

Instruction Manual (Basic Operations)

Thank you for purchasing our Handheld Advanced Tachometer.

Read through this manual in order to make full use of it.

Warnings and Cautions

In this document precautions are classified into two categories: WARNING and CAUTION. This depends on the degree of danger or damage possible if the precaution is ignored and the product is used incorrectly.

	This symbol is used to indicate precautions where there is a risk of death or serious personal injury to the operator if the product is handled incorrectly.
	This symbol is used to indicate precautions where there is a risk of some personal injury to the operator or only material damage to the product if the product is handled incorrectly.

Omission of Issuance of Certificate

This product has been tested under strict conditions for normal operation before shipment. Please note that the issuance of certificate is omitted.

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Warranty

- This product is covered by a warranty for a period of one year from the date of purchase.
- This warranty covers free-of-charge repair during the warranty period for defects occurred while the product is used under normal operating conditions according to descriptions in this manual and notices on the unit label.
- For free-of-charge repair during the warranty period, contact your dealer or Ono Sokki sales office nearby.
- Even during the warranty period, the following failures will be handled on a fee basis.
 - (a) Failures or damages occurring through misuse, misoperation, or modification
 - (b) Failures or damages occurring through mishandling (dropping) during transportation after purchase
 - (c) Failures or damages occurring through natural calamities (fires, earthquakes, flooding, and lightning), environmental disruption, or abnormal voltage
 - (d) Replenishment of expendable supplies, spare parts, and accessories.

- * This warranty does not limit any legal rights of customers.
- * If a customer engineer is dispatched to remote locations, the customer will be demanded for actual expenses.
- * For any questions such as those about repair after expiration of the warranty period, contact the dealer from which you purchased the product or the Ono Sokki sales office nearby. If the function of the product could be maintained through repair, it will be handled on a fee basis.
- * This warranty covers only the product itself; it does not cover any damages resulting from failures of the product.

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Be Sure to Read Before Starting Operation

WARNING

- Be careful about rotating parts of an engine, motor, etc. during measurement. When using an optional detector and/or AC adapter, take care not to let the cables be rolled into the rotating part of the engine.

- Be careful about hot parts of an engine, motor, etc. during measurement.

CAUTION

- Do not let this product touch hot parts of an engine, motor, etc. This product is not heat-resistant. So, be careful not to let it touch hot parts (exhaust pipe, etc.).

- Do not let this product touch an ignition coil. Doing so may cause malfunction or failures.

- Accurate measurement may be disabled for an engine with faulty ignition system (distributor, high-tension cable, ignition plug, etc.).

- Be sure to use the dedicated AC adapter (optional), when necessary. Using other adapters may cause failures.

- When installing dry cell batteries in the product, take care of polarities. If dry cell batteries are installed in wrong direction, the fuse may blow.

- Avoid rapid temperature change. Do not move the product from a hot to cold place, or vice versa, in a short period of time. Dew condensation inside the device may cause failures.

- Prevent foreign substances such as water, oil, dust from getting into the device. Do not use the device in a place where it may get wet or oily or in environment subject to moisture or dust.

CAUTION

- Be careful not to let it fall or give strong vibration or shock to it. This product contains precision electronic parts. Be careful not to let it fall or give strong vibration or shock to it.

- If the product is contaminated, wipe it with dry cloth or cloth dipped in solution of neutral detergent and tightly squeezed. Do not use volatile oil such as thinner or benzene or alcohol.

Overview

1. Overview

This product is a tachometer of handheld type that measures rotational speed by analyzing sensor signal frequencies through FFT processing.

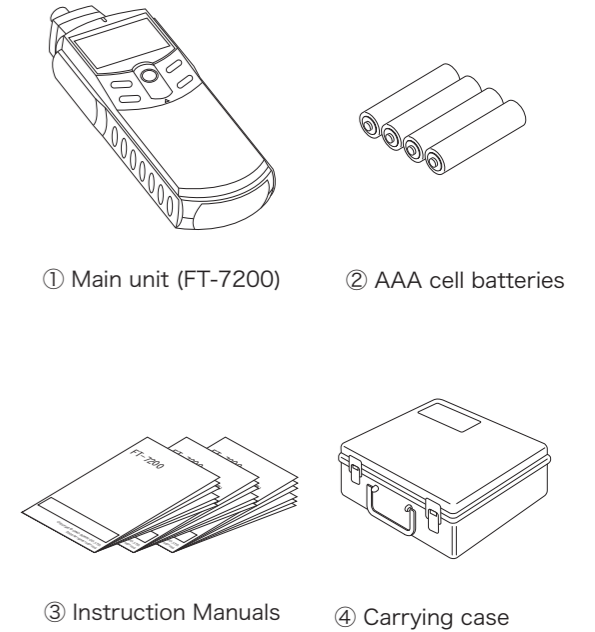
2. Features

- Applicable to various types of sensors
- Large and easy-to-read LCD
- Equipped with analog and sensor signal monitor outputs
- Both AAA cell batteries and AC adapter available
- Equipped with backlight function convenient for use in dark place
- Equipped with pulse output

3. Product Configuration

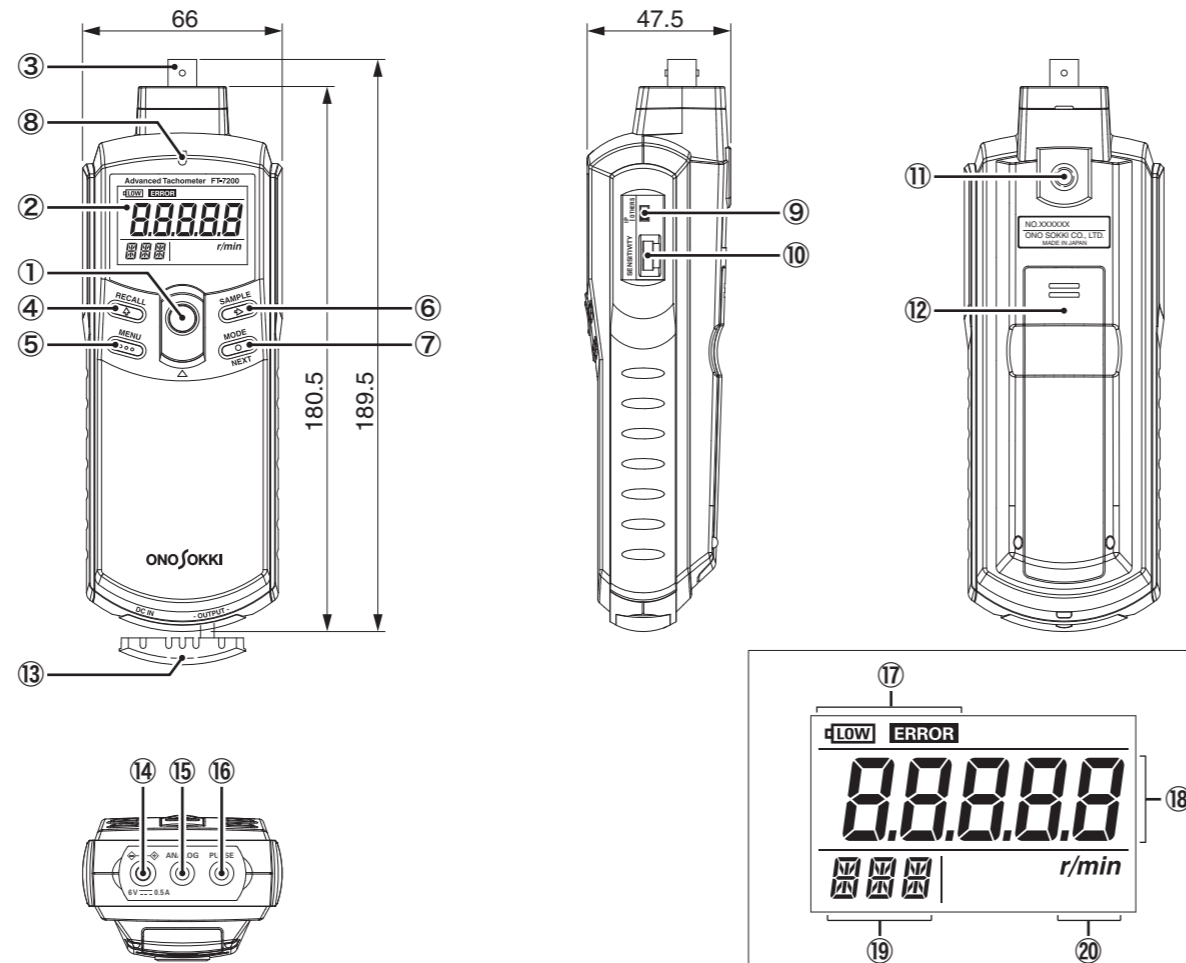
After opening the packing box, confirm that it contains all the items listed below.

①	Main unit (FT-7200)	One
②	AAA cell battery	Four
③	Instruction Manuals	Three different manuals
④	Carrying case	One



Note: Detectors are optional.

Part Names and Functions



- Power switch**
Used to set the power ON/OFF.
- Display**
Displays measurement values and settings.
- Input connector**
Connector for connecting sensors.
- RECALL/↑ switch**
In setup mode, this switch is used to enter numeric values or change selections. For acceleration/deceleration rotation measurement (when algorithm E of "ACT" mode is selected) in measurement mode, this switch is used to select the rotational speed at the measurement start from sampled candidate values.
- MENU switch**
Used to switch over between measurement and parameter setup modes.
- SAMPLE/→ switch**
In setup mode, this switch is used for digit shifting. Before starting acceleration/deceleration rotation measurement (when "ACT" mode is selected) in measurement mode, this switch is used to calculate rotational speed candidate values for the measurement start by sampling rotational speed data.
- MODE/NEXT switch**
For acceleration/deceleration rotation measurement (when algorithm E of "ACT" mode is selected), this switch is used to determine the candidate value selected with the ④ RECALL switch as the rotational speed at the measurement start.
- Indicator (input signal check light)**
When the amplifier sensitivity is appropriately set for the sensor signal amplitude, this indicator blinks cyclically.

- This indicator is off when no sensor signal is input or the amplifier sensitivity is insufficient. It is lit when the amplifier sensitivity is excessive.
- Sensor selection switch**
This switch is used to switch between IP Series and other sensors.
- Sensor amplifier sensitivity adjustment dial**
Dial for adjusting the sensor amplifier sensitivity.
- Tripod mounting hole**
Tapped hole for mounting tripod
- Battery cover**
- Connector cover**
Cover of DC power input and output connectors
- DC power input**
Input connector for connecting dedicated AC adapter (When the dedicated AC adapter and batteries are both used, the AC adapter is used in priority.)
- ANALOG output**
Connector for connecting optional AX - 501 cord of recorder, etc.
- PULSE output**
Connector for connecting optional AX-501 cord for outputting pulse converted from power spectrum frequency
- CONDITION display**
Displays low battery level or an error.
- MAIN display**
Displays measurement values, selected contents, set values, etc.
- SUB-display**
Displays set items, etc.
- UNIT display**
Displays measurement unit (r/min).

Before Use

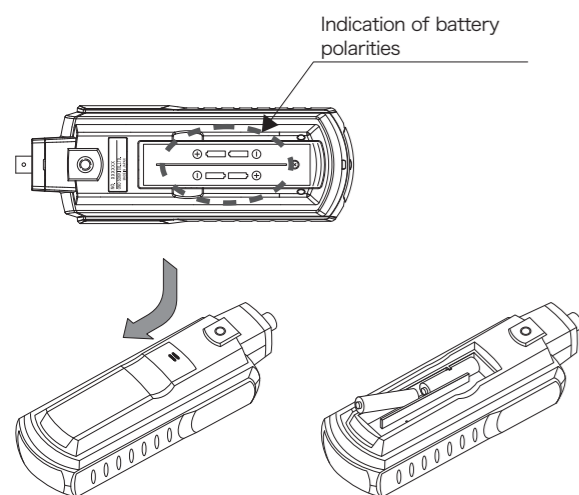
1. Power supply

This product is supplied the power from four AAA batteries or optional AC adapter (PB-7080).

When low battery mark "LOW" has appeared, replace the batteries with new ones. Make sure that the batteries to be installed are all new ones.

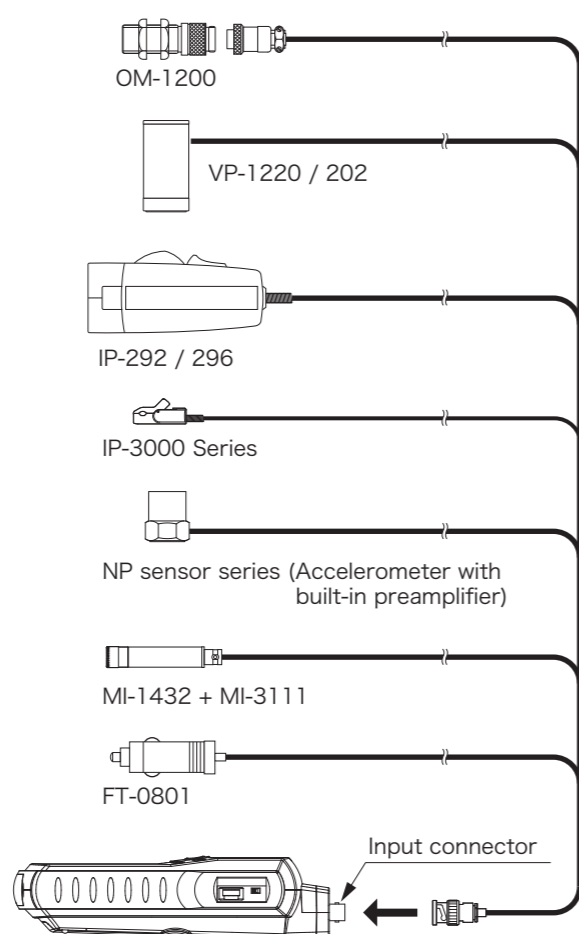
● Replacing batteries

- Slide and remove the battery cover by lightly pushing the two grooves on the cover with your finger.
- Install batteries, making sure they are in correct directions. If batteries are installed in wrong direction, the protection circuit may function to cause the fuse to blow.
- Close the battery cover.



2. Measurement

- When using the product for the first time, make various settings of mainunit before connecting the sensor. Such as sensor selection to be used in setup mode. The settings once specified remain saved when the power is OFF. (See "Function Description"/"Description of Functions and Operations"/3 "Setup mode"/3 "Select Sensor".)
- Securely connect the connector of the detector used to the input connector of this product.
- Slide the power switch to set the power ON.
- Set the measurement algorithm. (See "Function Description", "Description of Functions and Operations"/3 "Setup mode"/5 "Set operation mode" and 6 "Set measurement algorithm".)
- Set the number of pulses (P/R) per rotation according to the object to be measured.
- In measurement state, turn the sensor amplifier sensitivity adjustment dial until the indicator blinks steadily.

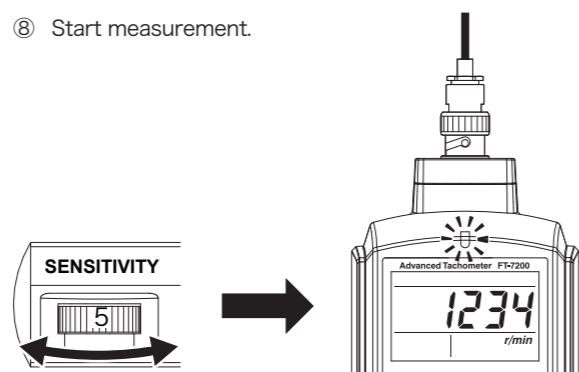


Note : All sensors are optional.

steadily.

- If the adjustment cannot be completed with the sensor amplifier sensitivity adjustment dial, change the input voltage level in setup mode and readjust the sensor amplifier sensitivity. (See "Function Description"/"Description of Functions and Operations"/3 "Setup mode"/1 "Select input voltage level".)

- Start measurement.



3. Precautions for Measurement

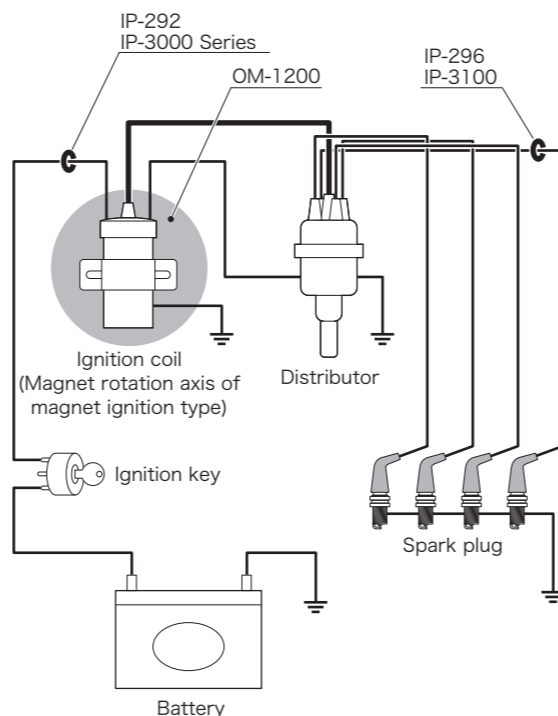
- During measurement, take care not to let this product touch an ignition coil. If this product has accidentally touched the ignition coil and the display has become unstable, once set the power switch OFF and then ON.
- If the sensor selection in setup mode is not correct, accurate measurement cannot be done. Make setting of sensor selection to be used in the setup menu or using the sensor selection switch.

4. Sensor Connection Locations

Each sensor has its own connection location defined. Connect the sensor to the correct location (see Instruction Manuals of the related sensor).

- If there is influence from another cylinder, keep the product away from its secondary cable.
- If there is influence from another cylinder, protect against it by shielding, etc.

Sample connections for engine rotation measurement



Options

- Output cable: AX-501
- AC adapter: PB-7080 (manufactured by KAGA COMPONENTS) (Input: 100 to 240VAC, Output: 6VDC)
- Sensors: OM-1200, VP-1220, VP-202, IP-292, IP-296, IP-3000A, IP-3100, Various NP series sensor (Accelerometer with built-in preamplifier), MI-1432 + MI-3111, FT-0801

*Custom-made sensors (magnetic flux leakage sensor, LED reflected light optical fiber sensor) are available.

Storage

The storage temperature range of this product is -10°C to +50°C.

When storing the product, keep it in a well-ventilated place avoiding direct sunlight; a place with very high or low temperature or high humidity is not acceptable.

If the product is not to be used for a long period of time, be sure to remove batteries to avoid accidents resulting from battery liquid leakage, etc.

Specifications

1. Measurement section

Objects to be measured: DC motors, compressors, gasoline engines, or other rotating bodies

Computing type: FFT

Measurement time: 250ms or less

Input frequency range: 2000Hz range; 30 to 2000Hz
500Hz range; 7.5 to 500Hz
250Hz range; 3.75 to 250Hz

Measurement unit: r/min (rotational speed)

Measurement accuracy: $\pm 2 \times$ rotational speed resolution (r/min) ± 1 count
* The rotational speed accuracy depends on the frequency range.

Minimum rotational speed resolution: Frequency range (Hz)/6400x60/Set pulse count (P/R)
* When the rotational speed is increasing or decreasing, the resolution goes lower.

Filter function: Limiting the target frequency range (rotational speed range) within the selected frequency range

Averaging process: Moving-average method
Average count; OFF, 2, 4, 8, 16

Sensor amplifier sensitivity adjustment dial: The dial on the right side of the main unit can be used to adjust the sensor amplifier sensitivity.

2. Detector section

Applicable sensors: OM-1200, VP-1220, VP-202, IP-292, IP-296, IP-3000A, IP-3100, NP series sensor (Accelerometer with built-in preamplifier), MI-1432 + MI-3111, FT-0801

*Custom-made sensors (magnetic flux leakage sensor, LED reflected light optical fiber sensor) are available.

Voltage levels: 5V; Maximum $\pm 5V$
0.5V; Maximum $\pm 0.5V$
0.05V; Maximum $\pm 0.05V$

Input coupler: AC coupling

Precaution for measurement: Correct detection may not be attained for some types of engines and objects to be measured.

Power supply for NP series sensor: Constant-current power supply (2.2 to 3.2mA at 25°C)

3. Display section

Number of digits: 5
Character height: 10.2mm
Display device: 7-segment LCD with backlight
Display update time: 0.5 \pm 0.2s
Display resolution: 1r/min

4. Measurement modes

CNS (Constant): Used for measurement objects with little variation in rotational speed (for example, when measuring rated rotational speed)

ACT (Active): Used for measurement objects with increasing/decreasing rotational speed (Note that correct measurement may not be attained for rapid changes.)

5. Analog output section

● REVO
Output contents: Output related to rotational speed displayed value

Voltage range: 0 to F.S./0 to 1V

Conversion type: 10-bit D/A conversion

Linearity: $\pm 1\%$ of F.S.

Output update time: 250ms or less

Temperature stability: $\pm 0.05\%$ of F.S./°C (ZERO/SPAN)

Set error: $\pm 0.5\%$ of F.S (Factory default of error set, ZERO/SPAN)

Load resistance: 100k Ω or more

Output connector: Super mini jack (ϕ 2.5)

● SIG
Output contents: Analog output for monitor acquired by waveform shaping of sensor signal

Load resistance: 100k Ω or more

Output connector: Super mini jack (ϕ 2.5, shared with "REVO" output)

6. Pulse output section

Signal contents: Pulse of power spectrum frequency extracted by FFT processing

Output voltage: Lo; 1V or less
Hi; 4.5V or more (with no load)

Output update time: 250ms or less

Load resistance: 100k Ω or more

Output connector: Super mini jack (ϕ 2.5)

7. General Specifications

Power supply: Four AAA batteries or optional AC adapter (PB-7080).

Continuous operation time: Approximately 6 hours (with backlight OFF)
Approximately 5 hours (with backlight ON)
(with alkaline batteries used at 20 ° C and NP series sensor unused (*1))

*1 When using NP series sensor, use of the dedicated AC adapter is recommended because the consumption current increases for driving the constant-current power supply.

Low battery indication: Lit at approximately 4.2V

Operating temperature range: 0°C to +40°C

Storage temperature range: -10°C to +50°C

Operating humidity range: +35 to 85%RH (without condensation)

Storage humidity range: +35 to 85%RH (without condensation)

Mass: Approximately 230g (main unit only, without dry cell batteries)

Outer dimensions: 189.5 x 66.0 x 47.5mm (main unit only)