Diesel Engine Tachometer

GE-1400

Instruction Manual (Basic Operations)

Thank you for your selection of the GE-1400 Diesel Engine Tachometer.
To ensure the performance of the GE-1400, please read this manual thoroughly together with the instruction manual of the CP-044 Detector (option).

WARNING and CAUTION
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 At 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 caution with the rotating section of the engine.
  In particular, when you use the sensor cable, AC adapter (option), or output cord, be careful not to allow the cables to be caught by the rotating section of the engine.
- Perform measurement using enough caution with the high-temperature section of the engine.

⚠ **CAUTION**

- Do not contact the equipment with the high-temperature section of the engine.
  Since the equipment does not have sufficient heat resistance, be careful not to contact it with the high-temperature section (such as the exhaust pipe) of the engine.
- When you touch with your hand the voltage/current output section of the GE-1400 or a circuit connected to it, make sure that the power is turned OFF.
- Do not forcibly rotate or move the detector with the detector attached to the fuel injection pipe. There is a risk of damage to the detector.
- Do not apply voltage to the input connector of the GE-1400.
- Since the GE-1400 handles very minute signals, the output signal may slightly change when turning ON or OFF the power of AC power equipment connected. This is not a failure.
- Be sure to use the AC adapter (PB-7080:option) dedicated for the equipment.
  Using other adapters may cause failure.

⚠ **CAUTION**

- Do not drop the product or apply excessive shock to it.
  Since this product incorporates high-precision electronic parts, be careful not to drop it or apply excessive shock to it.
- Do not expose the equipment to rapid temperature change.
  Do not move the equipment from a hot place to a cold place or vice versa. This is a risk of condensation inside the equipment which may cause failure.
- Do not get water, oil, dust, or other foreign materials inside the equipment.
  Avoid using the equipment on locations exposed to water or oil or locations which are very humid or dusty.
- Wipe dirt off using a dry cloth or a cloth dampened with neutral detergent and squeezed firmly. Do not use volatile oils (thinner, benzine, etc.) or alcohols.

Overview

1. Overview

The GE-1400 Diesel Engine Tachometer is a tachometer dedicated for 4-cycle diesel engines. It makes it easier to measure the rotational speed of an engine with high precision by attaching the CP-044 detector (option dedicated for the GE-1400) to the fuel injection pipe of the engine.

2. Features

- Trigger level adjustment function by means of a rotary knob
- Analog and pulse output function
- The backlight function enables display check even in a dark place.
- The memory function allows measurement results to be checked.
- AAA batteries or AC adapter (PB-7080:option) can be used as power supply.

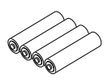
3. Product Configuration

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

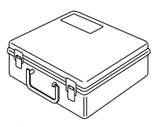
① Main unit (GE-1400) x1
② Output cord x1
③ AAA alkaline battery x4
④ Instruction manual x2
⑤ Carrying case x1


① GE-1400 main unit


② Output cord

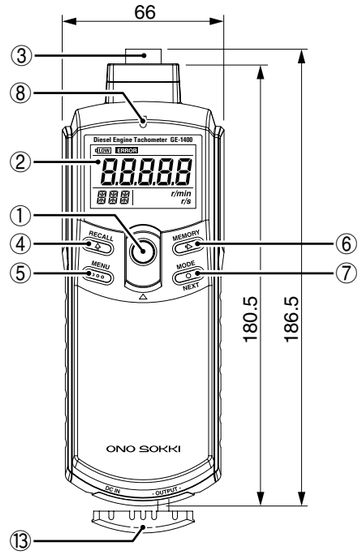

③ AAA alkaline battery

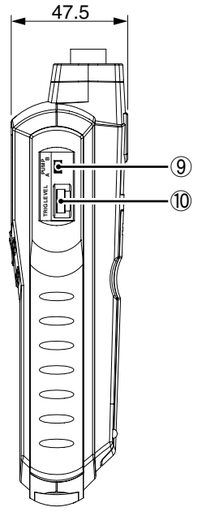

④ Instruction manual

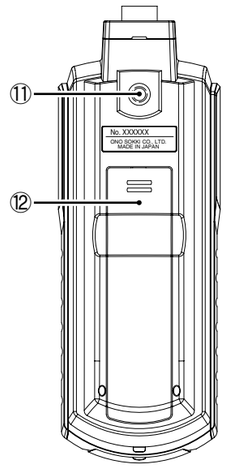

⑤ Carrying case

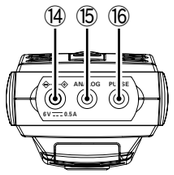
Note: The CP-044 detector is an option.

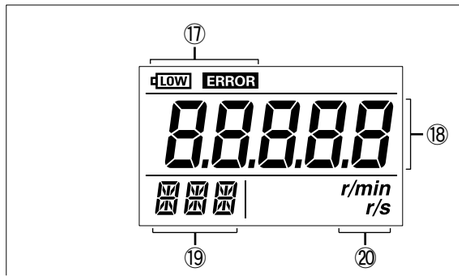
Name and Function of Each Section











⑫ Battery cover

⑬ Connector cover
Cover for the DC power input and analogue/pulse output connectors.

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

⑮ Analog output
Connect a recorder, etc. to this terminal using the supplied output cord.

⑯ Pulse output
Connect an FFT analyzer, etc. to this terminal using the supplied output cord.

⑰ CONDITION display
Displays LOW battery and errors.

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

⑲ SUB display
Displays the memory address, setup items, etc.

⑳ UNIT display
Displays various measurement units.

① Power switch
Turns the power ON or OFF.

② Display
Displays the measurement value and various settings.

③ Input connector
Connect the dedicated detector (CP-044).

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

⑤ MENU switch
Used for changeover between the measurement mode and the parameter setup mode.

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

⑦ MODE & NEXT switch
Used for item selection in the setup mode.

⑧ Indicator (input signal indicator)
While the detecting circuit is detecting the rotational signal, this LED indicator is lit.

⑨ Pump changeover switch
Change this switch according to the fuel pump type of the engine under measurement.

⑩ Trigger level adjustment knob
This knob is used to adjust the trigger level.

⑪ Tripod mounting hole
This screw hole is used to mount a tripod.

Before Use

1. Power Supply

The GE-1400 operates on four AAA batteries or AC adapter (option).

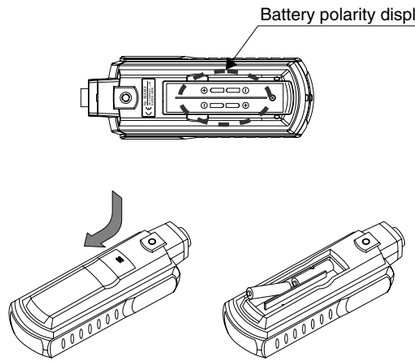
If the batteries are consumed and the LOW mark " LOW " appears, replace them with new ones. Be sure to replace all the four batteries at one time.

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

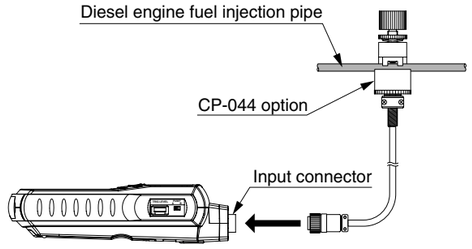
③ Shut the battery cover.



2. Measurement

① Attach the CP-044 detector to the fuel injection pipe. (For the attachment procedure, refer to the instruction manual supplied with the detector.)

② Connect securely the connector of the detector to the input connector of the GE-1400.



③ Set a pump changeover switch.

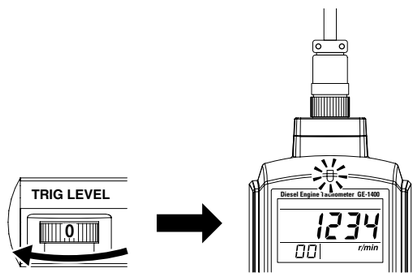
PUMP A B	PUMP A	Bosch type in-line injection pump
	PUMP B	Injection pump for single cylinder engine

④ Turn ON the power switch.

⑤ Set the measurement unit. (Refer to Function Reference/ Functions and Operations/2. Function of Each Switch/ ④ Setting the measurement unit.)

⑥ Start the engine and then set the gain (Hi:Lo) for the sensor amplifier. (Refer to Function Reference/Functions and Operations/2. Function of Each Switch/ ③ Setting the gain of the sensor amplifier.)

⑦ Turn the trigger level adjustment knob gradually from scale "0" so that the indicator blinks stably and the rotational speed is displayed.



⑧ Perform measurement.

3. If Measurement is Not Performed Normally

Refer to Function Reference/Troubleshooting.

Measurement may not be performed normally in the following cases:

① If the injection pressure is extremely low or unstable because the GE-1400 detects change of the pipe diameter involved in fuel injection to measure the rotational speed of the engine

② If measurement is influenced by vibration from other injection pipes through clamp fittings

③ If measurement is influenced by vibration from the engine

Specifications

1. Measurement Section

Applicable engine : 4-cycle diesel engine
Calculation method : Periodic calculation method
Measurement interval : 1s + 1-period interval of input signal or less
Measurement unit : r/min, r/s
Measurement range : 400 to 8000 r/min
* In the case of r/s, the range is obtained by dividing the above r/min value by 60.
Measurement accuracy : Display value(*1) x (± 0.02%) ± 1 count
(*1) The display value is the count value without the decimal point.
Measurement error function: If the measurement value exceeds the display range or specified upper-limit rotational speed, the error mark " ERROR " is displayed.
Trigger adjustment : Adjusted with the rotary knob on the right-hand side of the main unit.

2. Detecting Section

Detection method : Uses the dedicated CP-044 detector (option) to detect pulsation of the injection pipe occurring at the time of fuel injection.
Notes on measurement : In the following cases, normal measurement may be disabled.
a) If the injection pressure is extremely low or unstable because the GE-1400 detects change of the pipe diameter involved in fuel injection to measure the rotational speed of the engine
b) If measurement is influenced by vibration from other injection pipes through clamp fittings
c) If measurement is influenced by vibration from the engine

3. Display Section

Number of display digits: 5 digits
Character height : 10.2 mm
Display unit : 7-segment LCD with back light
Refresh time : 1 ± 0.2s

4. Measurement Mode

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 you turn OFF the power.

5. Analog Output Section

【REVO】
Output contents : Output for the rotational speed display value.
Voltage range : 0 to F.S./0 to 1V
Conversion system : 10-bit D/A conversion
Linearity : ± 1% of F.S
Output refresh time : 50 ms + 1-period interval of input signal or less
Temperature stability : ± 0.05% of F.S./℃ (ZERO & SPAN)
Setup error : ± 0.5% of F.S. (adjustment setup error at the time of shipment, ZERO & SPAN)
Load resistance : 100k Ω or more
Output connector : Super-mini jack (ϕ 2.5)
【SIG】
Output contents : Analog output for monitoring after shaping the waveform of the sensor signal (before pulse waveform conversion)
Load resistance : 100k Ω or more
Output connector : Super-mini jack (ϕ2.5-/common to REVO output)

6. Pulse Output Section

Output timing : 1-pulse output at each signal detection
Output voltage : Hi level : 4.5V or higher
Lo level : 0.5V or lower
Output logic : Positive logic pulse
Load resistance : 100k Ω or more
Output connector : Super-mini jack (ϕ 2.5)

7. General Specifications

Power supply : Four AAA batteries or dedicated AC adapter
Continuous operation time : About 16 hours (back light OFF)
About 8 hours (back light ON)
(Alkaline batteries used at 20 ℃)
Battery LOW display : Lights up at about 4.5V.
Operating temperature range : 0℃ to +40℃
Storage temperature range : -10℃ to +50℃
Operating humidity range : +35 to +85%RH (without condensation)
Storage humidity range : +35 to +85%RH (without condensation)
Mass : About 230g (main unit only, batteries not included)
Dimensions : 186.5 x 66.0 x 47.5mm (main unit only)

Options

① CP-044: Dedicated sensor
② PB-7080: AC adapter (TAS2901-Y-O-ONO; KAGA COMPONENTS)
IN; 100-240VAC 50/60Hz, OUT; 6VDC 2A

Storage

The storage temperature range of the GE-1400 is -10℃ to +50℃. 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 accidents caused by battery leakage, etc.