## Watch Movement Specification and Drawing

**CHRONOGRAPH**

### Cal. YM90A

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement Size</td>
<td>12””</td>
</tr>
<tr>
<td>Casing Diameter</td>
<td>Ø 27.0mm</td>
</tr>
<tr>
<td>Height</td>
<td>3.7mm</td>
</tr>
<tr>
<td>Battery Life</td>
<td>5 years</td>
</tr>
</tbody>
</table>
Cal. YM90A

<table>
<thead>
<tr>
<th>Items</th>
<th>Rev.</th>
<th>Page</th>
</tr>
</thead>
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<td>Specifications</td>
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<td>1</td>
</tr>
<tr>
<td>Appearance</td>
<td>00</td>
<td>2</td>
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<tr>
<td>Casing</td>
<td>01</td>
<td>3</td>
</tr>
<tr>
<td>Hand fitting</td>
<td>00</td>
<td>4</td>
</tr>
<tr>
<td>Hand setting stem</td>
<td>00</td>
<td>5</td>
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<tr>
<td>Dial-01</td>
<td>00</td>
<td>6-01</td>
</tr>
<tr>
<td>Dial-02</td>
<td>00</td>
<td>6-02</td>
</tr>
<tr>
<td>Holding ring for dial-01</td>
<td>00</td>
<td>7-01</td>
</tr>
<tr>
<td>Holding ring for dial-02</td>
<td>00</td>
<td>7-02</td>
</tr>
<tr>
<td>Attention for assembly</td>
<td>02</td>
<td>8</td>
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<tr>
<td>Attention of casing part structure</td>
<td>00</td>
<td>9</td>
</tr>
<tr>
<td>Operation-01</td>
<td>00</td>
<td>10-01</td>
</tr>
<tr>
<td>Operation-02</td>
<td>00</td>
<td>10-02</td>
</tr>
</tbody>
</table>
1. MOVEMENT DIMENSIONS
- Outside diameter: \( \phi 27.60 \text{mm}(12H-6H) \times 24.00 \text{mm}(3H-9H) \)
- Casing diameter: \( \phi 27.00 \text{mm}(12H-6H) \)
- Total height: 3.7mm (including battery)

2. TIME STANDARD
- Type of quartz oscillator: Tuning fork
- Frequency of quartz oscillator: 32,768 Hz
- Accuracy: \( \pm 20 \) seconds per month (on wrist)
- Operating temperature range: \(-5^\circ\text{C} \) to \(+50^\circ\text{C}\)
- Regulation device: Nil (Pre-adjusted)

3. INDICATOR / FUNCTIONS
- 3 Hands: Hour / Minute / 1/5 second chronograph (Center)
- Small hands: Minute chronograph (6H)
- Calendar: Instant setting device for date calendar
- Reset switch: Chronograph
- Chronograph: The chronograph can measure up to 60 minutes in 1/5 second increments, capable of timing 12 hours.

4. FEATURES
- Jewels: 0 Jewels
- Anti-magnetism: Over 1600A/m (Direct current magnetic field)
- Maximum unbalance of hands:
  - Minute chronograph hand: 0.03 \( \mu \text{N} \cdot \text{m} \)
  - 1/5 second chronograph hand: 0.09 \( \mu \text{N} \cdot \text{m} \)
  - Minute hand: 0.70 \( \mu \text{N} \cdot \text{m} \)
- Moment of Inertia:
  - 1/5 second chronograph hand: less than 0.2 \( \mu \text{g} \cdot \text{m}^2 \)

5. BATTERY
- Type / Size: Silver oxide battery / \( \phi 9.5 \text{mm} \times t 2.73 \text{mm} \)
- Recommended battery: SR927SW
- Nominal voltage: 1.55 V
- Battery life: Approx. 5 years
- Driving current consumption: Approx. 0.80 \( \mu \text{A} \)
- Operation stopping voltage: 0.9 V

6. SEPARATED PARTS (Parts code)
- Hand setting stem: 0351584 (Standard) or 0351585 (Long)
- Holding ring for dial: 0866650 (Standard) or 0866789 (Special)
- Battery: SR927SW

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.
**Center post**

| Type M (2) YM90A** | **
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum height from dial support</td>
</tr>
<tr>
<td>Total height including movement</td>
</tr>
</tbody>
</table>

*1: First pullout stroke

*2: Second pullout stroke

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1400 (from movement center)

4H Button stroke

12D

90

2H Button stroke

12D

77

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*3: The earth spring is absolutely placed in contact with the case back.

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Unit: 1=1/100mm
Hand fitting

- Unbalance
  - Minute chronograph hand: 0.03 N·m (3 μg·m)
  - 1/5 second chronograph hand: 0.09 N·m (9 μg·m)
  - Minute hand: 0.70 N·m (70 μg·m)

- Moment of inertia
  - 1/5 second chronograph hand: 0.2 μg·m²

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<table>
<thead>
<tr>
<th>Parts No.</th>
<th>Hour wheel</th>
<th>Center wheel</th>
<th>1/5 second counting wheel</th>
<th>Minute counting wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type M (2) YM90A**</td>
<td>0271588</td>
<td>0221583</td>
<td>0888582</td>
<td>0902580</td>
</tr>
</tbody>
</table>

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**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.
Hand setting stem

<table>
<thead>
<tr>
<th>Type</th>
<th>Part No.</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-1</td>
<td>0351584</td>
<td>1164</td>
<td>2005.5</td>
<td>164</td>
</tr>
<tr>
<td>(Standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type-2</td>
<td>0351585</td>
<td>1840</td>
<td>2681.5</td>
<td>750</td>
</tr>
<tr>
<td>(Long)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Material: Steel
Hardness: Vickers 600±50

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 two 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 not required.
   - After installing the battery, set the current time and then set the 1/5 second chronograph hand and minute chronograph hand at "0" position.

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].)

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.
**[*1] How to set the "0" position**

1. Pull crown out to the 2nd click position.
2. Press 2H button for 2 seconds. Minute chronograph hand turns a full round and can now be set to correct "0" position.
3. Press 4H button repeatedly to set it to "0" position.
4. Press 2H button for 2 seconds. 1/5 second chronograph hand turns a full round and can now be set to correct "0" position.
5. Press 4H button repeatedly to set it to "0" position.
6. Push crown back to normal position.
Chronograph function

- The chronograph can measure up to 60 minutes in 1/5 second increments, capable of timing 12 hours.
- When the measurement reaches 12 hours, the chronograph automatically stops counting.

■ Standard measurement

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

■ Accumulated elapsed time measurement

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

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

■ Split time measurement

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

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