

# sanwa®

## SE9100

デジタル式エレベータ速度計

DIGITAL ELEVATOR SPEEDOMETER

取扱説明書

INSTRUCTION MANUAL







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# **[1] SAFETY PRECAUTIONS**

## **-Before use, read the following safety precautions.-**


This instruction manual explains how to use your new digital elevator speedometer SE9100 safely.

Before use, please read this manual thoroughly. After reading it, keep it together with the product for reference to it when necessary. If you use the product in a method not specified in this manual, the protection function of the product may be imperiled.

The instruction given under the heading of “WARNING” and “CAUTION” must be followed to prevent accidental burn or electrical shock.

### **1-1 Explanation of Warning Symbols**

The meaning of the symbols used in this manual and attached to the product is as follows.

: Very important instruction for safe use.

- The WARNING messages are intended to prevent accidents to operating personnel such as an injury.
- The CAUTION messages are intended to prevent damage to the instrument.

### **1-2 Warning Instruction for Safe Use**

#### **WARNING**

The following instructions are intended to prevent accidents. Be sure to observe the instructions when using the instrument.

1. Do not use or operate the instrument in a way other than the method instructed in this manual.
2. Before measurement, wear optimum cap, clothes and protective eyeglasses so that your hair or clothes are not caught by the rotary object.
3. Wherever there is a risk that the rotary object exposes the operator to a danger, secure sufficient safety by installing a partition, etc.
4. Never measure values exceeding the measurement ranges.
5. Do not use the Main Unit, adapter or cable if it is damaged or broken.
6. Do not use the instrument while the rear case or battery compartment cover is open.
7. Do not throw or drop this instrument.



8. Ensure that the rotary object to be measured is free of abnormality.
9. Do not touch the rotary object during measurement.
10. Be sure to check the settings, function, adapter, jacks and cable every time before proceeding to measurement.
11. Do not change the function in the middle of measurement. Also do not disconnect/connect the adapter or cable during measurement.
12. Do not use this instrument while it or your hand is wet or when the operating temperature/humidity is outside the specified range.
13. Do not attempt to repair or modify the instrument unless when changing the batteries.
14. Check the instrument in the start-up inspection as well as in the inspection to be performed at least once a year.
15. This instrument is for indoor use only.



### **CAUTION**

1. Do not apply an external voltage to the input/output jacks.
2. When measuring a high-speed elevator (1000 m/min. or faster), do not perform continuous measurement for more than 1 minute.

## **[2] APPLICATIONS AND FEATURES**

### **2-1 Applications**

This instrument is a handy-type digital speedometer for use in contact-measurement of the speed of an elevator or lift and the emergency stop distance of an escalator. It can also measure the rotation speed of a motor by replacing the peripheral speed ring for speed measurement with a rotary contact for rotation speed measurement (optional).

### **2-2 Features**

LED display for easy readout even under low light.

Two independent data hold (CH1/CH2) functions plus maximum value hold function.

Memory storage of held value and maximum value.

Data hold by external triggering.

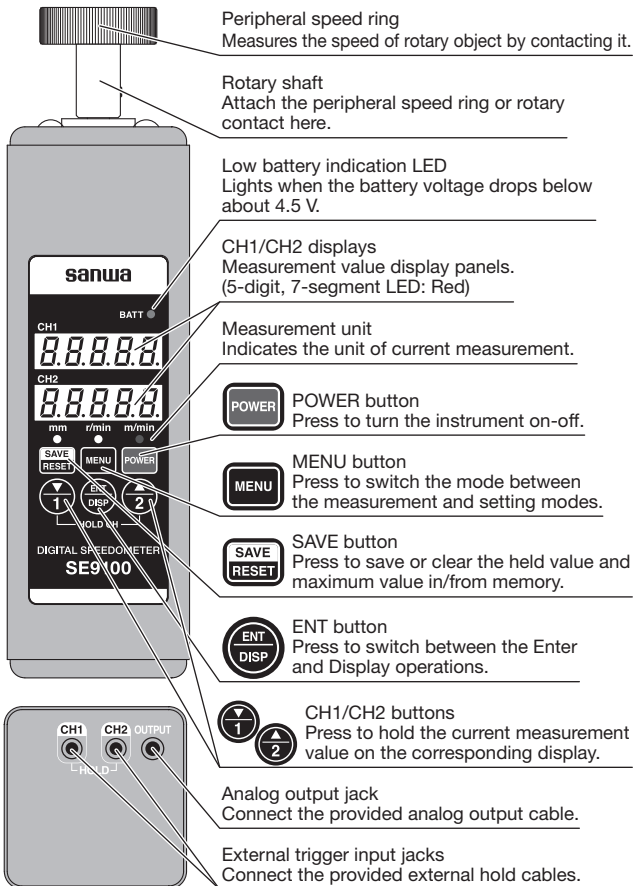
Movement average value display (average frequency setting can be set at any of 1 to 10 times).

Analog output of measurement value.



## [3] NAMES OF COMPONENT UNITS

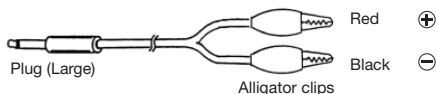
### 3-1 Main Unit





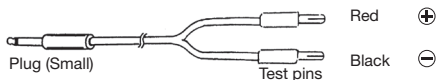
## 3-2 Accessories

### External hold input cables (SE-L-H type)



Connect the HOLD jacks to external switches.  
Two cables are provided for use with the 2 channels.  
Red: Conductor. Black: Shield.

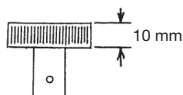
### Analog output cable (SE-L-O type)



Connect the OUTPUT jack with an analog recorder.

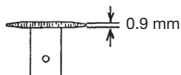
### Peripheral speed ring for speed measurement (SE-10 type)

Contact section thickness 10 mm



### Peripheral speed ring for speed measurement (SE-0.9 type)

Contact section thickness 0.9 mm



Attach on the rotary shaft of this instrument when measuring the speed of an elevator.  
Select either ring according to the shape of the measurement target.  
Use the provided Allen wrench for attaching and detaching.

### Allen wrench (1.5 mm width) (SE-220AD type)



For use in attaching/detaching the peripheral speed ring for speed measurement or the rotary contact.

### For rotation speed measurement Rotary contact (optional) (SE-R type)



For use in measuring the rotation speed of a motor, etc.



## **[4] DESCRIPTION OF FUNCTIONS**

### **4-1 POWER Button**

Press the button to turn the instrument ON. All displays light up and the instrument enters the measurement mode. To turn it OFF, press and hold this button for more than 0.3 sec.

### **4-2 Auto Power OFF**

When nothing has been input to the instrument for about 3 minutes after the last operation, the displays extinguish and the instrument turns OFF. When the POWER button is pressed while holding the MENU button depressed, the CH1 display shows [ *RP* ], and the CH2 display shows [ *1h* ], and the auto power OFF time changes to 1 hour. The auto power OFF time is reset to 3 minutes once the instrument is turned OFF.

### **4-3 Low Battery Power Indication**

When the batteries are exhausted until the supply voltage drops below about 4.5 V, the low battery power indicator LED lights up. Replace all of the four batteries when this indicator lights. For the battery replacement method, see section 6-3.

If this instrument is turned ON while the supply voltage is below about 4.0 V, the CH1 display shows [ *L o b R L* ] and the CH2 display shows [ *OFF* ], and the instrument is turned OFF and becomes unavailable.

### **4-4 Maximum Value Hold Function (MAX Value)**

After the instrument is turned ON, the held value is updated every time the maximum value during measurement is updated.

### **4-5 Hold Function (CH1/CH2)**

Measurement values can be held separately in the CH1 display and the CH2 display.

### **4-6 Externally Triggered Hold Function**

A measurement value can be held with external triggering by connecting the dedicated cable (SE-L-H type).

### **4-7 Analog Output Function**

This instrument can be connected to an external display or recorder device by connecting the dedicated cable (SE-L-0 type).



## 4-8 Memory Function

The held values and maximum value can be saved in the internal memory of the instrument.

## 4-9 Setting Functions: MENU Button

Press this button to set the measurement unit, analog output full scale and/or average number. It can also be used to recall a measurement value from the memory.

## 4-10 Error Display

When the instrument is turned ON, the stored measurement values are recalled from the flash memory. If a memory error occurs during this, the CH1 display shows [FL R5H] and the CH2 display shows [ErrOr], and the instrument is started with the default memory settings.

## [5] MEASUREMENT PROCEDURE

### WARNING

1. Never use a seriously damaged peripheral speed ring or rotary contact, particularly when the rotary part is deformed or worn considerably. Otherwise, it may slip during measurement and become a cause of extreme danger.
2. When measuring the speed of an elevator, never use a tool other than the peripheral speed ring provided with this instrument.
3. When measuring the rotation speed of a motor, etc., never use a tool other than the rotary contact optionally available for use with this instrument.
4. The peripheral ring for speed measurement or the rotary contact must always be fitted all the way till the root of the rotary shaft of this instrument and then tightened firmly with the Allen wrench.
5. When locking the instrument using a fixture, ensure that the instrument is locked firmly. The applied load of the peripheral ring should not exceed 5 kg and that of the rotary contact should not exceed 2 kg. Also take care of the contact angle (see sections 5-4, 5-5 and 5-6).





## CAUTION

1. Do not use the peripheral speed ring when its contact is worn seriously. Otherwise, reduction of the peripheral length may lead to a measurement error.
2. Be careful not to mistake the polarity of the analog output cable.

### 5-1 Start-up Inspection

To ensure safety, be always sure to perform a start-up inspection before work.

Appearance check:

Check the appearance of the instrument to see if it is free from damage caused by falling, etc.

Check that the peripheral speed ring or rotary contact to be used in measurement is not worn out.

Check that the adapter and cables to be used are free from irregularities such as wire disconnection and crack.

Check that the plugs and contact jacks are free from irregularities.

Check that the low battery power indication is not lit when the instrument is turned ON.

If it is lit, replace the batteries with new ones.

Load batteries before the first time you use this instrument.

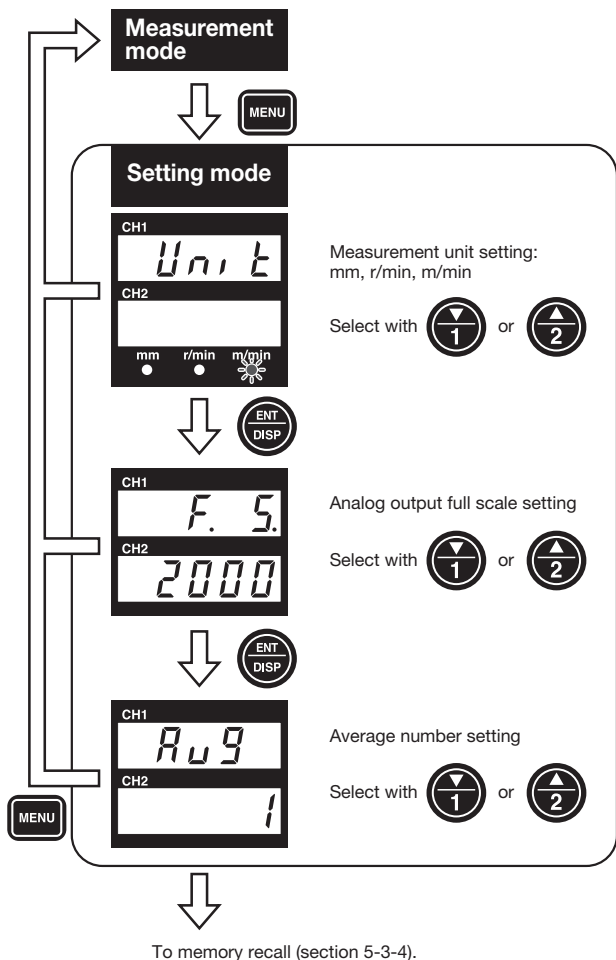
\* If nothing is shown on the displays, the batteries may be exhausted completely.

### 5-2 Settings

The unit of measurement, the full scale of analog output and the average number can be set.

Settings can be started by pressing the MENU button. The held values being displayed are cleared when a setting is changed. In the setting mode, each press of the ENT button switches the set item in sequence of Measurement unit setting → Analog output full scale setting → Average number setting.







○ Measurement unit setting

When the display shows [  $U_n$ ,  $t$  ], press the CH1 button or the CH2 button to select its measurement unit. The selected unit is indicated by the LED. The power-on setting is “m/min”.

○ Analog output full scale setting

When the display shows [  $F_5$  ], press the CH1 button or the CH2 button to select the maximum value when 2 V is output as the analog output.

Measurement unit	Full scale / 2 V	Power-on setting
m/min	20/200/2000	2000
r/min	200/2000/20000	20000
mm	20/200/2000	2000

○ Average frequency setting

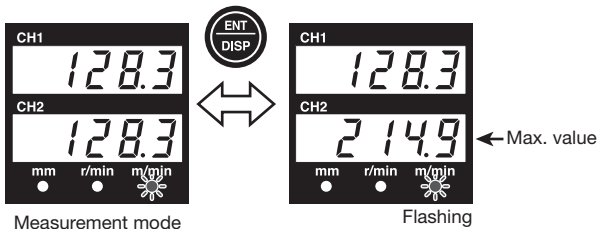
When the display shows [  $R_g$  ], press the CH1 button or the CH2 button to select the frequency to perform the averaging count of the movement average value display between 1 and 10 times. The power-on setting is 1. This setting does not affect the analog output.

## 5-3 Function Description

### 5-3-1 Maximum value hold function (MAX value)

#### – m/min & r/min measurements only

When the ENT button is pressed, the measurement unit LED flashes and the CH2 display shows the maximum value that has been held. Pressing the ENT button again cancels the maximum value display.





### 5-3-2 Hold function (CH1/CH2)

#### – m/min & r/min measurements only

The current measurement value can be held on the CH1 display by either pressing the CH1 button or using the CH1 external triggering function. Similarly, the measurement value can also be held on the CH2 display by means of the CH2 button or CH2 external triggering. As CH1 and CH2 are independent functions to each other, they are convenient for use in comparison of measurement values.

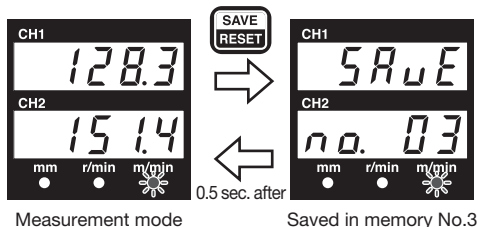
To use external triggering, connect the provided external triggering input cable (SE-L-H) to the instrument, set the red and black alligator clips to open and hold the current measurement value. Two input cables are required when using both CH1 and CH2.

### 5-3-3 Analog output function

When the provided analog output cable (SE-L-O type) is connected to the OUTPUT jack of the instrument, the measurement value is converted into a voltage and output there. (See “Analog output full scale setting” in section 5-2, “Settings”).

### 5-3-4 Memory function

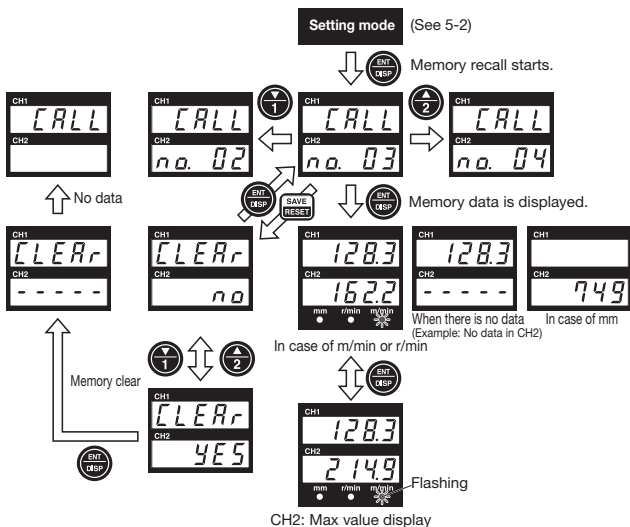
When the SAVE button is pressed in the measurement mode, the held values and maximum values currently displayed for CH1/CH2 are saved as a set in the memory of this instrument. At this time, the memory No. is shown on the CH2 display.



To recall the saved data, press the MENU button to enter the setting mode and then press the ENT button three times. The CH1 display shows [CALL] to indicate that the memory can be recalled. If data is saved in the memory, the memory No. is shown on the CH2 display.



Press the CH1 button or the CH2 button to select a memory No. and press the ENT button. The CH1 display shows the CH1 hold value and the CH2 display shows the CH2 hold value (a measurement unit LED lights). [ - - - - ] is displayed if no hold value is saved in memory. Pressing the ENT button again displays the maximum value (with measurement unit LED) on the CH2 display. To clear the saved data from memory, press the SAVE button while [ CALL ] is displayed in the CH1 display in the data recall status. The CH1 display shows [ CLEAR ] and the CH2 display shows [ no ]. Now press the CH1/CH2 button so that the CH2 display shows [ YES ] and then press the ENT button to clear the data. Note that it is not a single set of data that is cleared but that all data is cleared simultaneously.





## 5-4 Speed (m/min) Measurement

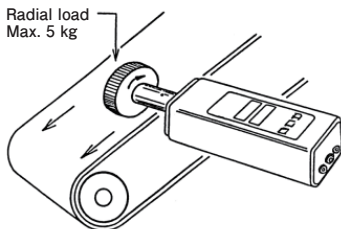
Set the measurement unit to m/min (see section 5-2).

Attach the peripheral speed ring for speed measurement securely on the instrument and apply the ring onto the measurement target such as a belt or wire rope so that the ring is parallel to the target. The display will show the measurement value.

To perform another measurement after the hold mode, turn the instrument OFF then ON again.

\* Do not perform 1 minute or longer continuous measurement at 1000m/min or more.

\* When the measurement value is 2000 m/min or more, the display shows "OL".



## 5-5 Rotation Speed (r/min) Measurement

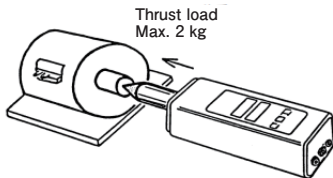
Set the measurement unit to r/min (see section 5-2).

Attach the optionally available contact for rotation speed measurement securely on the instrument and apply the contact onto the measurement target such as a motor shaft that the contact is coaxial with the target. The display will show the measurement value.

To perform another measurement, after the hold mode turn the instrument OFF then ON again.

\* Do not perform 1 minute or longer continuous measurement at 1000m/min or more.

\* When the measurement value is 2000 r/min or more, the display shows "OL".





## 5-6 Escalator Emergency Stop Distance Measurement (mm)

Set the measurement unit to mm (see section 5-2).

The CH1 display shows [Start] and the CH2 display shows [0] to indicate that the distance can be measured.

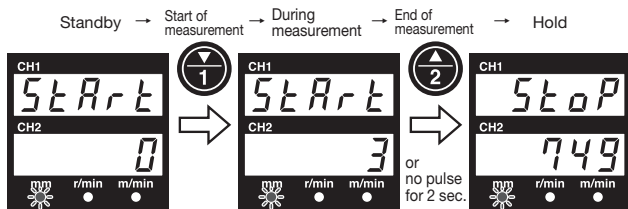
Attach the peripheral speed ring for speed measurement securely on the instrument and apply the ring onto the handrail of the escalator. Start measurement by pressing the CH1 button or apply external triggering for CH1.

To finish the measurement, press the CH2 button or apply external triggering for CH2.

The measurement also finishes when the ring has not be rotated for 2 sec. or more.

After the measurement, the CH1 display shows [Stop] and the CH2 display shows the distance. When the MENU button is pressed, the measurement value is cleared. If you want to save the measurement value in memory, press the SAVE button.

To perform another measurement, turn the instrument OFF then ON again.



\* When the measurement value is 2000 mm or more, the display shows "OL".

\* If the peripheral speed ring rotates in the opposite direction during measurement, the distance is also added to the measurement. For example, assuming that a 20 mm ring rotates and then returns by 1 mm, the measurement value becomes  $20\text{ mm} + 1\text{ mm} = 21\text{ mm}$ .



## [6] MAINTENANCE

### WARNING

1. This section is very important for safety. Read and understand the following instruction fully and maintain your instrument properly.
2. The instrument must be calibrated and inspected at least once a year to maintain the safety and accuracy.

### 6-1 Maintenance and Inspection

The maintenance and inspection are absolutely necessary for a long period of safe use and maintaining the quality. Perform the inspection with the procedure described in section 5-1, "Start-up Inspection".

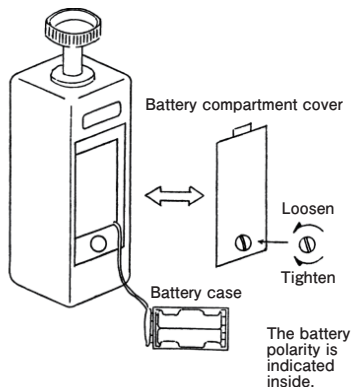
### 6-2 Calibration

For the calibration and inspection, contact Service Division, Hamura Factory, Sanwa Electric Instrument Co., Ltd. (See section 7-2, "Contact".)

### 6-3 Battery Replacement

If nothing is displayed or the low battery power indication LED lights when the instrument is turned ON, replace the batteries.

Remove the screw on the battery compartment cover, take out the battery case and insert four brand-new batteries in the case in the correct polarity. Place the battery case inside the battery compartment, fit the cover and tighten the screw.





## 6-4 Cleaning and Storage



### CAUTION

1. The instrument is not resistant to volatile solvents and should not be wiped with lacquer thinner or alcohol. When it gets dirty, wipe dirt away with a soft cloth moistened with a small amount of water.
2. The instrument is not resistant to heat and should not be placed near a source of high heat.
3. Do not store the instrument in a position subjected to excessive vibrations or a position presenting the risk of dropping.
4. Avoid storing the instrument under direct sunlight, high or low temperature, high humidity or a position with a risk of condensation.
5. Be sure to remove the batteries when the instrument is expected to be left unused for a long period of time.

## [7] AFTER-SALE SERVICE

### 7-1 Warranty and Provision

Sanwa offers comprehensive warranty services to its end-users and to its product resellers. Under Sanwa's general warranty policy, each instrument is warranted to be free from defects in workmanship or material under normal use for the period of one (1) year from the date of purchase.

This warranty policy is valid within the country of purchase only, and applied only to the product purchased from Sanwa authorized agent or distributor.

Sanwa reserves the right to inspect all warranty claims to determine the extent to which the warranty policy shall apply. This warranty shall not apply to disposables batteries, or any product or parts, which have been subject to one of the following causes:

1. A failure due to improper handling or use that deviates from the instruction manual.
2. A failure due to inadequate repair or modification by people other than Sanwa service personnel.
3. A failure due to causes not attributable to this product such as fire, flood and other natural disaster.
4. Non-operation due to a discharged battery.
5. A failure or damage due to transportation, relocation or dropping after the purchase.



## 7-2 Repair

Customers are asked to provide the following information when requesting services:

1. Customer name, address, and contact information
2. Description of problem
3. Description of product configuration
4. Model Number
5. Product Serial Number
6. Proof of Date-of-Purchase
7. Where you purchased the product

Please contact Sanwa authorized agent / distributor / service provider, listed in our website, in your country with above information. An instrument sent to Sanwa / agent / distributor without above information will be returned to the customer.

Note:

- 1) Prior to requesting repair, please check the following:  
Capacity of the built-in battery, polarity of installation and discontinuity of the test leads.
- 2) Repair during the warranty period:  
The failed meter will be repaired in accordance with the conditions stipulated in 7-1 Warranty and Provision.
- 3) Repair after the warranty period has expired:
  - If it is expected that servicing can restore the original functioning of the instrument, we will service it for a price upon request of the user.
  - The service charge or transport freight could sometimes become higher than the product price. Please consult us before asking for servicing.
  - The minimum retention period of the servicing performance parts of this instrument is six (6) years after the discontinuation of production. This period is equal to the servicing available period. However, the retention period of a part may be reduced if it becomes unavailable due to discontinuation of production of the part manufacturer, etc.
- 4) Precautions when sending the product to be repaired:  
To ensure the safety of the product during transportation, place the product in a box that is larger than the product 5 times or more in volume and fill cushion materials fully and then clearly mark "Repair Product Enclosed" on the box surface. The cost of sending and returning the product shall be borne by the customer.

## 7-3 SANWA web site

<http://www.sanwa-meter.co.jp>

E-mail: [exp\\_sales@sanwa-meter.co.jp](mailto:exp_sales@sanwa-meter.co.jp)



## [8] SPECIFICATIONS

### 8-1 General Specifications

Item	Specifications
Measurement ranges	Linear velocity: 0.1 - 2000.0 (m/min) Rotation speed: 1 - 20000 (r/min) Distance: 0 - 999 (mm) (Display possible up to 2000mm [reference value])
Measuring time	10 ms
Auto power OFF	When power has been left on for about 3 minutes after the last operation. Optionally extendable to 1 hour.
Measurement hold	CH1/CH2/Max. value * All independently. CH1/CH2: Hold possible by Main Unit panel + External triggering.
Movement average value display	Desired setting between 1 - 10 times
Memory	Max. 10 sets can be saved in internal memory.
Displays	5-digit red 7-segment LED x 2 rows
Display updating interval	200 ms
Analog output	Voltage range: 0 - 2 V (Full-scale value can be selected.) Output accuracy: $\pm(0.5 \% \text{rdg} + 1 \text{ mV})$ * When full-scale "2000" is set
Battery alarm	Indication LED lights when voltage drops below about 4.5 V during operation. Operation stops at about 3.8 V. Instrument cannot be started up at about 4.0 V or less.
Permissible load	5 kg in radial direction, 2 kg in thrust direction.
Power supply	LR6 ("AA"-size alkaline battery) 1.5 V x 4
Current drain	Max. about 100 mA
Battery life	20 hours or more
Usage temperature / humidity ranges	5 °C to 40 °C, Max. 80 %RH (without condensation)
Storage temperature/ humidity ranges (Batteries removed)	-10°C to 40 °C: $\leq 80 \% \text{RH}$ (without condensation) 40 °C to 50 °C: $\leq 70 \% \text{RH}$ (without condensation)
Dimensions	183(H) x 50(W) x 50(D)mm (without projections)



Mass	Main Unit Approx. 520 g (incl. batteries and SE-1 peripheral speed ring)
Accessories	<ul style="list-style-type: none"> <li>• Peripheral speed ring for speed measurement Thickness 10 mm (SE-10 type) x 1</li> <li>• Peripheral speed ring for speed measurement Thickness 0.9 mm (SE-0.9 type) x 1</li> <li>• Hold input cable (SE-L-H type) x 2 sets</li> <li>• Analog output cable (SE-L-O) x 1 set</li> <li>• Peripheral speed ring replacement tool (Allen wrench) x 1</li> <li>• Carrying case (C-SE type) x 1</li> <li>• Instruction Manual x 1</li> <li>• LR6 ("AA"-size alkaline battery) x 4</li> </ul>

## 8-2 Optional Accessory

Rotary contact: SE-R type

## 8-3 Measurement Ranges and Accuracies

Accuracy-guaranteed temperature/humidity ranges:  $23 \pm 5$  °C,  
 $\leq 80$  %RH, no condensation.  
dgt: digits (lowest digit)

### Measurement ranges

Measurement unit	Range	Accuracy (* Electrical operation)
Linear velocity	0.1 - 2000.0 m/min	$\pm 2$ dgt
Rotation speed	1 - 20000 r/min	$\pm 2$ dgt
Distance	0 - 999 mm	$\pm 2$ dgt

### Accuracy calculation method

Example) Linear velocity measurement (m/min)

Displayed value: 1000.0 m/min

Accuracy:  $\pm(2 \text{ dgt})$

Error:  $\pm 2 \text{ dgt} = \pm 0.2 \text{ m/min}$

True value:  $1000.0 \text{ m/min} \pm 0.2 \text{ m/min}$

\* At 1000.0 m/min, 1 dgt corresponds to 0.1 m/min.

Specifications and external appearance of the product described above may be revised for modification without prior notice.



## MEMO



## 保証書

ご氏名

様

ご住所

〒□□□-□□□□

TEL

保証期間

ご購入日 年 月より3年間  
(製品の確度については1年間)

型 名

**SE9100**

製造 No.

この製品は厳密な品質管理を経てお届けするものです。

本保証書は所定項目をご記入の上保管していただき、アフターサービスの際ご提出ください。

※本保証書は再発行はいたしませんので大切に保管してください。

**三和電気計器株式会社**

本社=東京都千代田区外神田2-4-4・電波ビル  
郵便番号=101-0021・電話=東京(03)3253-4871(代)

## 保証規定

保証期間中に正常な使用状態のもとで、万一故障が発生した場合には無償で修理いたします。ただし下記事項に該当する場合は無償修理の対象から除外いたします。

### 記

- 取扱説明書と異なる不適当な取扱いまたは使用による故障
- 当社サービスマン以外による不当な修理や改造に起因する故障
- 火災水害などの天災を始め故障の原因が本計器以外の事由による故障
- 電池の消耗による不動作
- お買い上げ後の輸送、移動、落下などによる故障および損傷
- 本保証書は日本国において有効です。

This warranty is valid only within Japan.

年 月 日	修理内容をご記入ください。

※無償の認定は当社においておこなわせていただきます。







# sanwa®

## 三和電気計器株式会社

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植物油インキを使用しています。

03-1911 2040 2040