ONO SOKKI

Digital Tachometer (For high speed)

HR-6800

Electromagnetic Detector

MP-5350

(The sensor is not included in a price of HR-6800)

Instruction Manual (Basic Operations)

Thank you for your selection of the HR-6800 Digital Tachometer.
To ensure the performance of the HR-6800, please read this manual thoroughly.

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.

⚠ WARNING	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.
⚠ CAUTION	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 inspections for correct operation before shipment. Please note that the issuance of certificate is omitted.

■ Warranty
1. This product is covered by a warranty for a period of one year from the date of delivery.
2. This warranty covers free-of-charge repair during the warranty period for defects occurred while the product is used under correct operating conditions according to descriptions in this manual and notices on the unit label.
3. For free-of-charge repair during the warranty period, contact your dealer or your nearest Ono Sokki sales office nearby.
4. Even during the warranty period, the following failures will be handled on a fee basis.
   (a) Failures or damages occurring through misuse, misoperation, repairing without ONO SOKKI'S approval.
   (b) Failures or damages occurring through mishandling (dropping) during transportation after purchase.
   (c) Failures or damages occurring by an Act of God (fires, earthquakes, flooding, and lightening), environmental disruption, or abnormal voltage.
   (d) Replenishment of expendable supplies, spare parts, and accessories.

This guarantee covers only the performance of the product itself only.
All inconvenience by the trouble of this product is not included.
*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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Observe the Following Points before Use

⚠ WARNING

- Perform measurement using enough care with the target under measurement rotating at high speeds.
  Be careful not to allow connection cables to be caught by rotating sections.
- When using an AC adapter, be sure to use a dedicated AC adapter (option).
  Using adapters other than the optional one may cause failure.
- Avoid using the equipment in places subject to rapid temperature change.
  Do not move the equipment rapidly from a hot place to a cold one or vice versa. Condensation can form inside the unit which may cause failure.
- Be careful not to get water, oil, dust, or foreign materials inside the unit.
  Do not use the equipment in places where you may get water or oil or places which are humid or dusty.

⚠ CAUTION

- Do not drop the equipment or apply excessive shock to it.
  Since this equipment incorporates high-precision electronic parts, be careful not to drop it or apply strong shock.
- Wipe dirt off using a dry cloth or a cloth dampened with neutral detergent and squeezed firmly. Do not use volatile oils (thinner or benzine) or alcohols.
- Be sure to use the supplied connection cables.
  Using cables other than the supplied one may make it impossible to obtain specified performance or, in the worst case, cause damage to the equipment.
- Measurement in strong magnetic field or near an AC line is not possible.
  Since this equipment has a high input sensitivity to enable measurement with a minute signal, measurement in strong magnetic field or near an AC line is not possible.

Overview

1.Overview

The HR-6800 Digital Tachometer is a handy tachometer with built-in batteries integrating the measurement unit and display unit. It is designed for measurement of bodies of revolution for dental instruments, textile machines, and general-purpose high-speed machine tools, etc.
With the use a dedicated Detector, the HR-6800 makes it possible to measure the rotational speed of the body of revolution under measurement.
Up to 20 measurement data items can be stored in the HR-6800 unit using the memory function, which is useful for subsequent confirmation.
The display unit displays the rotational speed (x10 r/min) with a 5-digit number.
The equipment is provided with an analog output (interchangeable with a monitor output) and a pulse output. The analog output is used for recording with a data recorder, etc., and the pulse output for tracking analysis with an FFT analyzer.

2.Features

- Measurement from low to high rotational speeds (100 to 999,990 r/min)
- High sensitivity
- MAX and MIN modes for displaying the maximum and minimum values
- Convenient memory function (up to 20 items can be memorized) for confirmation of measurement results
- Over mark function for indicating measurement values exceeding a specified value
- Analog output, sensor signal monitor output, and pulse output
- Type AAA batteries and AC adapter commonly used
- Back light function which is convenient for use in dark places

3.Measurement Principle

The Detector incorporates a permanent magnet and a detection coil to detect the rotational speed of an object under measurement based on the principle of electromagnetic induction.

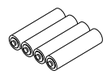
4.Unpacking

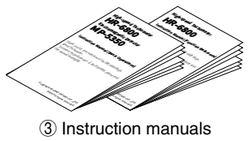
When you unpack the unit, make sure that you have all the following:

【HR-6800】

① HR-6800 main unit x1
② Type AAA alkaline dry battery x4
③ Instruction manual ..... x2 (2 different manuals)
④ Carrying case x1
⑤ MI-0301 Tripod attachment adapter x1


① HR-6800 main unit


② Type AAA alkaline dry batteries


③ Instruction manuals


④ Carrying case


⑤ Tripod attachment adapter (MI-0301)

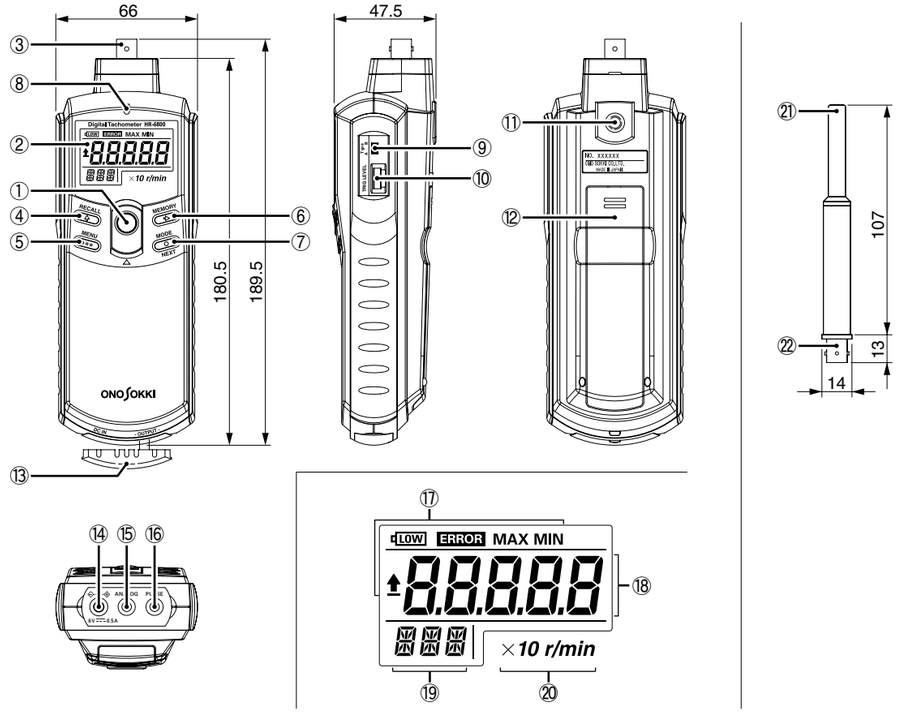
【MP-5350】
(The sensor is not included in a price of HR-6800)

① Detector (MP-5350) x1
② Connection cable (1m) x1


① MP-5350 Detector


② Connection cable

Name and Function of Each Section



① Power switch
Turns the power ON or OFF.

② Display
Displays the measurement value and various settings.

③ Input connector
Connected with the Detector with the supplied connection cable.

④ RECALL & ↑ switch
Used for memory call during measurement and numerical input in the parameter setup mode.

⑤ MENU switch
Used to switch between the measurement mode and the parameter setup mode.
The lock mode can be set and canceled by pressing this switch for 3 seconds or longer.

⑥ MEMORY & → switch
Used for memory writing during measurement and numerical digit shift in the parameter setup mode.

⑦ MODE & NEXT switch
Used for mode change during measurement and item selection in the parameter setup mode.

⑧ Indicator (input signal indicator)
When the detector circuit detects a rotational signal, the LED indicator lights up.

⑨ Type A/B selector switch
Used to select Type A or B.

⑩ Trigger level adjustment volume
Volume for adjusting the trigger level.

⑪ Tripod mounting hole
Used to mount a tripod.

⑫ Battery cover

⑬ Connector cover
Cover for the power inlet and output connectors.

⑭ DC power input
Input terminal for connecting the dedicated AC adapter. (when the dedicated AC adapter and dry batteries are used together, the AC adapter is given priority.)

⑮ Analog output
Terminal for connection with a recorder, etc. through the optional AX-501 cord.

⑯ Pulse output
Terminal for connection with an FFT analyzer, etc. through the optional AX-501 cord.

⑰ CONDITION display
Displays the measurement mode, LOW battery, and errors.

⑱ MAIN display
Displays measurement values, selections, settings, etc.

⑲ SUB display
Displays memory addresses, settings, etc.

⑳ UNIT display
Multiplies the measured value in the MAIN display by ten for readout in "r/min."

㉑ Detecting element
Bring the detecting element at the end of the Detector close to the body of revolution under measurement.

㉒ Output connector
Connected with the HR-6800 unit using the supplied connection cable.

Before Use

1.Power Supply

The HR-6800 operates on four Type AAA batteries or the dedicated AC adapter (option: PB-7080).

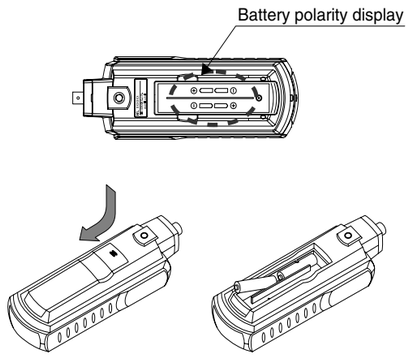
If the batteries are consumed and the LOW mark "LOW" appears, replace them with new ones. Be sure to replace all the four batteries at the same time.

Battery replacement procedure

① While pushing lightly the two (anti-slip) slots of the battery cover with your finger, slide it to remove.

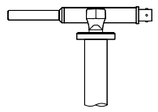
② Put the batteries properly in the battery compartment with the correct polarity (+/-).

③ Put the battery cover.

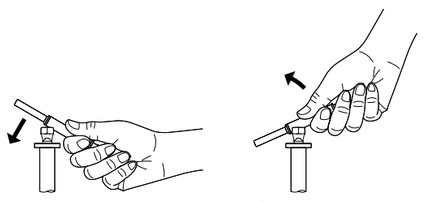


2.MI-0301 Tripod Attachment Adapter

With the use of the supplied tripod attachment adapter, the Detector can be installed using a commercially available tripod.



Attach the Detector to and detach it from the tripod attachment adapter as shown below.



Attachment Detachment

3.Measurable Bodies of Revolution

The HR-6800 enables measurement of the following bodies of revolution:

- A body of revolution with a magnet embedded

  Most stabilized measurement is possible.
  This system is recommended for a drill for rotation test.

- A body of revolution partially polarized

  A magnet is rubbed on a part of the body of revolution for polarization before measurement. If the magnetic force weakens with time, polarization is performed again.

- A body of revolution with a bumpy shape

  Since a magnet is embedded in the Detector of the HR-6800, whether a body of revolution can be measured depends on its shape. However, depending on the material and shape of the body of revolution, a detected signal may become minute making detection of rotation difficult. Therefore, if possible, magnet-based detection is recommended.

Note: Since the Detector has frequency characteristics, it needs strong magnetic force particularly when measuring low rotational speed.
Refer to the following rough standard of magnetic force:
100 r/min: 10 mT or more
10000 r/min: 5 mT or more
100000 r/min: 1 mT or more

Note: Measurement is not possible in places where strong magnetic field is present around the measuring point.

4.Measurement

① Connect the HR-6800 unit with the Detector using the supplied cable.

② Select Type A or B using the Type selector switch on the side face.

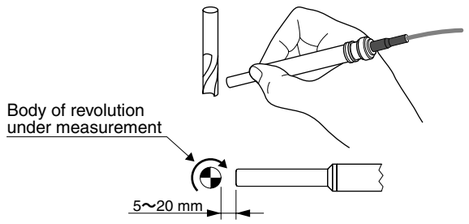
③ Slide the power switch to turn the power ON.

④ Set the number of pulses per rotation (P/R) and other parameters according to the object under measurement.

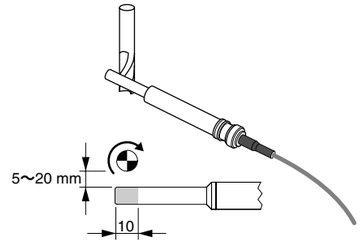
⑤ Bring the Detector close to the object under measurement.

Bring the end or its side face of the Detector to the body of revolution as shown below.

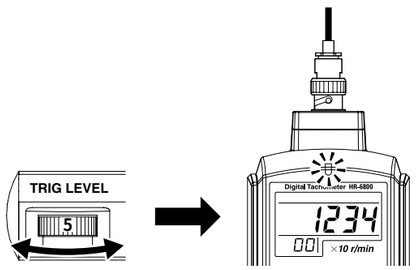
【Detection at the end】



【Detection at side face of the end】



⑥ During measurement, turn the trigger level adjustment volume so that the indicator blinks stably and the rotational speed be displayed. Since the center value of the trigger level adjustment volume is 5, gradually increase or decrease the trigger level from 5 to adjust the trigger level.



⑦ Perform measurement.

Specifications

1.Measurement Section

Objects under measurement: Bodies of revolution for dental instruments
Bodies of revolution for textile machines
Bodies of revolution for high-speed machine tools, etc.
* The object under measurement needs to be polarized.

Operation method : Periodic operation method
Measuring time : 50 ms + Input signal 10-period time or less
Input frequency range : 1.6 Hz to 16.666 kHz
Measuring unit : 10 r/min (rotational speed)
Measuring range : 100 to 999990 r/min (selectable)

Type selection	RANGE	Rotational speed range
A	Hi	10,000 to 999,990 r/min
	Lo	100 to 50,000 r/min
B	—	200,000 to 999,990 r/min

* When the number of pulses is set to "1"
* Generally, use Type A.

Measurement accuracy : Display value x (±0.02 %) ±1 count
Over range function : If the measurement value exceeds the display range, over range "ERROR" appears.
Upper limit rotation warning function: If the rotational speed exceeds a preset upper limit, upper limit warning "▲" appears.
Trigger adjustment function: Can be adjusted using the rotary volume on the right-hand side face of the HR-6800 unit.

2.Detecting Element

(The sensor is not included in a price of HR-6800)

Detection method : Electromagnetic induction
DC resistance : 25 to 40 Ω [20 ˚C]
Operating temperature range: 0 ˚C to +40 ˚C
Storage temperature range: -10 ˚C to +50 ˚C
Resistance to vibration : 19.6 m/s²
Resistance to shock : 490 m/s²
Mass : About 50 g (detecting element only)
Dimensions : 107 x ø14 mm

3.Display Section

Number of display digits : 5 digits
Character height : 10.2 mm
Indicator : 7-segment LCD with back light
Refresh time : About 1 s/0.5 s selectable

4.Measurement Mode

MAX (peak hold) : Displays the maximum value during measurement.
MIN (peak hold) : Displays the minimum value during measurement.
Others : Displays the current measurement value.
Memory function : Up to 20 measurement values can be memorized each time the memory switch is pressed. Since these values are stored in non-volatile memory, they are retained even after the power is turned OFF.

5.Analog Output Section

【REVO】

Output contents : Output to the display value of rotational speed.
Voltage range : 0 to F.S./0 to 1 V
(The full scale can be set with a setup parameter.)
Conversion method : 10-bit D/A conversion method
Linearity : ±1 % of F.S.
Output refresh time : 50 ms + Input signal 10-period time or less
Temperature stability : ±0.05 % of F.S./˚C (ZERO & SPAN)
Setup error : ±0.5 % of F.S. (adjustment setup error at the time of shipment, ZERO & SPAN)
Load resistance : 100 kΩ or more
Output connector : Super mini jack (ø2.5)

【SIG】

Output contents : Analog output for monitoring after waveform shaping of the sensor signal (before pulse waveform conversion)
Load resistance : 100 kΩ or more
Output connector : Super mini jack (ø2.5/Commonly used with REVO output)

6.Pulse Output Section

Output timing : Outputs one pulse for each signal detection.
(For bodies of revolution with one output per rotation, outputs one pulse per rotation.)
Output voltage : Hi level=4.5 V or higher
Lo level=0.5 V or lower
Output logic : Positive logic pulse
Load resistance : 100 kΩ or more
Output connector : Super mini jack (ø2.5)

7.General Specifications

Power supply : Type AAA dry battery (x4) or dedicated AC adapter (PB-7080)
Continuous operating time: About 13 hours (back light OFF)
About 8 hours (back light ON)
(When alkaline batteries are used at 20 ˚C)
Battery LOW display : Lights up at about 4.5 V.
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 : About 230 g (HR-6800 unit only, batteries not included)
Dimensions : 189.5 x 66.0 x 47.5 mm (HR-6800 unit)

Applicable Standards

① CE Marking
EN61326
EN61010-1

CE : This mark declares the compliance with EC instructions.

Options

① AX-501: Output cord
② PB-7080: AC adapter
(IN: 100 to 120 VAC, OUT: 6 VDC)

Storage

The storage temperature range of the HR-6800 is -10˚C to +50˚C. When you store it, avoid locations where the temperature is extremely high or low or the humidity is high. Store it in a place which is well-ventilated and not exposed to direct sunlight. If you do not use it for a prolonged period of time, be sure to remove the batteries to prevent accident caused by battery leakage, etc.