

SE-2400

INSTRUCTION MANUAL

Thank you for your selection of the SE-2400 Digital Engine Tachometer. To ensure that you get most out of the instrument, we strongly recommend you read follow the instruction in this manual carefully.

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GENERAL OPERATING PRECAUTIONS

CAUTION

Care should be taken not to touch the rotating parts of the engine when making measurements. When using the optional external sensor and the optional AC adaptor, special care is required for the cord not to be caught in the rotating parts of the engine.

Care should be taken not to touch the heated parts of the engine when making measurements.

CAUTION

Do not bring the SE-2400 in contact with heated parts (such as exhaust pipes) of the engine, as this may cause damages because it is not heatproof.

Do not bring the SE-2400 in contact with an ignition coil, as this may cause malfunctions or damages.

Measurement is not possible on engines with more than one ignition coil.

The engine with a fault in ignition systems (such as a distributor, a high-tension code and ignition plug) cannot be correctly measured.

Do not apply voltage to the external sensor input terminal of the SE-2400.

Do not use any other AC adaptors but the optinal PB-703.

Other adaptors may cause malfunctions or damages.

Do not use the SE-2400 at a location subjected to sudden temperature changes.

Do not hastily move the SE-2400 from high temperature to low temperature environments or vice versa to prevent internal condensation which may cause an equipment failure.

Be careful not to allow water or dust to intrude inside the cabinet.

Do not use the SE-2400 at a location where it may be exposed to splashing water, excessive moisture or dust.

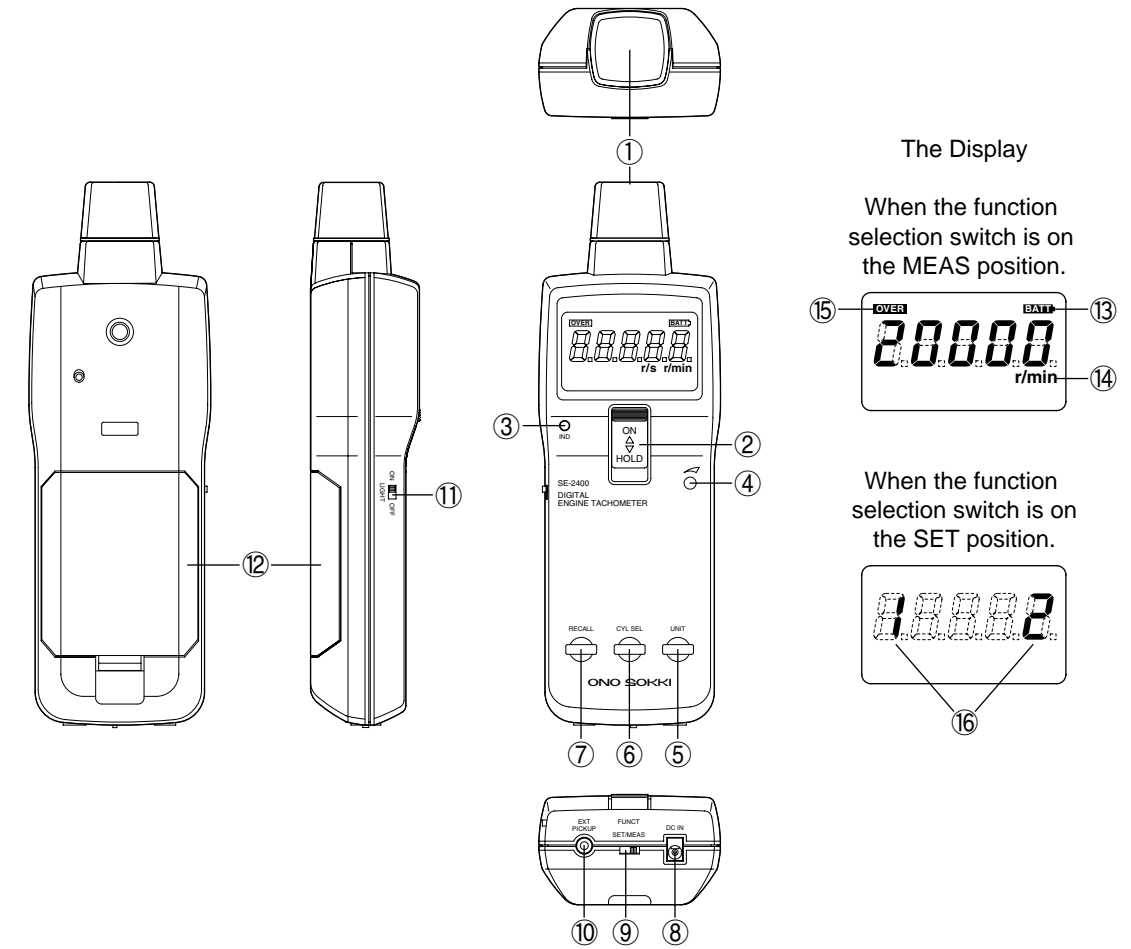
CAUTION

Do not drop or give strong shocks to the SE-2400. It contains precision electronic components which can be damaged by dropping or strong shocks.

If the outer case becomes soiled, wipe it off with a dry soft cloth or with a cloth slightly dampened with a neutral detergent.

Avoid volatile organic solvents such as thinners, benzine and alcohol.

NAME AND FUNCTION OF EACH PART

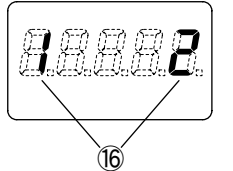


The Display

When the function selection switch is on the MEAS position.



When the function selection switch is on the SET position.



GENERAL DESCRIPTION

1.OUTLINE

The SE-2400 hand-held engine tachometer has its one unit construction containing the detector, the counter and the displays rotational speed of a gasoline engine in 1 r/min or 0.01 r/s units simply by making it close to the ignition coil of a gasoline engine.

2.FEATURES

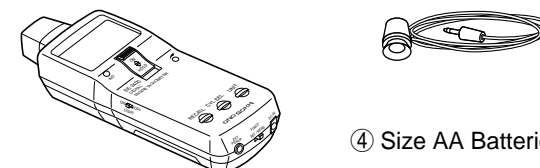
- Non-contacting detection enables an easy and safe measurement.
- Accurate rotational speed can be obtained in 1 r/min or 0.01 r/s unit.
- The accessory external sensor (IP-2800) makes it possible to measure from a distance.
- With the backlighting function, a display can be assured even in a dark place.
- With a recall function, the latest measurement result can be displayed when the power is switched off.
- By using the optional external sensor (VP-201), the number of rotations of diesel-engines can be measured.
- 2-way powered operation-type AA batteries or the optional AC adaptor (PB-703).

3.STANDARD ACCESSARIES

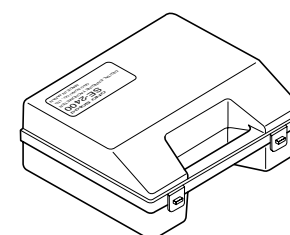
Your package should contain the following materials. Please make sure that you have received all these items upon un-packing.

- Digital Engine Tachometer SE-2400 1
- External Sensor IP-2800 1
- Size AA Batteries 3
- Carring Case 1
- Instruction Manual 1

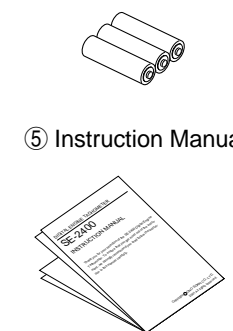
- ① Digital Engine Tachometer SE-2400
- ③ External Sensor IP-2800



- ④ Carring Case



- ④ Size AA Batteries
- ⑤ Instruction Manual



Detection head

This part detects the rotational signal (leakage of magnetic flux) when placed close to the ignition coil of an engine.

Power switch

By sliding this switch to the ON position, power is applied to the SE-2400. When you release your finger, power is switched off. If you slide the switch to the HOLD position, it will lock in the on condition even when you remove your finger.

Indicator

This blinks when the sensor circuit detects the rotation signal (leakage of magnetic flux) .

Sensitivity adjustment volume
Volume for adjusting the signal level.

UNIT switch

Each time this switch is pressed, the measurement unit changes from r/s to r/min or vice versa.

CYLINDER selection switch

The number of cylinder can be selected when the function selection switch is on the SET position.

RECALL switch

When the power is off, this switch can be pressed to recall the latest measured value stored in memory to the display. When power is on, this switch clears the stored value.

External power input terminal

This terminal is for the optional AC adaptor input.

Function selection switch

When the function selection switch is on the SET position, the number of cylinder can be selected by using the CYLINDER selection switch, while when the function selection switch is on the MEAS position, the rpm/rps of an engine can be measured.

External sensor input terminal

This is the input terminal for the IP-2800 (accessory) or the VP-201 (option) external sensor.

Backlighting switch

When this switch is slid into the ON position, the display backlighting is turned on.

Battery cover

Low battery indicator
When the batteries have been discharged and become less than 3.3 V, **BATT** mark will be indicated.

Measurement unit display

The measurement unit will be displayed as r/min or r/s. The unit will be changed with the UNIT switch.

“ OVER ” indicator

OVER indicator appears on the display when the rotational speed exceeds 20000 r/min or 333.33 r/s.

The number of cylinders display

The number of cylinders for 2-cycle engines will be displayed on the left side of the display, and that for 4-cycle engines will be displayed on the right side.

Omission of Test Qualification Issuance

Since this product has been tested through a series of strict inspections and a complete program of quality control, issuance of the test qualification has been omitted.

Warranty

1. This product is covered by a warranty for a period of one year from the date of purchase.
 2. This warranty covers free-of-charge repair for defects judged to be the responsibility of the manufacturer, i.e., defects occurred while the product is used under normal operating conditions according to descriptions in this manual and notices on the unit label.
 3. For free-of-charge repair, contact either your sales representative or our sales office nearby.
 4. The following failures will be handled on a fee basis even during the warranty period.
 - (a) Failures occurring through misuse, mis-operation, or modification
 - (b) Failures occurring through mishandling (dropping) or transportation
 - (c) Failures occurring through natural calamities (fires, earthquakes, flooding, and lightning), environmental disruption, or abnormal voltage.
- * For repairs after the warranty period expired, contact your sales representative or our sales office nearby.

*Outer appearance and specifications are subject to change without prior notice.
HOME PAGE: <http://www.onosokki.co.jp/english/english.htm>

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MEASURING METHOD

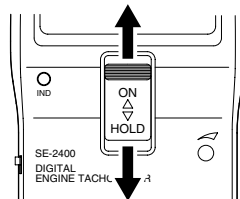
1. Applying power

By sliding the power switch to the ON position, power is applied to the SE-2400. When you release your finger, the switch returns to the center position and power is switched off.

If you slide the power switch to the HOLD position, it will lock in the on condition even when you remove your finger. For switching off the power, the switch is to be moved to the center position.

It is convenient to keep the switch to the HOLD position when continuously measuring the rotational speed.

The power switch is not locked.



The power switch is locked.

2. Setting the number of cylinder

Set the number of cylinder according to the engine to be measured. In the initial condition, "4-cycle 1-cylinder" is selected. When the batteries are replaced with new ones or when the optional PB-703 AC adaptor is disconnected (no battery is installed), the initial setting of 4-cycle 1-cylinder will be selected.

By sliding the function selection switch to SET position, the Fig.1 as shown below will be displayed. The "-" in the left side display stands for the number of cylinders for 2-cycle engines and the "1" in right side display stands for numbers for cylinder of 4-cycle engines.

Each time the cylinder selection switch is pressed, the display will be changed in the order of the Chart1 below.

When a desired number of cylinder is displayed, slide the function selection switch to MEAS position.

Fig.1

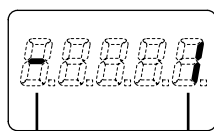


Chart 1

Number of the cylinders at 2-cycle engine.	Number of the cylinders at 4-cycle engine.
-*1	1
1	2
-	3
2	4
-	5
3	6
4	8

It returns the setting condition to measure 4-cycle/one cylinder engine by pressing the change-over switch to the number of the cylinder when it is 4 cycle/eight cylinders.

*1
"-" indicates no subject.

3. Setting the measurement unit

Each time the UNIT switch is pressed, the measurement unit will be changed from r/min to r/s or vice versa. In the initial condition, the r/min unit is selected.

4. Starting measurement

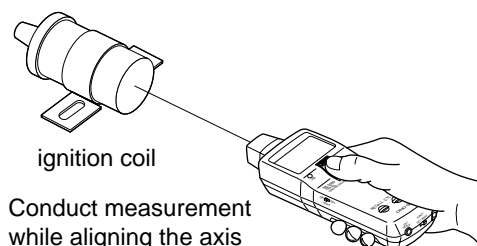
Slide the power switch to the ON or HOLD position to supply power to the unit.

After setting the number of cylinder, slide the function selection switch to MEAS position.

Set a measurement unit.

When the detection head is placed close to an ignition coil of the engine, the indicator starts blinking.

When you bring the detection head much closer to the ignition coil, the indicator lamp blinks at a constant frequency. At high rotational speed the lamp looks as if growing without blinking. This distance is the measuring position. The distance between the ignition coil and the detector head is normally 10 to 200 mm.



Conduct measurement while aligning the axis directions the device and ignition coil.

Adjust the sensitivity adjustment volume in order to make the signal sensitivity stable when the measurement is made unstable.

5. Measurement with the IP-2800 external sensor

When you further extend the cable of the IP-2800, use the optional IP-001 extension cable (3 m).

Insert the jack of the IP-2800 to the external sensor input terminal of the SE-2400.

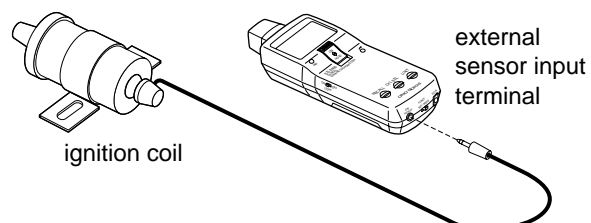
Mount the sensor part of the IP-2800 to the ignition coil.

Slide the power switch to the ON or HOLD position to supply power to the unit.

After setting the number of cylinder, slide the function selection switch to the MEAS position.

Set the measurement unit.

Now you are ready to take a measurement.



6. Measurement precaution

Do not put any obstacle between the SE-2400 and ignition coil.

The accurate measurement is impossible if there is any obstacle between them since the rotation signal is cut off.

Care should be taken not to bring the main body or the detection head in contact with an ignition coil. If an irregular display occurs due to an accidental contact with the ignition coil, slide the power switch to off and then turn it on again.

Do not place a magnetic object near the SE-2400 under measurement.

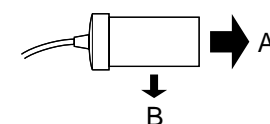
Since the SE-2400 detects leakage of magnetic flux generated from the ignition coil, if there is any magnetic object nearby, an irregular display will occur.

Measurement range of the SE-2400 is 20000 r/min (max.). Use it within this range.

Please keep the correct direction of the unit at the the measurement so that the IND lamp blinks at a fixed interval.

The A part of open magnetic circuit type ignition coil (especially cylindrical shape) structurally generates higher density magnetic flux, and B part of it generates smaller density magnetic flux.

Since the SE-2400 detects leakage of magnetic flux, detecting from the A direction is suitable for measurement. Closed magnetic circuit type ignition coil has a complicated leakage flow of magnetic flux, so there may be a case when a display fluctuates depending on measuring directions or methods. In this case, place the SE-2400 a little bit apart from the ignition coil and make measurement where the display becomes stable.



7. About the batteries

This instrument operates on three Size AA dry cell batteries or the optional PB-703 AC adaptor.

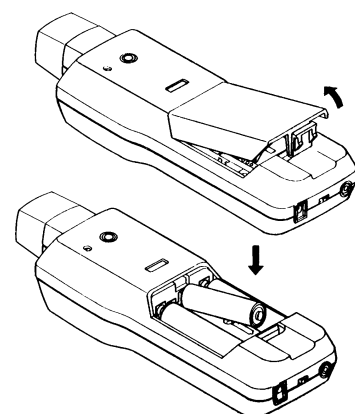
When the batteries have been discharged and the display shows a **BATT** mark, be sure to replace all three batteries with new batteries.

How to replace the batteries

Remove the battery cover by sliding out it while pressing the knob.

After removing the existing batteries, insert new batteries with care of their polarity.

Close the battery cover.



Specifications

1. Detector section

Detection method : Electromagnetic induction method

Detecting object : Ignition coil

Detection distance : 10 to 200 mm.

2. Measurement section

Measurement unit : r/min, r/s

Measurement range :

2-cycle	4-cycle	Measuring range
	1 cylinder	120 to 20000 r/min
1 cylinder	2 cylinder	120 to 20000 r/min
	3 cylinder	120 to 20000 r/min
2 cylinder	4 cylinder	120 to 20000 r/min
	5 cylinder	120 to 20000 r/min
3 cylinder	6 cylinder	120 to 15000 r/min
4 cylinder	8 cylinder	120 to 12000 r/min

Number of display digits : 5

Display type : 7-segment LCD display with backlighting

Time base : Quarts crystal oscillator (32.768 kHz)

Measurement display time : 1 s, automatically repeating

Accuracy : ± 1 r/min (± 2 r/min for 10000 r/min or more)

"OVER" : indicator : **OVER** indicator appears on the display when the rotational speed exceeds 20000 r/min or 333.33 r/s.

3. General specifications

Storage time : The last measured value is stored in memory until batteries wear down or until power supply from an AC adaptor is interrupted.

Power source : AA batteries × 3

Batteries life : Approx. 150 hours

Approx. 20 hours(When backlight is used)

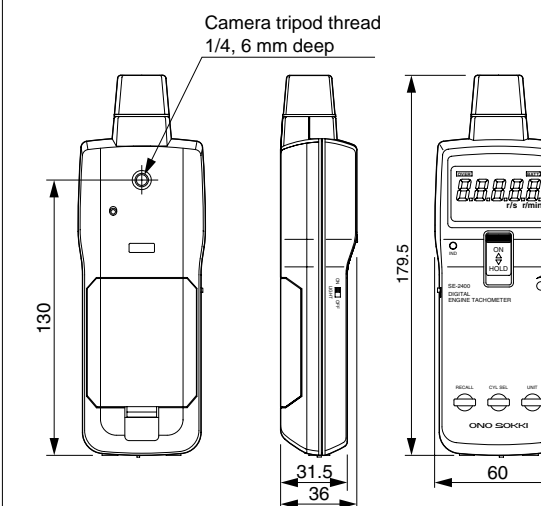
Low battery indication : About 3.3 V

Operating temperature : 0 to + 40

Storage temperature : - 10 to + 55

Weight : Approx. 130 g (without incl. Batteries)

Outer dimensions : (unit : mm)



TROUBLESHOOTING

If a malfunction of the SE-2400 is suspected, and items in the following table are checked but the unit still seems to be malfunctioning, contact your sales representative or our sales office.

Symptom	Check item	Counter measure
No indication	Batteries are inserted ? Battery polarity is correct ? Batteries are charged ? AC adaptor is plugged ?	Insert batteries. Insert batteries in correct polarity. Replace batteries with new ones. Plug AC adaptor.
Unstable indication	Is the measuring distance correct ? Isn't the ignition coil contacting to the SE-2400 ? Is there any obstacle between the SE-2400 and ignition coil ? Is an ignition coil closed magnetic circuit type ?	The distance at which measurement can be executed is 10 to 200 mm from an ignition coil. Do not let the ignition coil contact to the SE-2400. Do not put an obstacle between the SE-2400 and ignition coil. Change the measuring direction.
The rotation speeds is extremely high/low	Is the setting of the number of cylinder is correct ? Is an ignition coil closed magnetic circuit type ? The rotation speed is displayed twice.	Set the correct value referring to '2. Setting the number of cylinder'. Change the measuring direction. It may happen with the specification of an ignition coil. Please change a setup of the number of cylinders.

Option

AC adaptor (PB-703)

Insert the jack of the PB-703 to the external power input terminal of the SE-2400. Connect the plug of the PB-703 to the AC100 V receptacle. By connecting the PB-703 in this manner, the SE-2400 operates from AC line power.

External Sensor (VP-201)

The VP-201 can be used to measure the rotational speed (rpm) of 4-cycle gasoline-engines and 4-cycle diesel-engines.

Storage

The storage temperature range is - 10 ~ + 55 .
Avoid storing the unit in a damp place and under direct sunlight, and provide a good ventilation. When not in use for long period, remove batteries to prevent possible damage from battery leakage.