EC-2100 Elevator Speedometer
Simple Operation Manual

ONO SOKKI CO., LTD.

Forwards

This manual describes the basic operation of the EC-2100 Elevator Speedometer.
Before using the EC-2100, please be sure to thoroughly read this manual. Precautions described in this manual contain items that may lead to property damage unless observing. Be sure to observe the precaution in this manual.

Contents

For Your Safety

To ensure safe and proper use of the EC-2100 Elevator Speedometer, be sure to understand warnings and precautions described in this chapter and the other parts of this manual before using the product.
When operating your EC-2100 Elevator Speedometer, follow the directions described in this part and the other parts of this chapter. Ono Sokki assumes no responsibility for any warranty regarding damages, failures or injuries resulting from failure to follow instructions on warning and cautions given in this manual and this section.

■Safety Indications

This manual describes possible danger or risks of the product or those you may encounter if the relevant direction is ignored and the measures for avoiding such danger or risk.
A warning label is stuck on or near portions of the product with possible danger or risk.
In this manual, two different terms WARNING and CAUTION are used depending on the degree of danger or risk possible. Each term has the following meaning.

⚠ WARNING	Indicates a risk of death or serious personal injury to the operator if the direction is ignored.
⚠ CAUTION	Indicates a risk of burn or other personal injury to the operator or a risk of material damaged to the product id the direction is ignored.

Precautions and notices for danger are given by three different symbols: Attention, Prohibited, and Compulsory. Each symbol has the following meaning:

Symbol	Definition		Example
△	Attention	Indicates a risk of danger if the direction is ignored. The pictogram in the symbol specifically indicates the danger	
🚫	Prohibition	Indicates an action that is prohibited and should never be attempted. The pictogram in or near the symbol specifically indicates the prohibited action.	
●	Compulsion	Indicates an action that is mandatory and must be performed to avoid risk. The pictogram in the symbol specifically indicates the compulsive action.	

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■ Meaning of symbols used in this manual and warning labels

● Attention

⚡	Indicates a risk of electric shock.
☝	Indicates a risk of injury.
🔥	Indicates a risk of smoking of igniting.
⚠	Indicates a general precaution or warning.

● Prohibition

🚫	Do not disassemble, repair or modify this instrument, There is a risk of electric shock or fire.
🚫	Do not use this instrument in locations subject to water or other liquid. Getting water may cause electric shock or ignite.
🚫	Do not bring this instrument close to the fire. There is a risk of igniting.
🚫	Do not touch this instrument while your hands are wet. There is a risk of electric shock.
🚫	Do not touch the specified portion. There is a risk of electric shock or burn or another injury.
🚫	Indicates a general action which is prohibited.

● Compulsion

❗	Indicates an action of a general user. Operate the instrument following the descriptions.

To ensure safe proper use of the RC-2100 Elevator Speedometer, please be sure to confirm the warnings and precautions described in this chapter before use.

■ General precautions

⚠ WARNING

⚠	Do not operate the instrument on locations where there is a gas or steam. Using the instrument in a place where there is a combustible or explosive gas or vapor may result in an explosion.
	Avoid using the instrument in a place of high temperature. Using the instrument in a place of a temperature exceeding the operational temperature range may cause the instrument to catch on fire.
	Do not block the heat radiation system as there is a risk of fire if heat builds up inside the instrument. Place the instrument away from the wall on locations with the best ventilation possible
⚠	Do not splash or spill water on the instrument. Short-circuits or generated heat could cause a fire or electric shock. In case the instrument gets wet, immediately disconnect the AC adapter or remove the batteries, and contact your dealer or ONO SOKKI sales office.
🚫	Never disassemble or dismantle the instrument Using the instrument in the opened or disassembled condition may cause a trouble, such as a failure and an electric shock. When internal adjustment, inspection or repair is required, contact your dealer or ONO SOKKI sales office.

■ Precautions on electric shock

⚠ WARNING

⚠	Before touching circuit connected to parts where voltage/ current is output, make sure that the power is OFF. Touching such part without turning the power OFF may cause electric shock. Be sure to sufficiently insulate circuits from output voltage/ current.

■ Precaution before turning the power ON

⚠ WARNING

⚠ ⚠	If you hear thunder, never touch any metal part or plug of the instrument. There is a danger of electric shock due to inductive lightning.
	If there is smoke, abnormal noise, or abnormal odor coming from the instrument or if you accidentally drop or damage it, immediately turn OFF the power and unplug the instrument. Then, contact your dealer or ONO SOKKI sales office nearby as soon as possible. Using the instrument under such abnormal conditions may cause the fire.

■ Notes for wiring cable

⚠ WARNING

		Do not touch cables with wet hands. Electric shock may occur.

■ CE marking・EMC applicable

⚠ CAUTION

	Do not install the instrument in a place with oily smoke, steam, moisture or dust. Electricity could conduct the oil, water or dust to cause a fire or electric shock.
	Do not install the instrument in an extremely high temperature or direct sunlight. It may cause a fire.
	Do not extent the signal cable more than necessary.

1. Overview

1.1 Overview

The EC-2100 Elevator Speedometer is a compact and lightweight handheld speedometer with built-in batteries, designed for adjustment, maintenance, and inspection of an elevator. The EC-2100 Elevator Speedometer is provided with two display units enabling speed display at two different measurement timings. By fixing the EC-2100 Elevator Speedometer to jig or using the EC-0201 External Detector (option), you can perform inspection works alone.
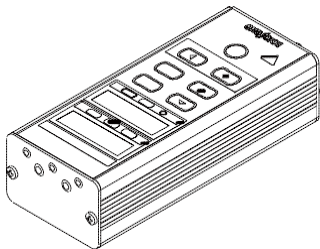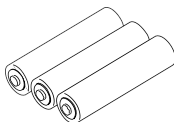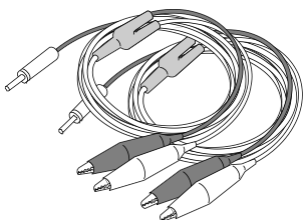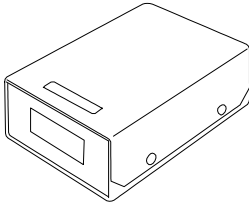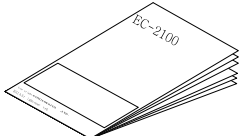
1.2 Features

・Memory function (for storing and reading 10 measurement results)

・Maximum hold function (for holding maximum measurement value)

・Averaging function (for averaging with desired number of times up to 200 times)

・Analog and pulse output

・CE marking (noise-immune design)

・Remaining battery level check (remaining battery level displayed at activation)

・Distance measurement function

1.3 Product Configuration

When you unpack the unit, make sure that you have all the following:

① EC-2100 Elevator Speedometer x1

②Type AA alkaline dry battery x3

③EC-0922 External Hold Signal Cable (1.4m) x2

④Hexagonal wrench (for fixing Circumferential Ring) x1

⑤EC-0925 Carrying Case x1

⑥Instruction Manual x1

①EC-2100 Elevator Speedometer	② Type AA alkaline dry battery	③ EC-0922 External Hold Signal Cable (1.4 m)
④Hexagonal wrench	⑤ EC-0925 Carrying case	⑥ Instruction manual

2. Name and Function of Each Section

Please check the name and function of each section before using the EC-2100 Elevator Speedometer.
* The following mainly describes the function of each switch in the measurement mode. The switch which is assigned the other function when it is in the setting mode is described in the last of each switch explanation.

M4 depth 8 (Jig mounting hole x4)   Battery lid fixing screw x2
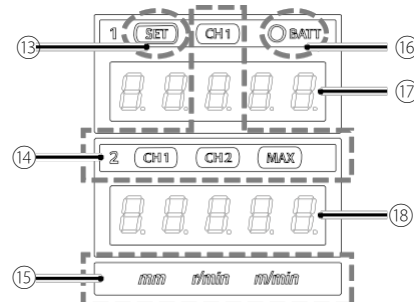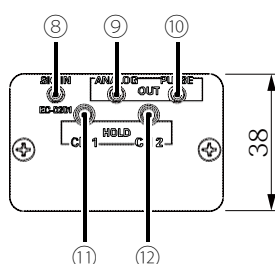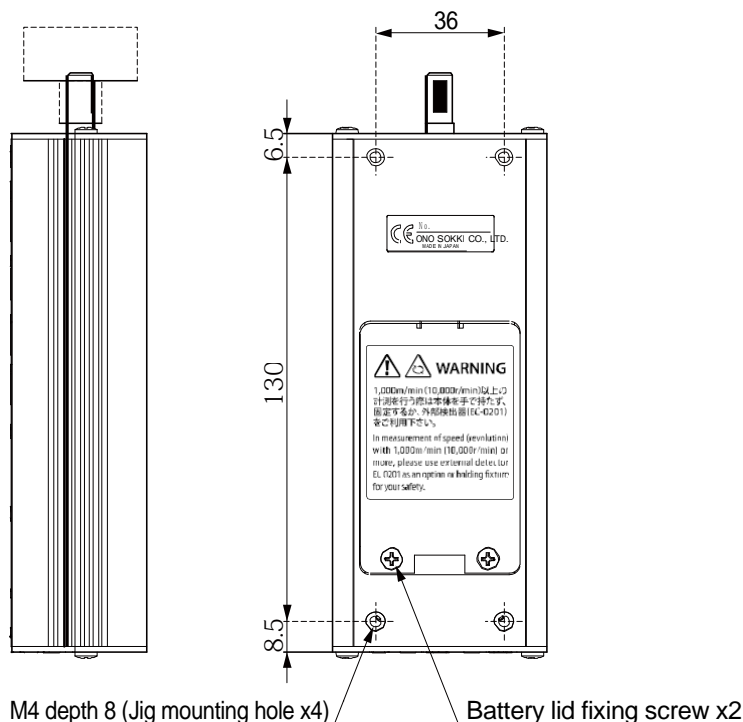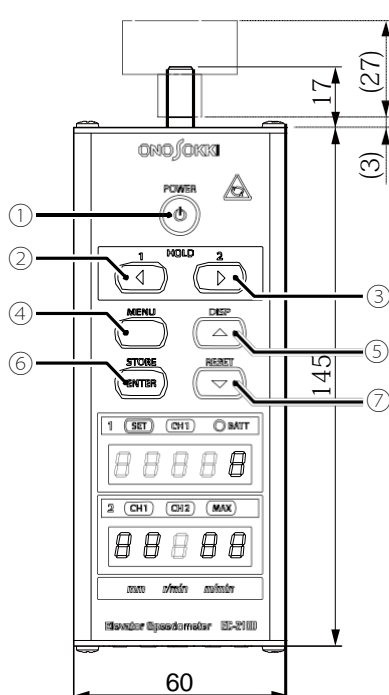
①POWER switch

This switch turns the power ON and OFF. However, the auto power-off function turns OFF the power when no operation is performed for three minutes.

②CH1 hold switch ◄

Pressing this switch holds the measurement value and displays it on CH1 (upper display).
 【Setting mode】 Move the blinking part (setting unit, the number of digits) to the left.

③CH2 Hold switch ▶

Pressing this switch holds the measurement value and displays it on CH2 (lower display).
　【Setting mode】 Move the blinking part (setting unit, the number of digits) to the right.

④MENU switch

　The switch switches between the setting mode and the measurement mode.
　【Setting mode】 Apply setting item at the time of pressing the MENU button and return to the measurement mode.

⑤DISP switch/△

This switch changes the measurement item.
In speed/rotation speed measurement: Pressing this switch changes the values in the lower display in order of [CH2] > [MAX] > [Instantaneous Value]. When there is no hold data, it changes in the order of [MAX] > [Instantaneous Value].
In distance measurement: Pressing this switch switches the rotation measurement direction between [right] and [left].
　【Setting mode】 Add the blinking number of digits in the order of 0 > 1> 2 at the time of setting the number.

⑥STORE switch/ ENTER

Stores up to 10 sets of measurement results in the EC-2100 Elevator Speedometer. Note that the 11th measurement result is overwritten onto the first setting.
(ENTER: Applies the setting and selects the next setting item in the setting mode.)

⑦RESET switch /▽

Resets the held value in the upper (CH1) / lower (CH2) display, or reset automatically stored max. value to zero.
【Setting mode】 Subtract the blinking number of digits in order of 0 > 9 > 8 at the time of setting the number.

⑧SIG IN（EC-0201）
Connect the EC-0201 External Detector (option).

⑨ANALOG OUT
Connect the AX-0501 Analog Output Cable (option).

⑩PULSE OUT
Connect the EC-0923 Pulse Output Cable (option)

⑪CH1 HOLD
Connecting the supplied EC-0922 External Hold Signal Cable and inputting a non-voltage signal enable holding the display value of CH1 instead of using the CH1 hold switch.

⑫CH2 HOLD
Performs the same operation as ⑪ on CH2.

⑬Setting mode indicator

Lights up when you press the MENU switch to select the setting mode.

⑭Measurement item indicator

The currently displayed item out of measurement items CH1, CH2, and MAX lights up.

⑮Unit indicator

The currently displayed item out of units mm, r/min, and m/min lights up. mm display corresponds to an option.

⑯BATT LOW indicator

Lights up when the battery voltage falls below 3.5 V. When this indicator lights up, the batteries need to be replaced.

⑰CH1 measurement value indicator (upper display)

Displays a result of the measurement.

⑱CH2 measurement value indicator (lower display)

Displays a result of the measurement.

3. Setting Mode

3.1 Power Switch

1. Press the "POWER" switch to turn ON the power of the EC-2100 Elevator Speedometer.
2. When the power is turned ON, "bAtt" is displayed in the upper display and the remaining battery level "__"
(when remaining battery level is 100%) is displayed for approx. 2 seconds in the lower display.
3. When no button operation is performed or no signal is input for 3 minutes, the power is automatically turned
OFF to prevent wasteful battery power consumption.
4. When the power is turned ON, the "r/min" or "m/min" is selected depending on the last operating state.
(When "mm" was last used, the present selection is canceled and "m/min" is selected.)

3.2 Setting Mode

In the measurement mode, press the "MENU" switch. The "SET" LED indicator lights up and the parameter
setting mode is entered.

Then, set parameters by using the "◁", "▷", "△", and "▽" switches. The current setting is applied when you
press the "ENTER" switch to change the item or press the "MENU" switch to return to the measurement
mode.

*Setting unit: Unit "mm" can be selected only when the EC-0202 Distance measurement function is installed.

*Reading stored data is displayed only when there is stored data.

* Unit "mm" can be selected only when the EC-0202 Distance measurement function is installed.

*Setting the number of averagings is displayed only when "m/min" or "r/min" is selected.
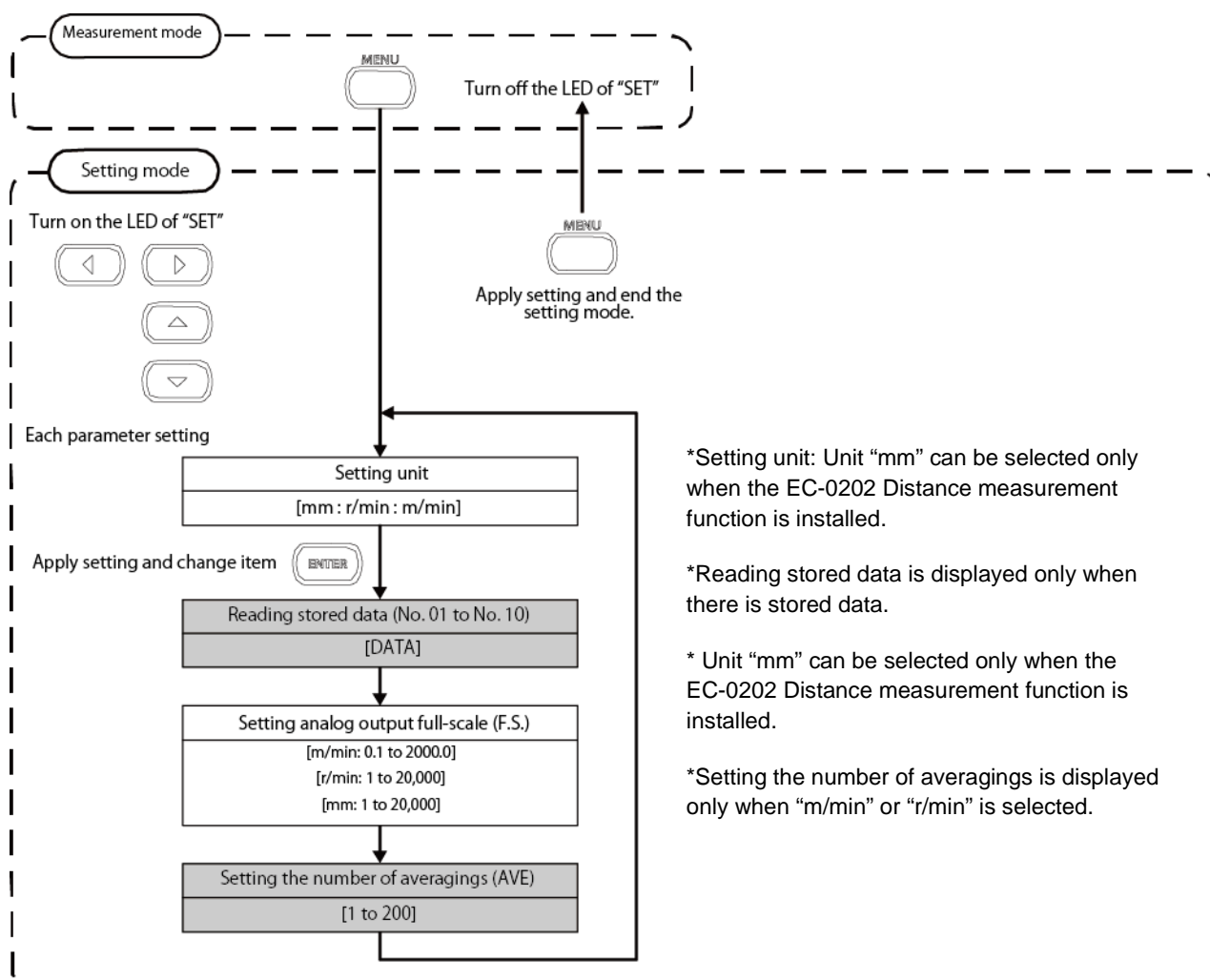
3.2.1 Unit setting

When "Unit" is displayed in the upper display, pressing the "◁" and "▷" switches changes the unit in the lower display. The current setting is applied when you press the "ENTER" switch to change item or press the "MENU" switch to return to the measurement mode.

m/min	Speed measurement
r/min	Rotation speed measurement
mm	Distance measurement (option)

*"m/min" is selected at the time of shipment
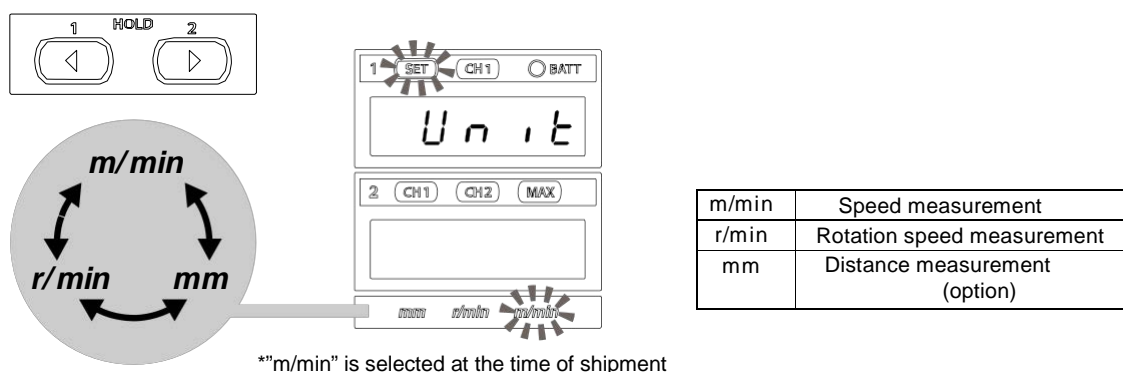
Note: To select "mm", the "EC-0202 Distance Measurement Function" (option) needs to be installed.

3.2.2 Reading the stored measurement data

Only when there is stored data, the storage number is displayed in the upper display and the stored data is displayed in the lower display. Pressing the "◁" and "▷" switches enables selecting "CH 1", "CH 2", or "MAX" for the storage number displayed in the lower display.
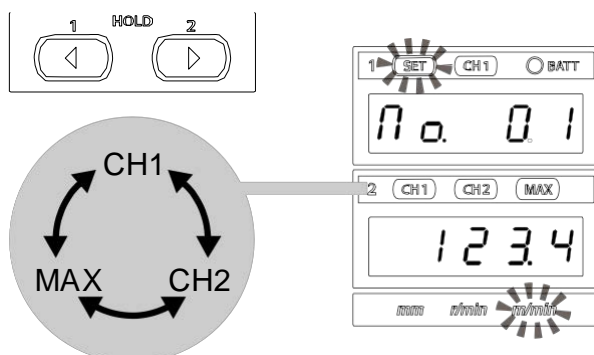
Pressing the "△" and "▽" switches enables selecting data display for up to "No. 01" to "No.10."
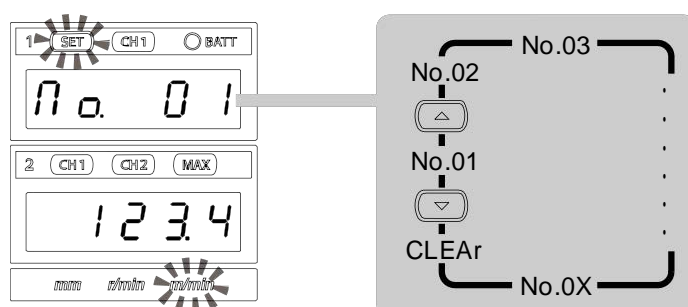
When "CLEAr" is displayed in the upper display and "No" is displayed in the lower display, pressing the "◁" and "▷" switches changes the lower display to "YES." Pressing the "ENTER" switch in this state clears all the stored data.
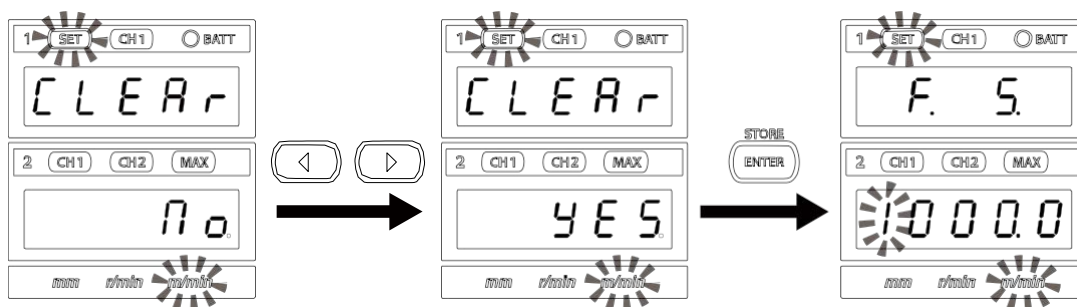
When press "ENTER" while selecting "YES", all stored data is cleared and move to the next setting item of analog output full-scale.

Unsaved storage numbers are not displayed.

3.2.3 Analog output full-scale setting

"F.S." (FULL SCALE) is displayed on the upper display and the value for 1V output is displayed in the lower display. The most significant digits blink. Press the "◁" and "▷" switches to move the blinking digit, and press the "△" and "▽" switches to select the number at each digit.
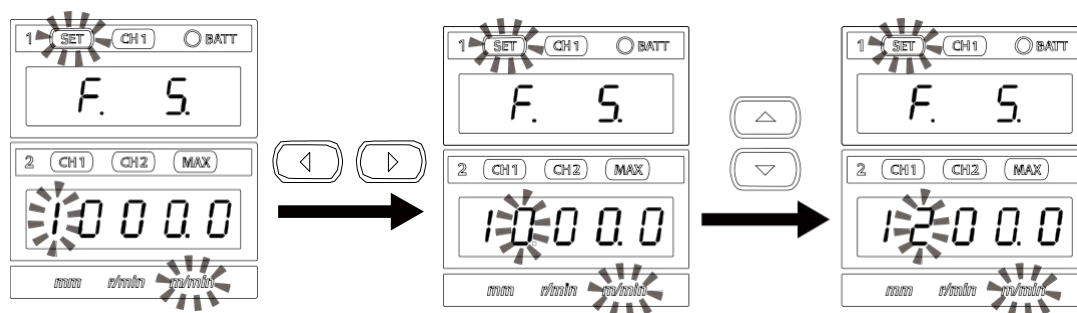
Setting range

| Measurement item	F.S. Setting range	Output voltage range (V)
Speed measurement	0.1 to 2,000.0	0 to 1
Rotation speed measurement	1 to 20,000	0 to 1
Distance measurement (option)	1 to 20,000	0 to 0.5 to 1 (-setting value to 0 to setting value)

* "1000.0" is selected at the time or shipment.

3.2.4 Number of averaging setting

"AVE." ("AVERAGE") is displayed in the upper display and the number of averaging is displayed in the lower display. The most significant digits blink. Press the "◁" and "▷" switches to move the blinking digit, and press the "△" and "▽" switches to select the number at each digit.
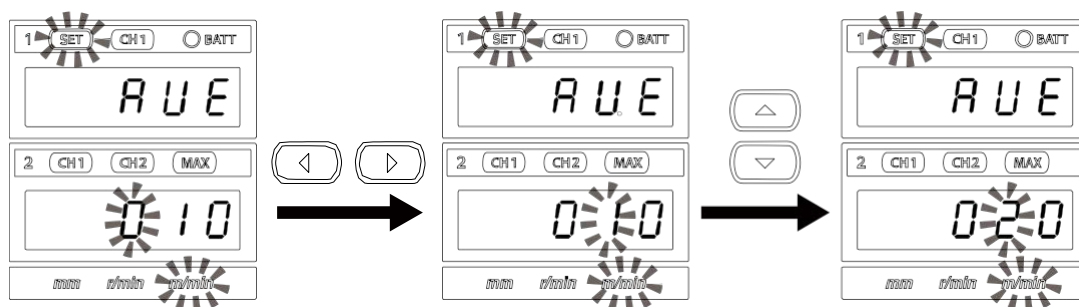
Setting range

Measurement item	Number of averaging setting range
Speed measurement	1 to 200
Rotation speed measurement	

* "010" is selected at the time of shipment.

* The distance measurement is invalid at the time of shipment.

Note: To ensure a resolution of 0.1 m/min (1 r/min), it is necessary to set the number of averaging to 10 or more.

4. Measurement of an elevator

4.1 Before measurement

When attaching circumferential ring (KS-400/KS-500/KS-0800) or rotating shaft and its relay shaft (KS-300+EC-0924) to the EC-2100, insert the shaft into each measurement tip all the way until it stops and makes sure that the circumferential ring is securely fixed to the chamfered portion of the shaft by the supplied hexagonal wrench. Fixing each measurement tip to a wrong position or loosely attaching it may cause detachment during measurement and possibly resulting in an accident.

Chamfered Portion

Shaft

Circumferential Ring
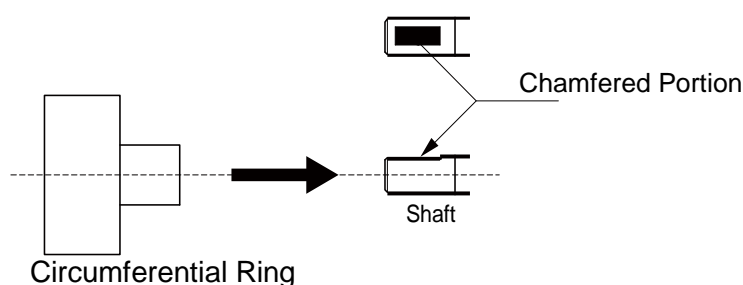
■ Speed measurement
The circumferential ring (KS-400/KS-500/KS-0800) is used for the speed measurement of the elevator. We provide three types of circumferential ring. Check the width and material of each one and choose one depending on your purpose.

KS-400
Metallic Wide Type
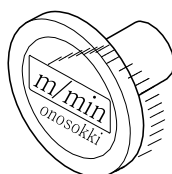
KS-500
Metallic Narrow Type
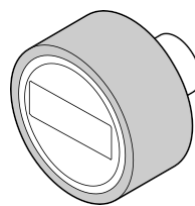
KS-0800
Rubber coating wide type

■ Rotation speed measurement
When measuring the rotation speed of the motor etc., rotating contact tip (KS-300) is used. The center hole of the motor axis is used for the rotation speed measurement. The EC-0924 extension shaft can be used if necessary.
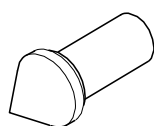
KS-300
Rotating contact tip
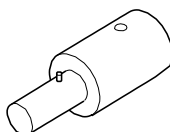
EC-0924
Relay shaft

4.2 Basic Measurement

4.2.1 Speed measurement

After turning on the power, select the unit "m/min". Press the circumferential ring onto a wire rope or a pulley to measure the rotation speed.

●Never touch the rotating section. There is a risk of getting your hand caught in the rotating section resulting in serious personal injury. Work gloves and clothes are also at the risk of it. Be careful not to get too close to the rotating section for your safety.

●When the speed exceeds 1,000 m/min (10,000 r/min), make the measurement by fixing the EC-2100 Elevator Speedometer or the EC-0201 External Detector (option) for your safety.
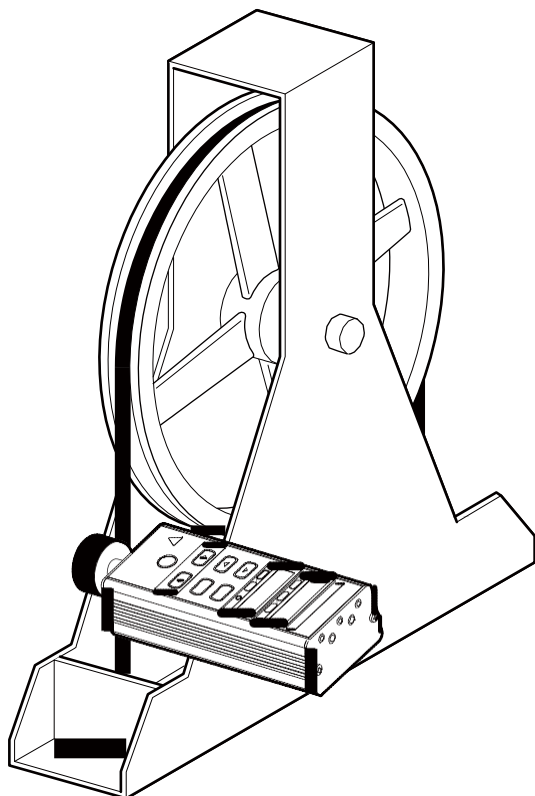
Note: Mounting screw holes are prepared on the rear side of the main unit.

4.2.2 Rotation speed measurement

After turning on the power, select the unit "r/min", press the Rotating contact (KS-300) onto a center of motor axis or pulley to measure the rotation speed.

● Never touch the rotating section. There is a risk of getting your hand caught in the rotating section resulting in serious personal injury. Work gloves and clothes are also at the risk of it. Be careful not to get too close to the rotating section for your safety.
● Make sure that the shaft center of the measurement object is pressed by the shaft center of the rotating contact tip, and hold on the EC-2100 firmly.
● Check the circumferential rings and rotating contact tips before measurement. Replace the new parts by ONO SOKKI when you find the rubber part worn, resin part cracked or attaching part loosed, do not keep using them.

4.3 Holding the measurement value

Press the "CH1/CH2" hold switch of the EC-2100 Elevator Speedometer to hold the measurement value.
Pressing the "RESET" switch clears the held data.
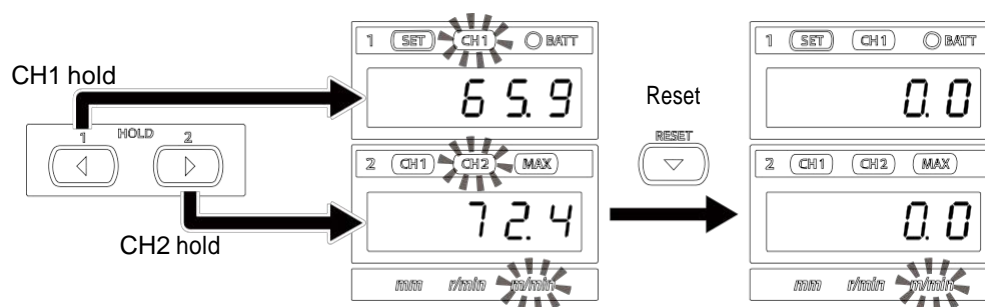
When using the EC-0922 External Hold Signal Cable, the hold state enters when the contact opens (OFF).
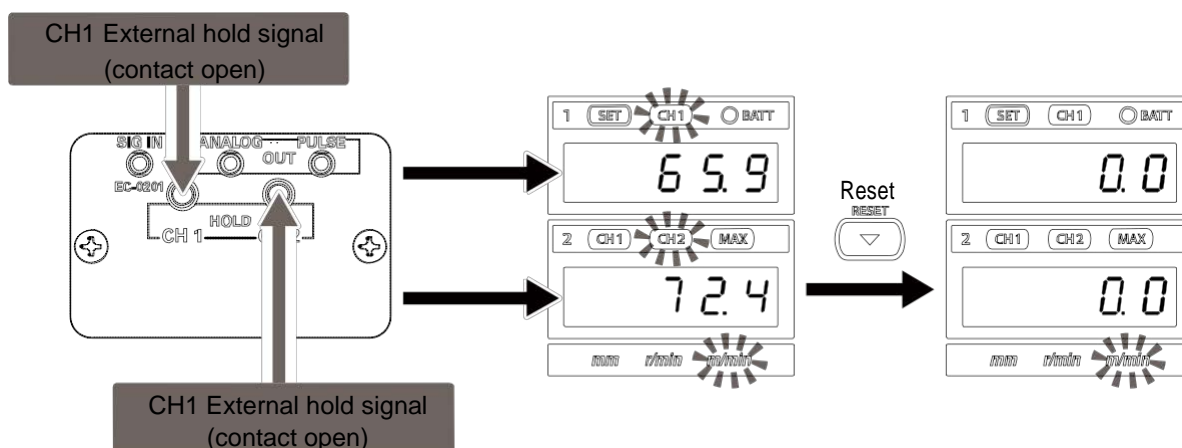
4.4 Displaying the maximum value

Press the "DISP" switch to change the display item in the order of CH2 (hold value), MAX (maximum value) and instantaneous value. When the measurement value of CH2 is not held, display item is switched in order of instantaneous value and MAX. When the "MAX" is blinking by pressing "DISP" switch, the maximum value is displayed in the lower display regardless of whether the hold switch is used. Press the "RESET" switch to clear all the stored data including maximum value.
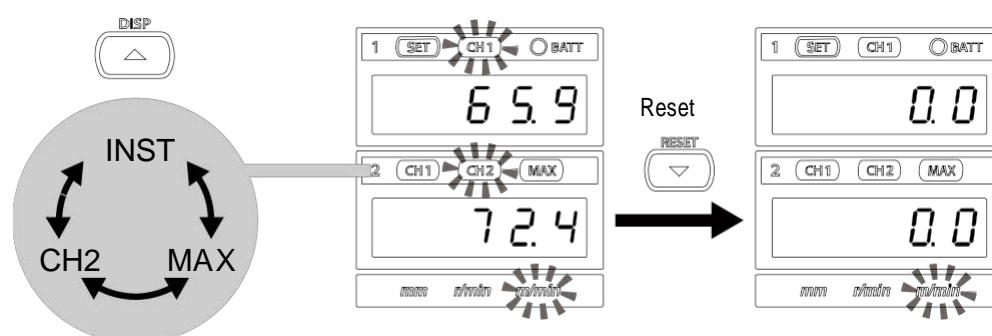
4.5 Storing the measurement value

When press the "STORE" switch, up to 10 sets of the hold data (CH1/ CH2) and the maximum value (MAX) can be stored in the EC-2100 Elevator Speedometer. When data is stored, the storage number (No.XX) is displayed in the upper for one second and "SAVe" is displayed in the lower for one second.

> Note: When saving the eleventh measurement data, the stored first data is overwritten.

* The stored data can be read in the setting mode.
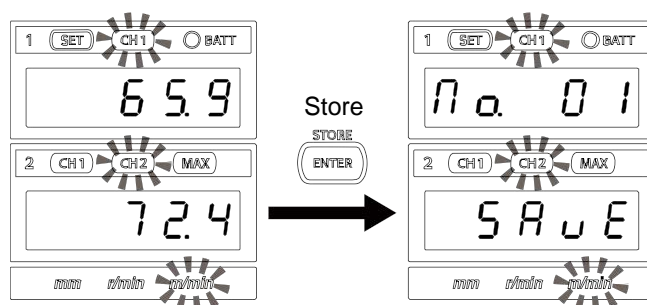
4.6 Reading the stored measurement data

The stored measurement data can be read in the setting mode by the "MENU" switch.
*Please refer to the "3.22 Reading the stored measurement data" on page 12.

5. Measurement of an escalator

5.1 Outline

This measurement aims to measure the actual moving distance of an escalator after emergency stop operation.
*Unit "mm" can be selected only when the EC-0202 Distance measurement function is installed.

5.2 Before measurement

5.2.1 Attaching circumferential ring

The rubber coating type circumferential ring (KS-0800) is suitable for the measurement of an escalator using the handrail. We provide several types of a circumferential ring so that you can choose appropriate one depending on your need. Please refer to the measurement of elevator page about the types or attaching method of the circumferential ring.

5.2.2 Connecting the trigger unit

Switching the EC-0203 Trigger unit (option) enables both operations of an escalator emergency stop and measurement start of the EC-2100. When using the trigger unit, connect the CH1 terminal of the EC-2100 and the EC-2100 terminal of the trigger unit, and STOP terminal of the trigger unit and emergency stop terminal of the escalator.

EC-2100
Elevator Speedometer

The emergency stop terminal of the escalator

EC-0203 Trigger unit
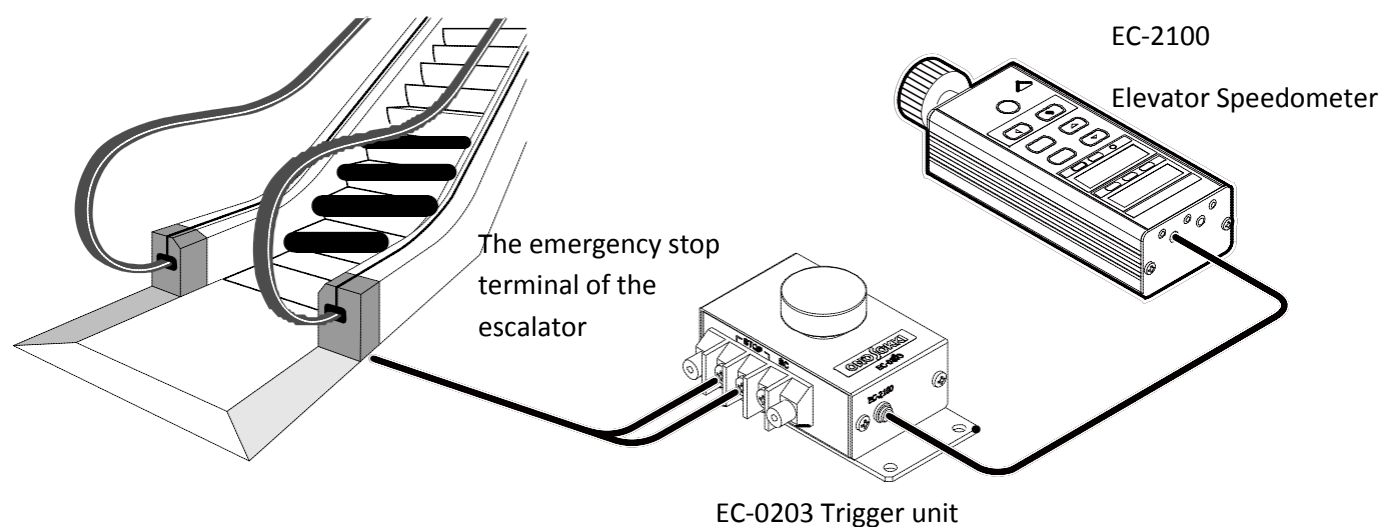
5.3 Basic measurement

5.3.1 Setting unit

Turn the power ON and select the unit "mm". *Please refer to the [3.21 Unit setting] on the page 12 for the unit setting.

5.3.2 Setting of measurement direction

Press the "MENU" switch to return to the measurement mode after setting the unit "mm". And then the distance measurement is ready. The measurement direction can be set by pressing the "△" and "▽" switches in this state. When pressing the circumferential ring of the Elevator speedometer to the handrail of an escalator, select "right" when the handrail is rotated to the right, select "left" when it is rotated to the left. The positive (+) measurement value is displayed in the setup direction and the negative (-) is displayed to an opposite of the setup direction.
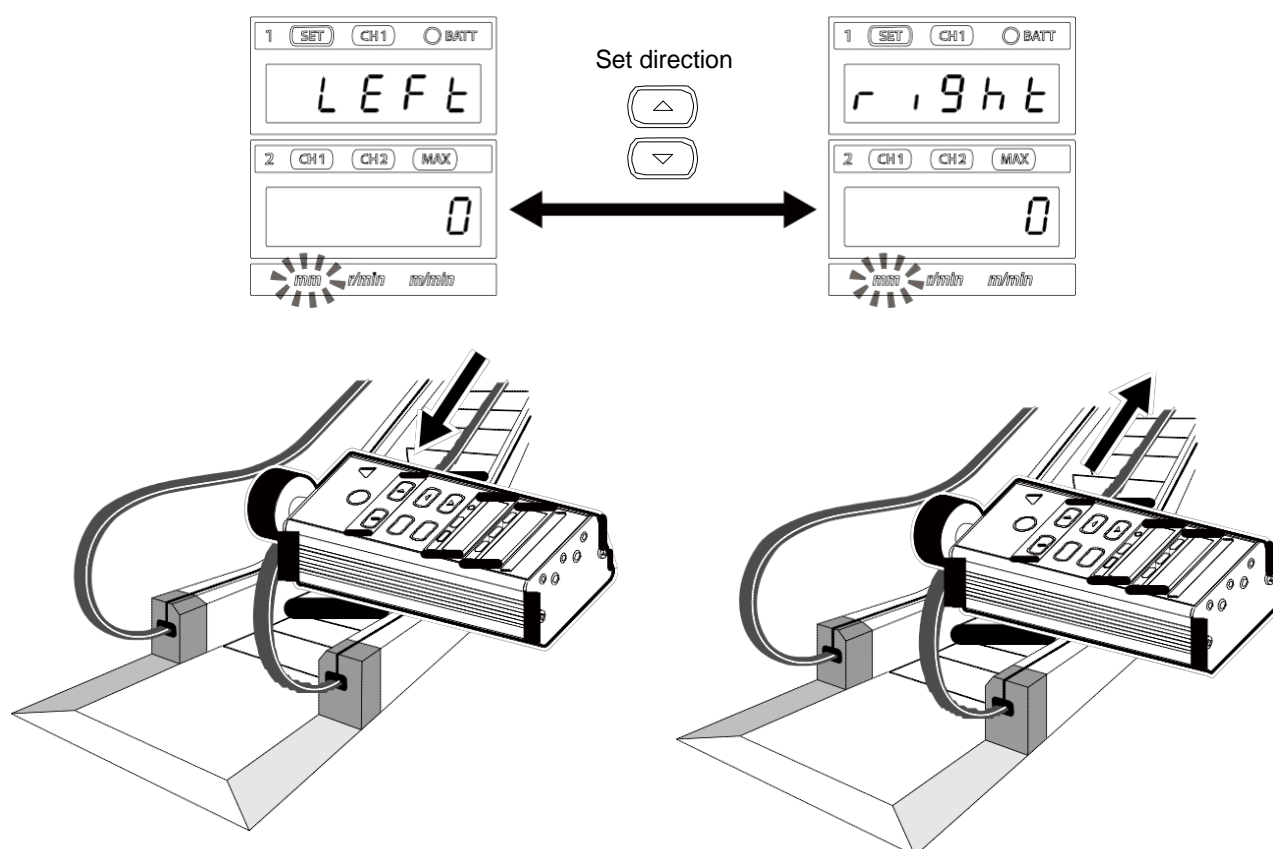
5.3.3 Starting and stopping measurement

Press the "CH12 hold switch or the switch of the EC-0203 Trigger Unit while attaching the EC-2100 to the escalator to start measurement.
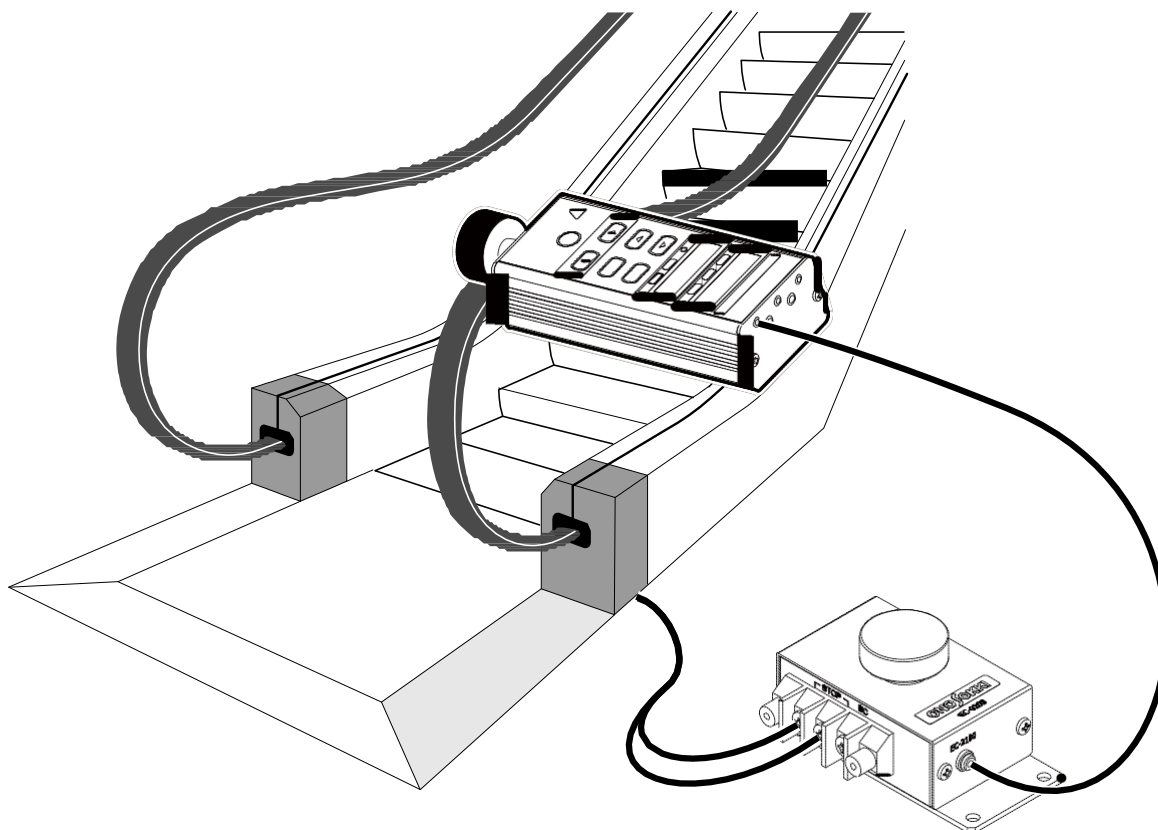
When the Circumferential ring does not rotate for 2 seconds, measurement is automatically stopped. Hold the EC-2100 Elevator Speedometer for at least 2 seconds after the escalator under measurement stops. The distance over which the circumferential ring rotates is displayed in the lower display. Pressing the "CH2" switch also stops measurement.
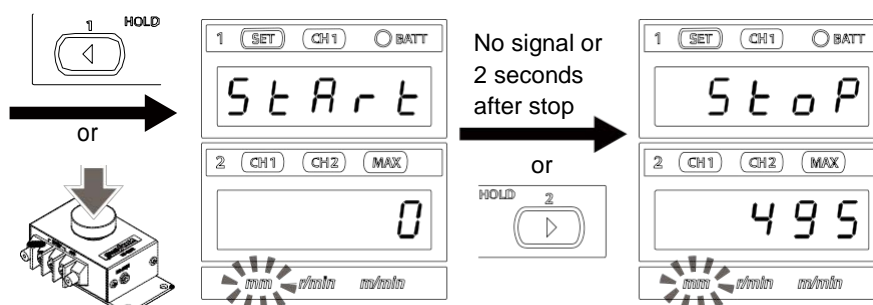
5.4 Storing the measurement data

Press the "STORE" switch to store up to ten measurement results including the direction, polarity, and values in the EC-2100 Elevator Speedometer. When the data is stored, the storage number (No.XX) is displayed in the upper and "SAvE" is displayed in the lower for one second.

Note: When saving the eleventh measurement data, the stored first data is overwritten.

* The stored data can be read in the setting mode.
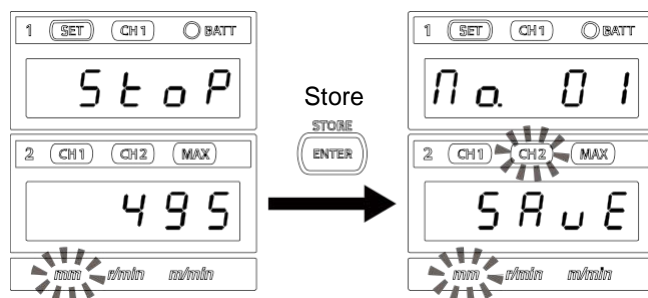
5.5 Reading the stored measurement data

The stored measurement data can be read in the setting mode by the "MENU" switch.
* Please refer to the section [3.2.2 Reading the stored measurement data].

6. Specification

6.1 Measurement section

Measurement method	：Contact method
Measurement range	：Speed measurement; 0.1 to 2,000.0 (m/min)
	Rotation speed measurement; 1 to 20,000 (r/min)
	Distance measurement (option); 0 to ±999 (mm)
	*Measurement is possible for up to ±5000 mm. Measurement value of ±999 mm or more cannot be guaranteed.
Measurement accuracy	：±1 count
Measurement time	：10 ms
Measurement unit	：m/min, r/min, mm (mm is option)
Auto power off function	：Turns OFF the power in 180 seconds after the last operation
Measurement value hold function	：CH1, CH2, Maximum
Averaging function	：Arbitrary set 1 to 200 times
Memory function	：Stored up to 10 sets of measurement results in the EC-2100.

6.2 Detection section

Number of pulses	：150 pulses/ rotation, slit reflection method
Light source	：Infrared emitting diode
Light-receiving element	：Photo diode
Allowable	：5 kg in radial direction, 5 kg in thrust direction
Bearing life	：2×10^7 r/min·h (maximum load within specification)

6.3 Display section

Display unit	：5 -digit red 7-segment LED (upper and lower display)
Update time	：100 ms
Resolution	：0.1 (m/min: Number of averagings 10 or more)
	1 (r/min: Number of averagings 10 or more)
	1 (mm)

6.4 Analog output section

Contents	：Instantaneous value (averaging result output)
Voltage range	：0 to F.S./ 0 to 1 V
Conversion method	：10 bits D/A conversion
Linearity	：±1% F.S.
Output update time	：10 ms
Output connector	：φ 2.5 pin jack

6.5 Pulse output section

Output method	：Transistor output (open collector)
Withstand voltage	：14 V
Number of pulses	：600/ rotation
Logic	：Negative logic
Pulse width	: Approx. 0.5 to 1.2 μs
Output connector	：φ 2.5 pin jack

6.6 General specification

Power supply	：Type AA batteries (x3)
Battery life	：Continuous operating time; 15 hours or more
Current consumption	：100 mA maximum (when power voltage is 4.5 V)
Operating temperature range	：0 to 45 ℃
Storage temperature range	：-10 to 60 ℃
Outer dimensions	：60(W)×162(H)×38(D) mm (same as former model EC-900)
Weight	：Approx. 423 g (including batteries, not including circumferential ring)

6.7 Accessories

EC-0922 External Hold Signal Cable (1.4m) x2

EC-0925 Carrying case x1

Hexagonal wrench (1.5 mm between opposing sides) x1

Type AA battery x3