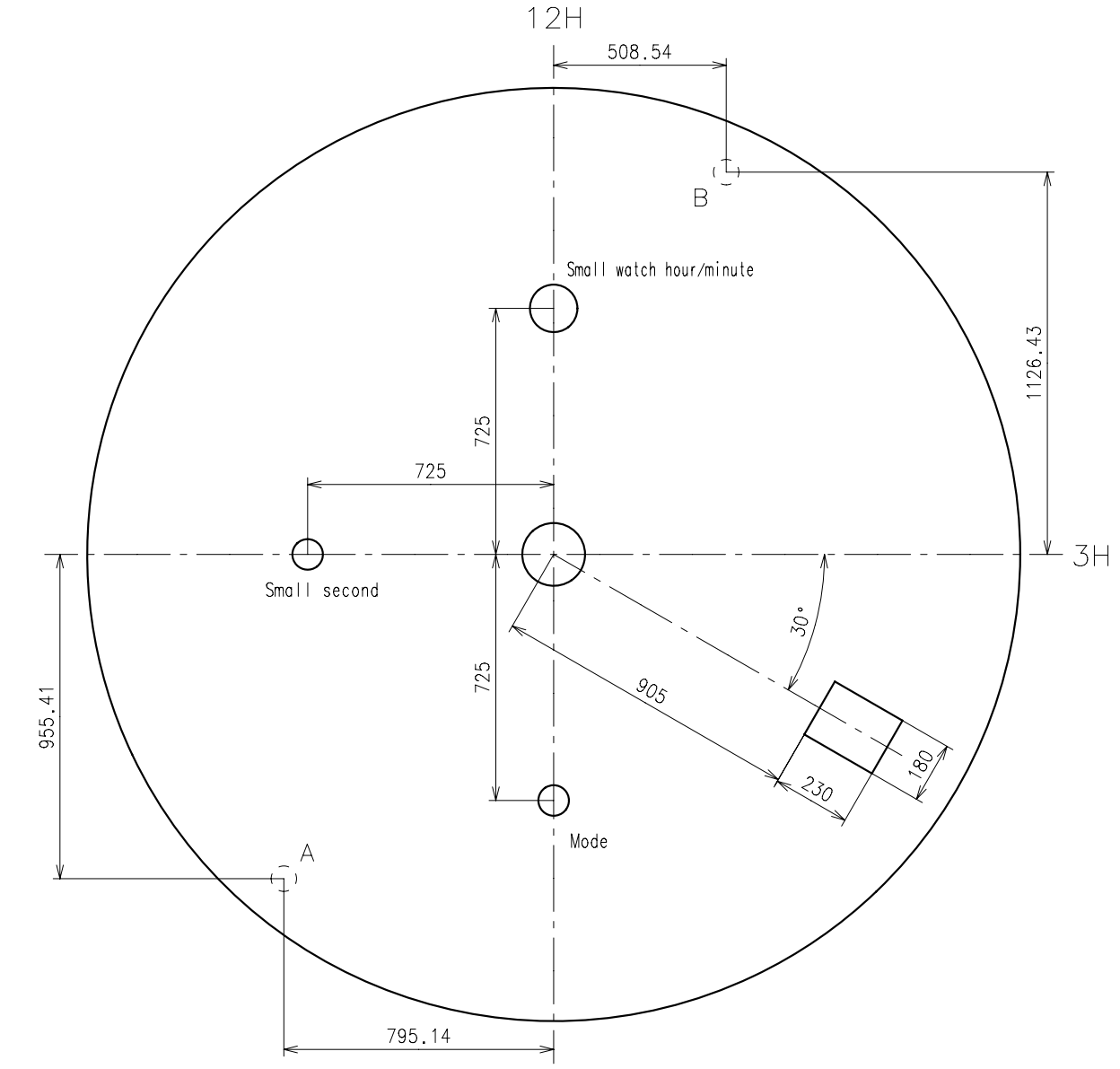
Cal. YM87A	Dial-01	Date:30/Jan./'15
		Rev.:01

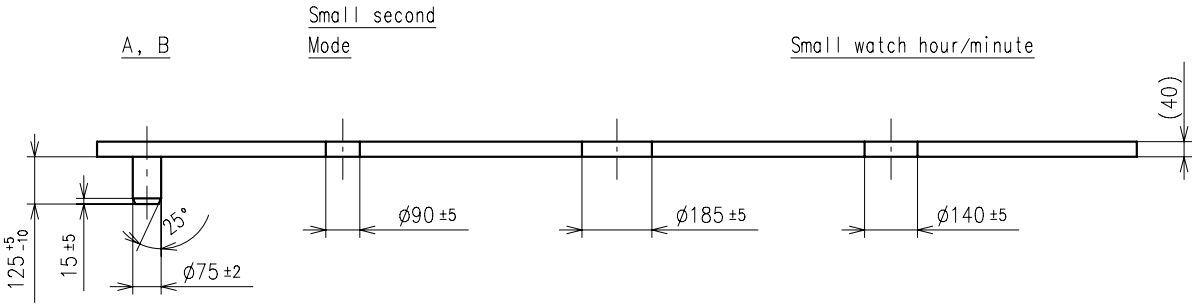




Unit : 1=1/100mm

Cal. YM87A	Dial-02	Date:30/Jan./'15
		Rev.:01

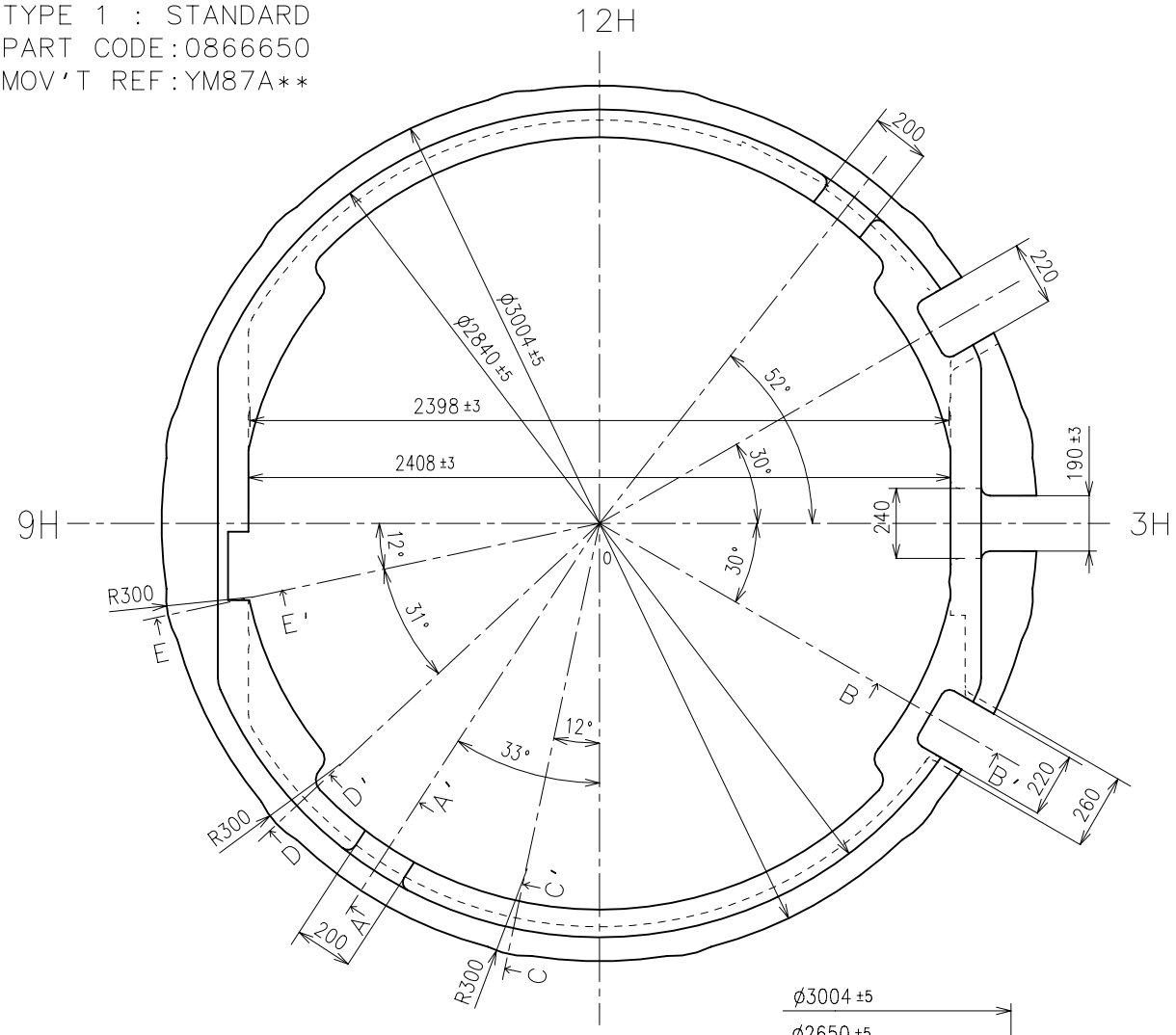


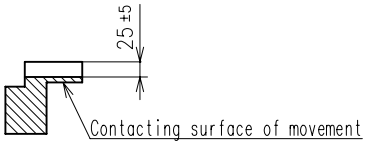


Unit : 1=1/100mm

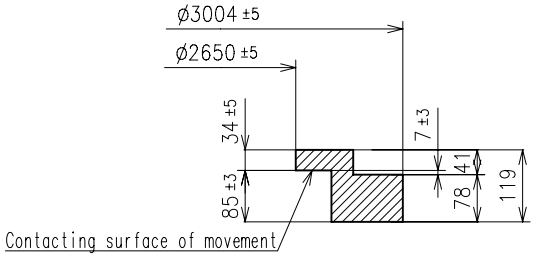
Cal. YM87A	Holding ring for dial	Date:22/Aug./'23
		Rev.:03

TYPE 1 : STANDARD
PART CODE:0866650
MOV'T REF:YM87A**

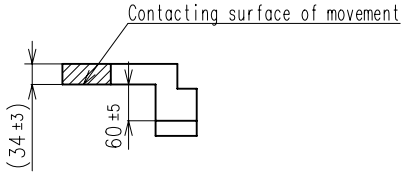




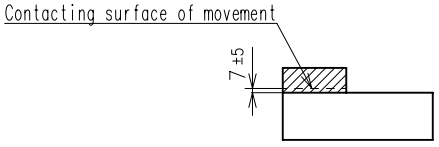
A-A' section



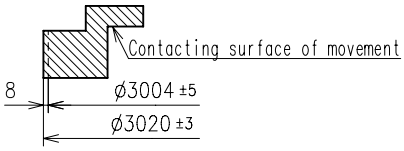
0-12H section



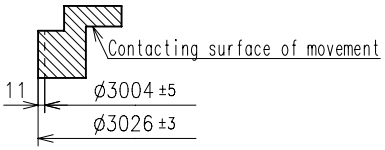
B-B' section



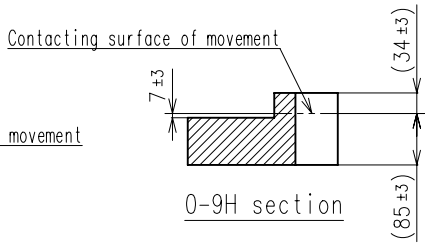
0-3H section



C-C' section



D-D' section
E-E' section



0-9H section

Unit : 1=1/100mm

1.How to replace the battery

- Please use the specified battery to keep the stable performance for a long time.
- Please install the minus part of the battery towards inside of the watch.
- When installing or changing the battery, it is recommended to remove three battery clamp screws first, then remove the battery clamp not to damage the movement parts.
  If you install the battery without removing the battery clamp, please install the battery from [→] direction as illustrated below Fig.[1].
- Install the battery under the circuit cover as illustrated below Fig.[1] and Fig.[2].
- System-reset is required as below.
  After installing battery, short the circuit pattern “AC” to battery clamp for more than 2 seconds.
  Then, under time setting condition, set small watch hour and minute hand, center hand and mode hand at "0" position.

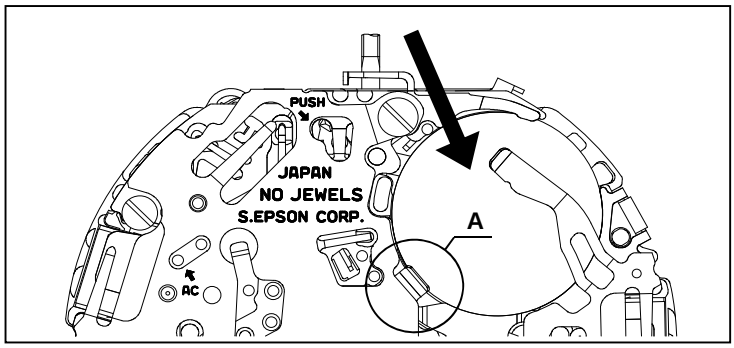


Fig.[1]

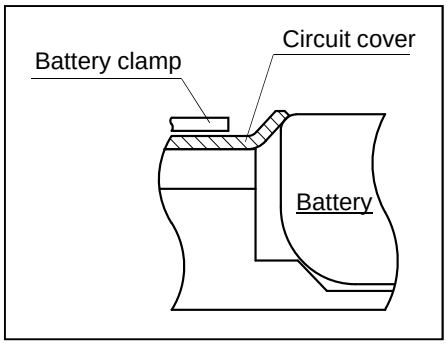


Fig.[2] A section

2.How to remove the stem

- When removing the stem, pull out the crown at 1st click position and then remove the stem while pressing the hollow portion of setting lever by tweezers. (Refer to the Fig.[3].)
- Please do not transform the earth spring.

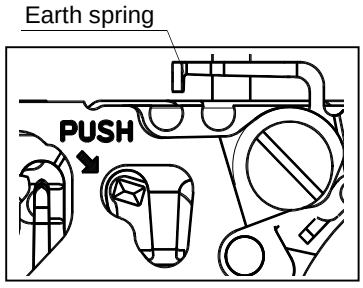


Fig.[3] Crown pulled out at 1st click

3.How to set the hands

- Each hand moves at step interval. Set the each hand at correct position according to the scale on the dial in order not to make a mistake in reading time.
- Do not turn the hand forcibly.

4.How to remove the hands

- When removing the hands, use exclusive fork-shaped tools.
- Do not remove the dial under the condition that any hands are set.

5.How to test the accuracy

When measuring the time accuracy, use specified Quartz Tester and change the gate time in 10 seconds.

1.Minute hand

The center wheel have a safety stopper structure to prevent the minute hand from being pressed too much. However pay attention to the contact between hour hand and minute hand.

2.Holding ring for dial

Use the specified holding ring for dial to prevent rotation of the movement inside of the case in order to stabilize the button operation.
Refer to the [Holding ring for dial] page instruction as to the shape and tolerance.

3.Case

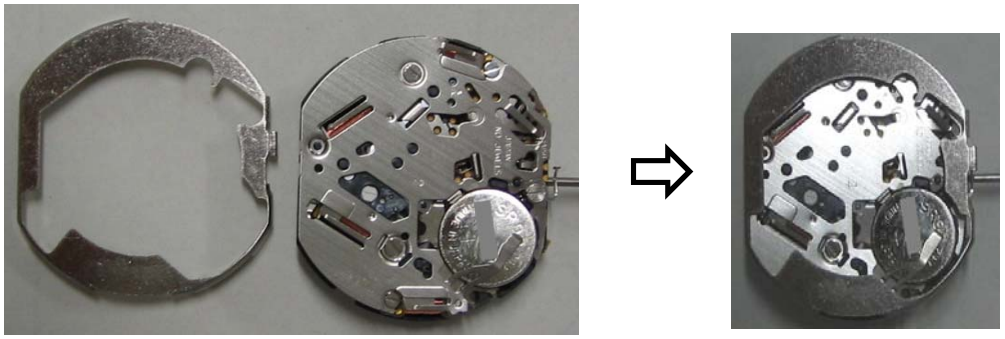
Use the metal case to prevent from the movement mal-function by static electricity.

4.Hour wheel

When set and remove the hour hand repeatedly, it may reduce the hand fixing torque because the hour wheel is made by plastic.
To ensure the enough fixing torque, it isn't recommended to re-assemble the hour hand more than five times.

5.Magnetic shield plate

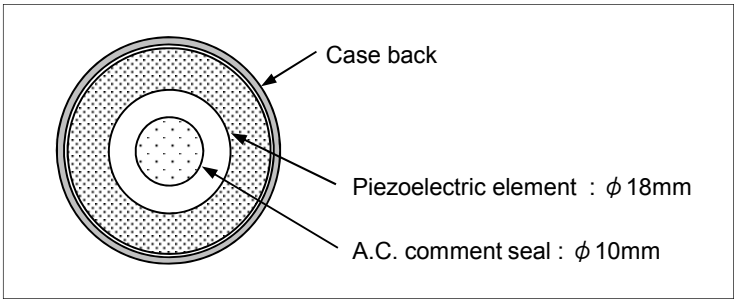
Install magnetic shield plate on the movement(on battery clamp) before assembling the case back.
Refer to the following picture not to install magnetic shield plate incorrect direction.



Magnetic shield plate Movement

6.Piezoelectric element , A.C. comment seal

Stick piezoelectric element and A.C. comment seal to the center of case back.



(1) Piezoelectric element

Piezoelectric element must be stuck to case back by thermoplastic adhesive.

Thermoplastic adhesive is already printed to the surface of piezoelectric element.

Heating temperature and time to stick piezoelectric element is shown in the following table.

Material of case back	Heating temperature	Heating time
Stainless	250℃	5 seconds
Titanium	250℃	6 seconds

Check piezoelectric element is definitely stuck to case back after heating.

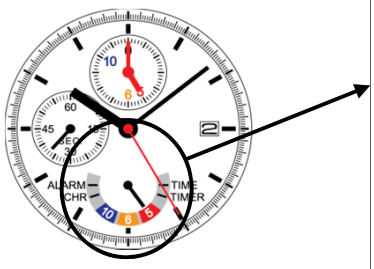
(2) Sticking position

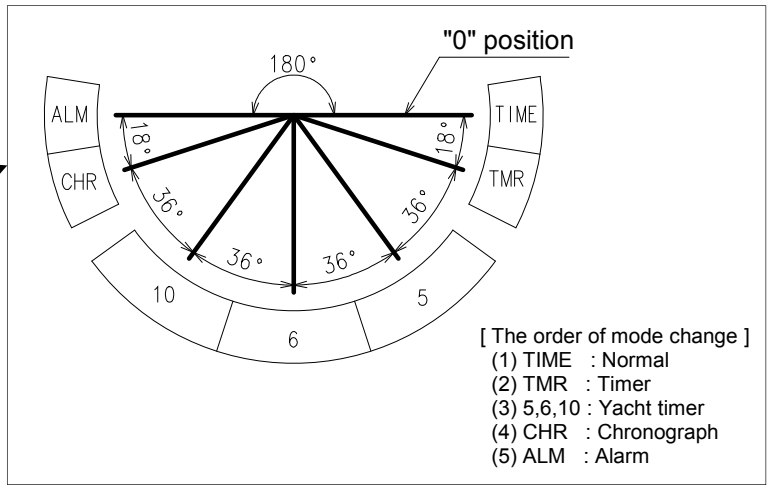
- The amount of the misalignment between the center of case back and piezoelectric element : 0.35mm and less
- The amount of the misalignment between the center of piezoelectric element and A.C. comment seal : 0.50mm and less

If the sticking position of piezoelectric element and A.C. comment seal is drastically misaligned or if the electrical continuity is bad, no sound may occur.

Cal. YM87A	Attention of dial design	Date : 30/Jan./'15
		Rev. : 01

1.The design instruction of mode indicator





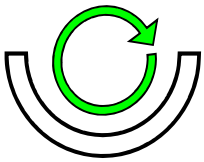
2.The index design instruction of mode hand

(1) Mode function

The mode hand moves 180 degrees from the start point.

(2) Set to "0" position

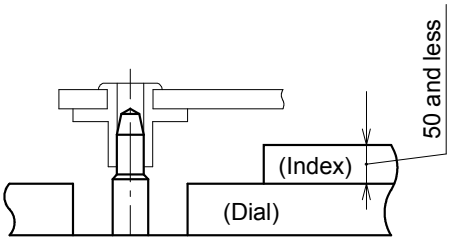
When the mode hand set to "0" position, the mode hand turns a full round.



(3) Dial index design

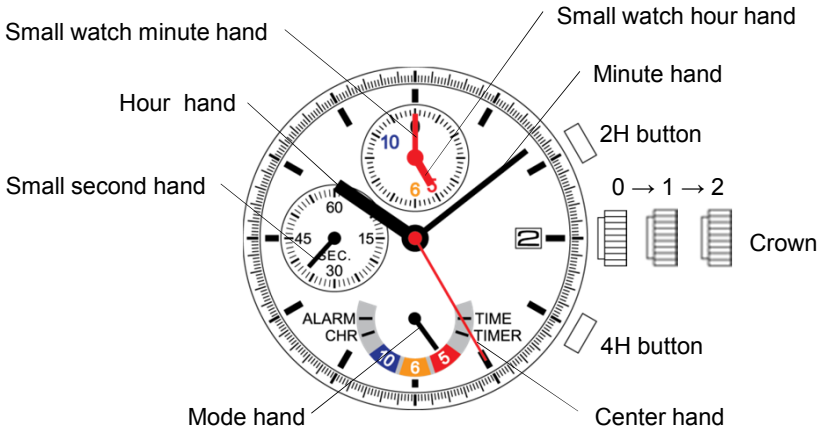
The dial index must be designed on the assumption that the mode hand turns a full round.

Index height : 50 and less



3.The start position of mode hand

The start position of the mode hand can be set on the arbitrary positions in the range of 360 degrees.



	Crown position		
	0 click	1st click	2nd click
Crown	Free	Turn clockwise for date change	Time setting
2H button	[*1]	Mode change [*2]	[*3]
4H button	[*1]	[*2]	Time setting for small watch. [*3]

[*1] Button operation of each mode (Crown position : 0 click)

Display	Mode	2H button	4H button
TIME	Time	Single-time alarm stop Sound demonstration (more than 2 seconds)	Single-time alarm time setting Single-time alarm stop
TMR	Timer	Start/Stop	Reset
Yacht 5,6,10	Yacht timer	Start / Stop Restart	Reset 1 minute adjustment Split / Split release
CHR	Chronograph	Start/Stop	Reset Split / Split release
ALM	Alarm	Regular alarm stop Sound demonstration (more than 2 seconds)	Regular alarm stop

[*2] Button operation of each mode (Crown position : 1st click)

Display	Mode	2H button	4H button
TIME	Time	Mode change	Free
TMR	Timer	Mode change	Timer time setting (1～10 minutes)
Yacht 5,6,10	Yacht timer	[5] →[6] →[10] Mode change	Free
CHR	Chronograph	Mode change	Free
ALM	Alarm	Mode change	Regular alarm time setting

The order of mode change : [TIME] → [TMR] → [Yacht 5] →[Yacht 6] →[Yacht 10] → [CHR] → [ALM]

[*3] "0" position / System-reset (Crown position : 2nd click)

How to set the "0" position

Pull crown out to the 2nd click position.
↓
Press 2H button for more than 5 seconds.
Small watch minute/hour hands turn and can now be set to correct "0" position.
↓
Press 4H button repeatedly to set it to "0" position.
↓
Press 2H button.
Center hand turns a full round and can now be set to correct "0" position.
↓
Press 4H button repeatedly to set it to "0" position.
↓
Press 2H button.
Mode hand turns a full round and can now be set to correct "0" position.
↓
Press 4H button repeatedly to set it to "0" position.

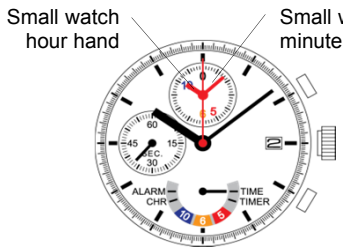
Press 2H button here will allow you to resume the procedure again as indicated by the arrow if necessary.
↓
Push crown back to normal position.

System-reset

Pull crown out to the 2nd click position.
↓
Press 2H and 4H buttons at the same time for longer than 2 seconds.

It is necessary to set the "0" position after system-reset.

Time function



- The single-time alarm can be used in the Time mode.
- Indicator of small watch hour hand and small watch minute hand.
  Single-time alarm OFF : Current time
  Single-time alarm ON : Alarm time
- The single-time alarm can be set to ring only once at a designated time within the coming 12 hours.
- The alarm time can be set in one minute increments.
- When the mode is changed from Time mode, the single-time alarm is reset.

■ Set the single-time alarm time

Press 4H button repeatedly to set the small watch hands to the desired alarm time.
The small watch hands move quickly when the 4H button is kept pressed. They stop when the hands reach to the current time.
Release and press the 4H button, the small watch hands will start moving again.

■ Stop the alarm

At the designated time the alarm rings for 20 seconds, and it is automatically disengaged as it stops.
It is possible to stop ringing manually when pressing any button.

■ Cancel the single-time alarm (when alarm time is set)

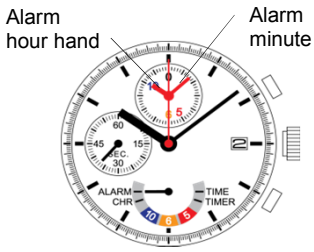
Press and hold 4H button until small watch hands stop and indicate the current time.

Change the Time mode to another mode.

■ Alarm sound demonstration (Crown position : 0 click)

Press and hold 2H button for longer than 2 seconds.
The alarm sound can be heard while the button is kept pressed.

Alarm function



- The regular alarm can be set to sound at a designated time everyday.
- The regular alarm can be set to 12 hours.
- The alarm time can be set in one minute increments.
  The beep sound of regular alarm is available only at the Alarm mode.

■ Set the alarm time

Crown	→	2H button	→	4H button	→	Crown
Pull out 1st. position		Set the Alarm mode		Set the alarm time [*1]		Push back Normal position

[*1]
Press 4H button repeatedly to set the alarm hands to the desired alarm time.
The alarm hands move quickly when the 4H button is kept pressed.

■ Stop the alarm

At the designated time the alarm rings for 20 seconds, and it is automatically disengaged as it stops.
It is possible to stop ringing manually when pressing any button.

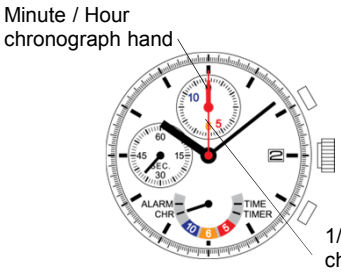
■ Cancel the alarm

Change the mode except the Alarm mode.

■ Alarm sound demonstration (Crown position : 0 click)

Press and hold 2H button for longer than 2 seconds.
The alarm sound can be heard while the button is kept pressed.

Chronograph function



- The chronograph can measure up to 12 hours in 1/5 second increments.
- When the measurement reaches 12 hours, the chronograph automatically stops counting.

■ Standard measurement

2H button (Start) → 2H button (Stop) → 4H button (Reset)

■ Accumulated elapsed time measurement

2H button (Start) → 2H button (Stop) → 2H button (Restart) → 2H button (Stop) → 4H button (Reset)

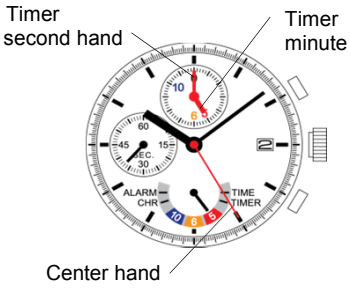
Restart and stop of the chronograph can be repeated by pressing 2H button.

■ Split time measurement

2H button (Start) → 4H button (Split) → 4H button (Split release) → 2H button (Stop) → 4H button (Reset)

Measurement and release of split time can be repeated by pressing 4H button.

Yacht timer function



- The yacht timer can be set 3 pre-set countdown time with beep sound.
- The countdown time can be selected as a mode.
  - 5 minutes
  - 6 minutes
  - 10 minutes
- When the timer counting, timer and center hands turns counterclockwise.
- After finishing countdown timer, the chronograph starts automatically.
- When the timer counting, another pre-set time can't be selected.

■ Set the timer

Crown (Pull out 1st. position) → 2H button (Set the Yacht timer mode 5→6→10) → Crown (Push back Normal position)

■ Yacht timer operation

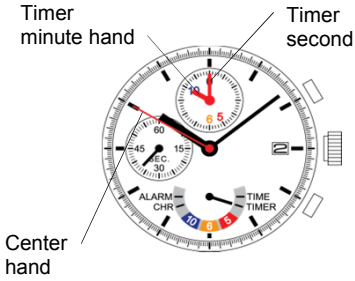
2H button (Start) → 4H button (1 minute adjustment)

→ Count up beep sound
It returns to the preset time automatically.

→ 2H button (Stop) → 2H button (Restart) → 2H button (Stop) → 4H button (Reset (Timer off))

Restart and stop of the timer can be repeated by pressing 2H button.

Countdown timer function



- The countdown timer can be set 10 minutes with beep sound.
- It is necessary to set the time before use.
- Timer and center hands turns counterclockwise.

■ Set the timer

Crown	→	2H button	→	4H button	→	Crown
Pull out 1st. position		Set the Timer mode		Set the time [*1]		Push back Normal position

[*1]
The timer can be set to a maximum of 10 minutes in 1 minute increments.
The timer hand will back to “1” minute after “10” minutes.

■ Countdown timer operation

2H button (Start) → Count up beep sound
It returns to the preset time automatically.

2H button (Stop) → 2H button (Restart) → 2H button (Stop) → 4H button (Reset / Timer off)

Restart and stop of the timer
can be repeated by pressing 2H button.

■ Indicator of center hand

The numbers on the outer circle of the dial indicated by the center hand shows the timer time.