LC-8310

GPS Speedometer

Item CAN output function (LC-0854)

Standard Conforms to ver. 2.0B

Update frequency OFF, 1 Hz, 5 Hz, 10 Hz, 20 Hz, or 100 Hz selectable

Baud rate 125, 250, 500, or 1000 kbps selectable

Format Supports standard ID/ extended ID

Data Speed, distance, satellite and other information are gathered one ID (ID can be specified.)

Accessory D-Sub9 pin connector CAN branch cable (LC-0862)

High-sensitive GPS Speedometer
LC-8310 High-Sensitive GPS Speedometer

LC-8310 High-Sensitive GPS speedometer measures vehicle speed and travel distance by using GPS, GLONASS and IMU with high accuracy and high response. Wide variety of optional software supports various vehicle tests and vehicle measurement fulfilling the needs of users.

1 High accuracy

By the use of Doppler effect*1 of moving object and carrier wave transmitted from the satellites, the LC-8310 enables highly accurate calculation of the moving object speed. Receiving plural satellite signals from GPS and GLONASS allows high sensitive, high response measurement.

*1: The Doppler effect is the change in frequency of acoustic/electromagnetic radiation emitted by a source when there is speed difference between an observer and its source. The shift is perceived to higher frequencies when the source approaches and to lower frequencies when it recedes.

2 Stable and high sensitivity

Using IMU (Inertial Measurement Unit)*2 and satellite signals (GPS and GLONASS), the LC-8310 enables highly accurate calculation of the moving object speed. Receiving plural satellite signals from GPS and GLONASS allows high sensitive, high response measurement.

*2: IMU is the sensor unit which detects the angle speed and acceleration in each direction by the gyro sensor and accelerator placed in orthogonal three axes.

3 Supports various kinds of vehicle tests

Optional software allows to increase the number of vehicle tests to be supported.

Braking test (MFDD) : (LC-0831 required)

MFDD (Mean fully developed deceleration) : one of the requirements for brake test. Measures the braking distance, braking time, MFDD etc. from the start of braking to the vehicle stop. Also measures the speed, braking distance, braking time, and interval deceleration for each specified step.

Average deceleration calculation : Wet grip performance test supported (LC-0831 required)

With LC-0831, you can calculate the tire’s wet grip performance based on UN-ECE R117.

\[
AD = \frac{V_1^2 - V_2^2}{2d}
\]

V1: Initial velocity km/h (setup value: 80 km/h)
V2: Final velocity km/h (setup value: 20 km/h)
d: Distance between V1 and V2 (m)

Coast down test: WLTP* supported (LC-0831 required)

To calculate the driving resistance, let the vehicle coast and measure the time in each speed range. LC-0831 can output time and distance data for each specified velocity, the elapsed time every 10 km/h can also output.

*WLTP: Worldwide harmonized Light-duty Test Procedure
GPS Speedometer LC-8310

High-Sensitive GPS Speedometer, PC-less measurement type

Features
- Using GPS enables stable measurement which is not affected by weather or road surface conditions.
- Highly accurate and fast response measurement by original algorithm using GPS, GLONASS and IMU.
- Various vehicle measurements can be conducted by adding optional software.
- Easily installed even in a limited space such as two-wheel vehicles.
- Data logging without a PC: Data can be stored in an attached USB memory or internal storage memory.
- Easy to operate with a touch panel.
- Analog 4ch, pulse 1ch, CAN 64ch input as standard.

Product configuration

Standard system configuration

- LC-0088 GPS/GLONASS antenna
  Compact, easy installation on a dashboard.
- LC-0833 USB memory
  USB memory for measurement data logging.
- LC-0083 Remote box
  Remote control of start/stop command, selecting measurement mode.
- LC-0089 Touch panel type display unit
  As well as test start/stop, test mode selection or test condition setup can easily be operated on a touch panel display.

CAN input function

Right side of the LC-8310 main unit (conforms to CAN Ver2.0 B)

Analog · pulse input function

Analogue: 4 channels
Pulse: 1 channel
Voltage range: 0 to ±20 V

Front

Rear

Right side

Standard software
(CD is attached to the main unit.)

Software option (sold separately)
- LC-0831: Acceleration/deceleration Test
- LC-0832: Fuel Consumption Test
- LC-0833: Track Display

PC (sold separately)
Setting of measurement condition, logging for measurement data of speed/distance etc.

Compact IMU (option, provided as standard with LC-0825)
External compact IMU is a standard accessory of LC-0825 IMU data output function. Speed, acceleration, and angle speed are measured based on the external compact IMU as a measurement origin. Internal IMU of LC-8310 is not activated when an external compact IMU is used. (The data output from the internal IMU is not available.)

DPU-414 Printer (option)
Direct printing of measurement data.

LC-8310 High-sensitive GPS Speedometer

Features
- Using GPS enables stable measurement which is not affected by weather or road surface conditions.
- Highly accurate and fast response measurement by original algorithm using GPS, GLONASS and IMU.
- Various vehicle measurements can be conducted by adding optional software.
- Easily installed even in a limited space such as two-wheel vehicles.
- Data logging without a PC: Data can be stored in an attached USB memory or internal storage memory.
- Easy to operate with a touch panel.
- Analog 4ch, pulse 1ch, CAN 64ch input as standard.
Feature

- Displays of measurement data and CAN/OBD II data, and settings of measurement items.
- Screen display with good visibility such as a floating meter function.
- Data transfer to the OS-2000 series (Time series data analysis software) by [OS-2000] button.
- Docking Window enables various layout building.
- Language selection of Japanese or English is available.

"Meter" display as a window

Meter display can be set as a separate-frame window. Displaying meter items are selectable to make various layout.

"Docking Window" enables various layout building

The dockable locations are displayed by dragging the central window. Screen layout can be changed according to the measurement scene.

Easy data transfer to OS-2000 series by just one click operation

One click operation of data transfer to OS-2000 (time-series data analysis software).

OS-2000 series

Time-series data analysis software OS-2000 series can perform flexible data-edit from huge amount of data which Microsoft® Excel® cannot handle. OS-2000 can handle various data format including CSV or WAV files, as well as the recorded data of LC-8000 series. It can freely perform overwriting of different waveforms, waveform division, movement, enlargement, and the reduction. Various filters, video replay function, FFT Analysis function, and sound quality evaluation are also provided.

OS-2000 series is automatically activated for data transfer by clicking this button.
Optional Software

**LC-0831: Acceleration/deceleration Test**
- Display of elapsed time in acceleration test. (0 to 400 m / 0 to 1000 m)
- AD (average deceleration) calculation in braking test.
- MFDD (Mean Fully Developed Deceleration) calculation in braking test.
- Display of deceleration speed and elapsed time in ABS test.
- Data display in V-STEP/ D-STEP/ T-STEP modes.

**LC-0832: Fuel Consumption Test**
- Input of the pulse signal from the DF-2200 Flow Meter.
- Calculation and display of fuel consumption, fuel consumption rate, and accumulated fuel consumption, etc.
- Data output in D-STEP/ T-STEP modes.

**LC-0833: Track Display**
- Display of vehicle path.
- Measurement of drift amount.
- Measurement of minimum turning radius.

**LC-0834: CAN output function**
- Output of CAN data measuring in the main unit.
- Up to 100 Hz of output sampling.
- CANdb format file generation function makes it easy to use with CAN recording device.

**LC-0824: Unit selection function**
- Measurement unit can be selected from km or mile.

**LC-0825: IMU data output**
- XYZ directions of acceleration, angular speed, and angle information can be measured.

**LC-0826: Vertical direction measurement function**
- Vertical measurement can be performed with GPS height data and IMU Z-axis data. Slope can also be calculated from vertical data.

**LC-0854: CAN output function**
- Output of CAN data measuring in the main unit.
- Up to 100 Hz of output sampling.
- CANdb format file generation function makes it easy to use with CAN recording device.

**Track display function**
- LC-0831, LC-0833 options are installed
- Vehicle path of the test is also measured and displayed
- Track display software is able to be used with the other test function (optional software) at the same time. For example, drift amount can be measured at the same time when MFDD at the brake test is measured.

**Hardware test function**

**LC-0827: Hardware acceleration test function**
**LC-0828: Hardware brake test function**
**LC-0829: Hardware coasting test function**
- The following tests can be performed without using a PC. Results can be viewed on the form display.
  - Startup acceleration test
  - ABS brake test
  - Passing acceleration test
  - Fade recovery test
  - MFDD brake test
  - Coast test
- You can also check the deceleration in braking tests etc.

**LC-0827: Display example of distance-based report**

**LC-0828: Display example of result display**

**LC-0829: Display example of speed-based report**
Major Functions

// Multiple test function

• The multiple test results are collectively managed in data manager.
• This function allows easily to verify the difference of each test result.
  *One item of data is created with the Ready → Start → Stop measurement sequence.

// Orientation detection function

• Function available for multiple test.
• Used when reciprocal running tests are required.
• By setting the driving direction of the vehicle, measurement data is respectively recorded to course A and course B.
• Useful for rearranging result, and displaying average value for each course.

// Divided coasting test function

• A function available when the orientation detection function is set in coasting test and multiple test.
• Test is started and finished automatically by setting the number of divisions and the test start speed.
• Multiple recorded data are merged to see in one table.
## Measurement Items

### Accuracy

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Guaranteed Traceability Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal speed</td>
<td>±0.2 km/h at 30 km/h or more and 7 or more acquired satellites.</td>
</tr>
<tr>
<td>XYZ acceleration</td>
<td>±0.6 km/h at less than 30 km/h horizontal speed and less than 7 acquired satellites.</td>
</tr>
<tr>
<td>XYZ angular speed</td>
<td>±0.3 km/h at less than 30 km/h horizontal speed and with 7 or more acquired satellites.</td>
</tr>
</tbody>
</table>

### List of optional functions

<table>
<thead>
<tr>
<th>Model number</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC-0831</td>
<td>Acceleration / deceleration test</td>
</tr>
<tr>
<td>LC-0832</td>
<td>Fuel consumption test</td>
</tr>
<tr>
<td>LC-0833</td>
<td>Track display</td>
</tr>
<tr>
<td>LC-0834</td>
<td>GPS/GLONASS antenna</td>
</tr>
<tr>
<td>LC-0835</td>
<td>Touch panel display unit</td>
</tr>
<tr>
<td>LC-0836</td>
<td>Unit selection function</td>
</tr>
<tr>
<td>LC-0837</td>
<td>IMU data output</td>
</tr>
<tr>
<td>LC-0838</td>
<td>Vertical direction measurement function</td>
</tr>
<tr>
<td>LC-0839</td>
<td>Hardware acceleration test function</td>
</tr>
<tr>
<td>LC-0840</td>
<td>Hardware brake test function</td>
</tr>
<tr>
<td>LC-0841</td>
<td>Hardware coasting test function</td>
</tr>
<tr>
<td>LC-0842</td>
<td>USB memory</td>
</tr>
<tr>
<td>LC-0843</td>
<td>CAN output</td>
</tr>
<tr>
<td>LC-0844</td>
<td>CAN cable (2m)</td>
</tr>
<tr>
<td>LC-0845</td>
<td>CAN terminal register adapter</td>
</tr>
<tr>
<td>LC-0846</td>
<td>CAN branch cable (2m)</td>
</tr>
<tr>
<td>LC-0847</td>
<td>CAN cable (2m)</td>
</tr>
<tr>
<td>LC-0848</td>
<td>Tape switch</td>
</tr>
<tr>
<td>LC-0849</td>
<td>CAN cable for cigarette lighter socket</td>
</tr>
<tr>
<td>LC-0850</td>
<td>General-purpose input output cable</td>
</tr>
<tr>
<td>LC-0851</td>
<td>Carrying case</td>
</tr>
<tr>
<td>LC-0852</td>
<td>DPU-414 Compact thermal printer</td>
</tr>
<tr>
<td>LC-0853</td>
<td>PW-C0252-W2-U AC adapter for printer for Japan use</td>
</tr>
<tr>
<td>LC-0854</td>
<td>TP-0411 Thermal paper for printer for Japan use</td>
</tr>
<tr>
<td>LC-0855</td>
<td>PS-P20023B AC adapter for main unit</td>
</tr>
</tbody>
</table>

*1: Comes as standard accessory with LC-8310. Also order available separately as an option.

## Specification

### Analog input

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels</td>
<td>4</td>
</tr>
<tr>
<td>Voltage range</td>
<td>±20 V</td>
</tr>
<tr>
<td>Sampling frequency</td>
<td>100 Hz</td>
</tr>
<tr>
<td>Offset error</td>
<td>±20 mV or less</td>
</tr>
<tr>
<td>Linearity</td>
<td>±0.5%/fS</td>
</tr>
</tbody>
</table>

### Pulse output

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of channels</td>
<td>1ch</td>
</tr>
<tr>
<td>Input voltage range (AC)</td>
<td>0.2 to 24 Vrms</td>
</tr>
<tr>
<td>Input voltage range (DC)</td>
<td>Hc: +3.0 to 28.0 V, Lo: -1.0 to 1.0 V</td>
</tr>
<tr>
<td>Input waveform</td>
<td>AC selected: Sine wave, DC selected: Square wave</td>
</tr>
<tr>
<td>Frequency range (DC selected)</td>
<td>DC to 50 kHz (Pulse count)</td>
</tr>
<tr>
<td>Frequency range (AC selected)</td>
<td>1 Hz to 50 kHz</td>
</tr>
<tr>
<td>Accuracy (DC selected)</td>
<td>Pulse count: ±1 count, Frequency: ±0.02 % ±1 Hz</td>
</tr>
<tr>
<td>Accuracy (AC selected)</td>
<td>±0.6 % (less than 1 kHz)</td>
</tr>
<tr>
<td>Measurement range (DUTY)</td>
<td>10 to 90 %</td>
</tr>
<tr>
<td>Min. pulse width</td>
<td>±10 µs or more</td>
</tr>
<tr>
<td>Accuracy (AC selected)</td>
<td>Frequency: ±0.02 % ±1 Hz</td>
</tr>
</tbody>
</table>

### Power supply output

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>12 ± 2 VDC (approx. 200 mA or less)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>up to 12 VA</td>
</tr>
</tbody>
</table>

### General specification

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>9 to 28 VDC/100 to 240 VAC (AC adapter use: option)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>up to 12 VA</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to 50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-10 to 60 °C</td>
</tr>
</tbody>
</table>

### Accessory

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna (LC-0088), Remote box (LC-0083), Touch panel display unit (LC-0831), Cable for cigarette lighter socket (LC-0865), USB memory (LC-0863), PC software, Mount adapter for display unit (LC-0832).</td>
<td></td>
</tr>
</tbody>
</table>

### Operating environment for GPS Speedometer PC software (ver.3.0)

<table>
<thead>
<tr>
<th>Measurement Items</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Intel® Core™ 2 Duo / 2 GHz or more</td>
</tr>
<tr>
<td>OS</td>
<td>Windows® 7 / 32 bit / 64 bit / 10 / 32 bit / 64 bit</td>
</tr>
<tr>
<td>Memory</td>
<td>512 MB or more</td>
</tr>
<tr>
<td>HDD</td>
<td>80 GB or more</td>
</tr>
<tr>
<td>Display</td>
<td>XGA (1024 x 768) or more</td>
</tr>
<tr>
<td>USB</td>
<td>USB 2.0 (High Speed) 1 port or more</td>
</tr>
</tbody>
</table>

*1: Accuracy at 30 km/h or horizontal speed with 7 or more acquired satellites and no multipath effect. ±0.3 km/h at less than 30 km/h horizontal speed and with 7 or more acquired satellites. ±0.6 km/h with less than 7 acquired satellites.

*2: Accuracy at 300 m measurement distance with 30 km/h or higher horizontal speed with 7 or more acquired satellites and no multipath effect. ±0.5 % at less than 30 km/h horizontal speed and with less than 7 acquired satellites.
### Specification of options

<table>
<thead>
<tr>
<th>Item</th>
<th>Compact IMU unit (LC-0087)</th>
<th>CAN output function (LC-0854)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X,Y,Z acceleration</td>
<td>Measurement range: -98.0 to 98.0 m/s²</td>
<td>Standard</td>
</tr>
<tr>
<td>Linearity</td>
<td>±0.2 % of F.S. (reference)</td>
<td>Conforms to ver. 2.0B</td>
</tr>
<tr>
<td>X,Y,Z angular speed</td>
<td>Measurement range: -150.0 to 150.0 °/s</td>
<td>Update frequency</td>
</tr>
<tr>
<td>Linearity</td>
<td>±0.1 % of F.S. (reference)</td>
<td>OFF, 1 Hz, 5 Hz, 10 Hz, 20 Hz, or 100 Hz selectable</td>
</tr>
<tr>
<td>Cable</td>
<td>approx. 5 m</td>
<td>Baud rate</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP43</td>
<td>125, 250, 500, or 1000 kbps selectable</td>
</tr>
</tbody>
</table>

#### Remote box (LC-0083)
- Function: Command of measurement start/stop, clear of display
- SW: START, STOP, RESET, SELECT, READY

### Outer Dimensions

**LC-8310 High-sensitive GPS Speedometer**

**LC-0087 Compact IMU**

**LC-0089 Touch panel type display unit**

**LC-0083 Remote box**

**LC-0088 GPS/GLONASS antenna**

### Reliable and high level calibration JCSS*1 Accredited Calibration Laboratory

Ono Sokki provides reliable and high level calibration as "Accredited Calibration Laboratory", which is certified by JCSS calibration laboratory accreditation system, based on the skills and know-how of quality assurance system which has been acquired through many years of practice.

Under the JCSS of calibration laboratory accreditation system, Ono Sokki is assessed and accredited as Accredited Calibration Laboratories to meet the requirements of Measurement law, relevant regulations and ISO/IEC.

**Accreditation Scope**
- Acoustics & Ultrasound
- Acceleration
- Torque
- Fluid flow
- Electricity (Direct Current & Low Frequency)
- Speed

Ono Sokki can issue the calibration certificates with the JCSS*1 accreditation symbol, which assures the traceability to National Measurement Standards as well as a laboratory’s technical and operational competence, and is acceptable in the world through the ilac*2/MRA*3.

*1: JCSS: Japan Calibration Service System
*2: ilac: International Laboratory Accreditation Conference
*3: MRA: Mutual Recognition Arrangements

---

* Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and other countries.
* Other product names and model names are trademarks or registered trademarks of each individual company.
* The copyrights are reserved by each individual company.