

# GPS Speedometer LC-8100

Highly precise measurement  
by GPS and IMU



**ONOSOKKI**

# The IMU unit enables highly precise and stable measurement even under bad GPS signal reception

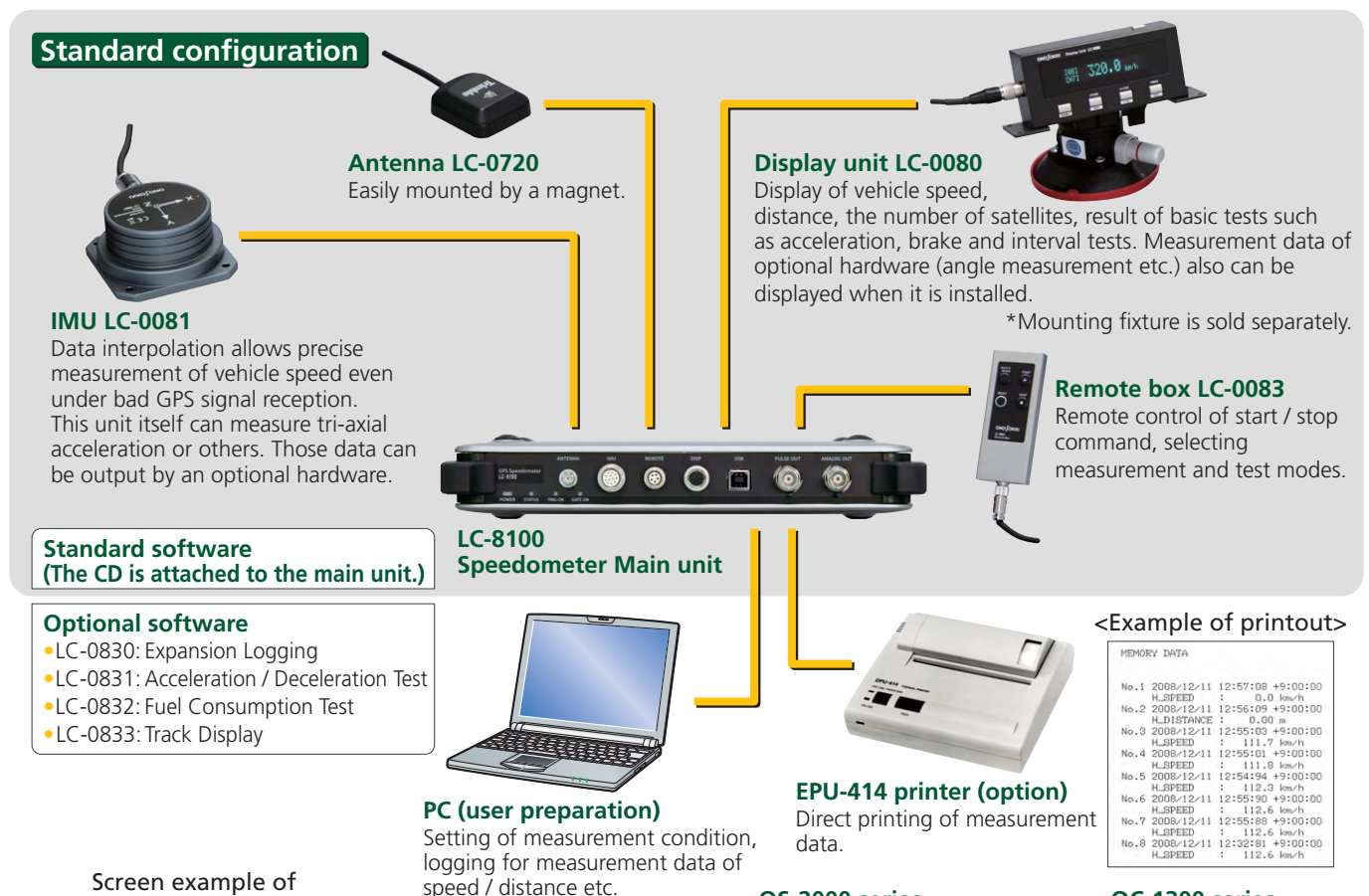
This GPS-based speedometer precisely measures horizontal speed and distance, is also useful for running tests of acceleration and braking etc.

Even under bad GPS signal reception, standard IMU unit can make precise and stable measurement at update cycle of 100 Hz. Connecting the LC-8100 to a PC enables GPS setting, measurement condition setting and logging of measurement data such as speed and distance. Various options will support your measurement and testing applications.

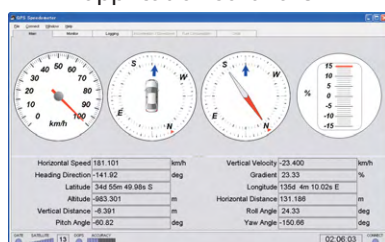
## Features

- The measurement is not affected by weather or road surface conditions.
- Standard GPS and IMU make stable measurement.
- Can be used for acceleration / brake test with a delay time of 5 ms or less.
- Various optional measurements by hardware; vertical direction measurement, tri-axial acceleration, tri-axial angle etc.
- Various optional vehicle tests by software; expansion logging, acceleration / deceleration test etc.

## LC-8100 series system

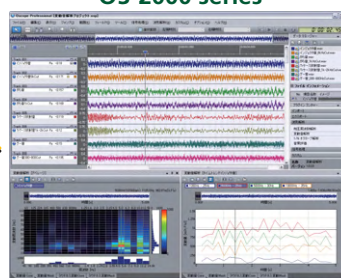


Screen example of application software

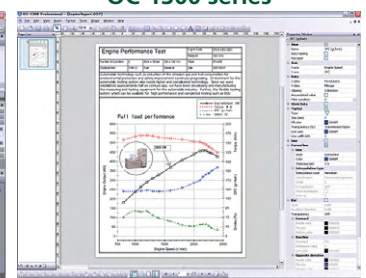


Output as CSV format

OS-2000 series

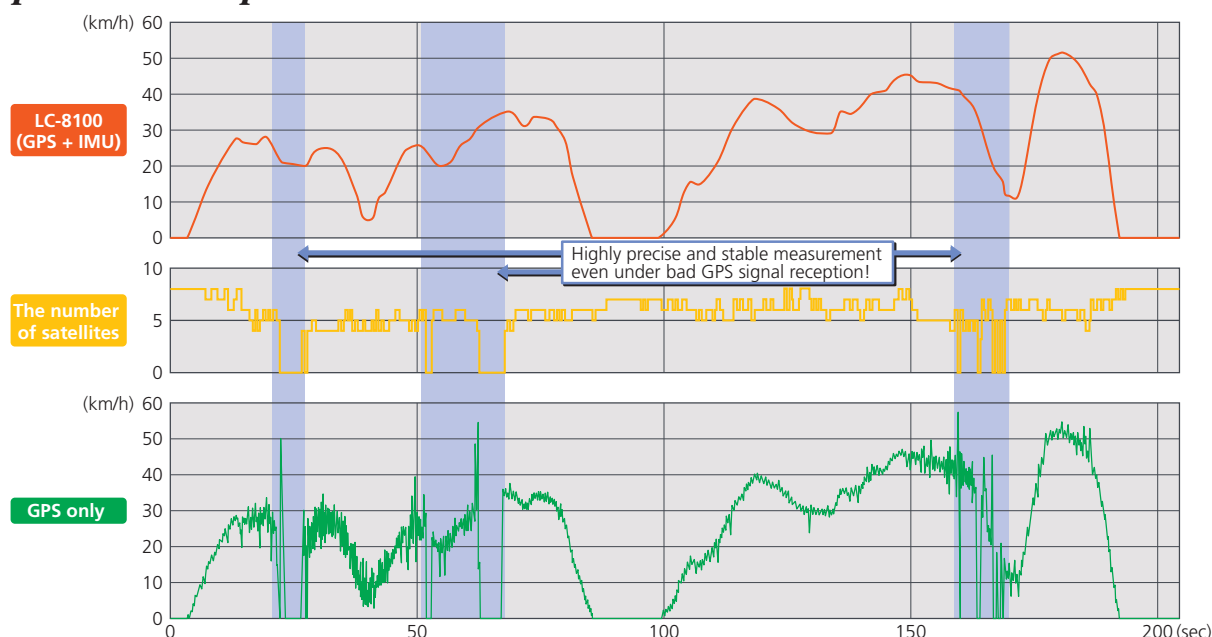


OC-1300 series



Secondary processing / analysis of logging data

## Output data examples



## Measurement & function

### LC-8100 GPS Speedometer (hardware in the main unit)

- Horizontal speed / distance measurement
- Interval horizontal direction measurement test (time duration, moving distance, speed data from start to stop)
- Basic starting acceleration test (arrival time to the specified distance)
- Basic brake test (MFDD<sup>\*1</sup>, initial speed, stop time, stop distance)

### LC-8100 GPS Speedometer (main unit + standard application software)

- Settings of output, GPS, IMU and measurement conditions etc.
- Display of horizontal speed / distance, heading direction, latitude and longitude, satellite situation
- Logging of the above data (data storage, numeric display, sampling at 100Hz)

### LC-0811 CAN<sup>\*2</sup> Output Function (hardware option)

- Using CAN communication enables output of horizontal speed / distance, the number of satellites, or DOP (Dilution of Precision)
- Output of angle, angular speed, acceleration data in combination with the LC-0821 optional IMU data output function (option)
- Output of height, vertical speed data in combination with the LC-0822 vertical direction measurement function (option)

### LC-0821 IMU Data Output Function (hardware option)

- Tri-axial acceleration / angle / angular speed measurement

### LC-0822 Vertical Direction Measurement Function (hardware option)

- Vertical gradient / distance / speed measurement
- Relative height measurement from start

\*1: MFDD: Mean Fully Developed Deceleration.

\*2: CAN: Controller Area Network

\*3: V-STEP mode displays, records and prints of D (distance) and T (time) series data on the bases of V (velocity).

D-STEP mode displays, records and prints of V (velocity) and T (time) series data on the bases of D (distance).

T-STEP mode displays, records and prints of V (velocity) and D (distance) series data on the bases of T (time).

\*4: F-CONST shows the other data series based on fuel flow. F-PATTERN is multi-measurement running mode which measures running data from START trigger to the next trigger.

### LC-0830 Expansion Logging Software (software option)

- Logging of speed / distance / latitude / longitude data
- Logging of external input data in combination with the LC-0810 (option)
- Logging of IMU output data in combination with the LC-0821 (option)
- Logging of vertical direction measurement data in combination with the LC-0822 (option)
- Easy to read 8-ch graph display
- 100 Hz data sampling

### LC-0831 Acceleration / Deceleration Test Software (software option)

- Display of elapsed time in acceleration test (0 to 400 m or 0 to 1,000 m)
- MFDD calculation in brake test
- Display of deceleration speed / elapsed time in ABS test
- Display of acceleration / braking test data in V-STEP / D-STEP / T-STEP modes<sup>\*3</sup>

### LC-0832 Fuel Consumption Test Software (software option)

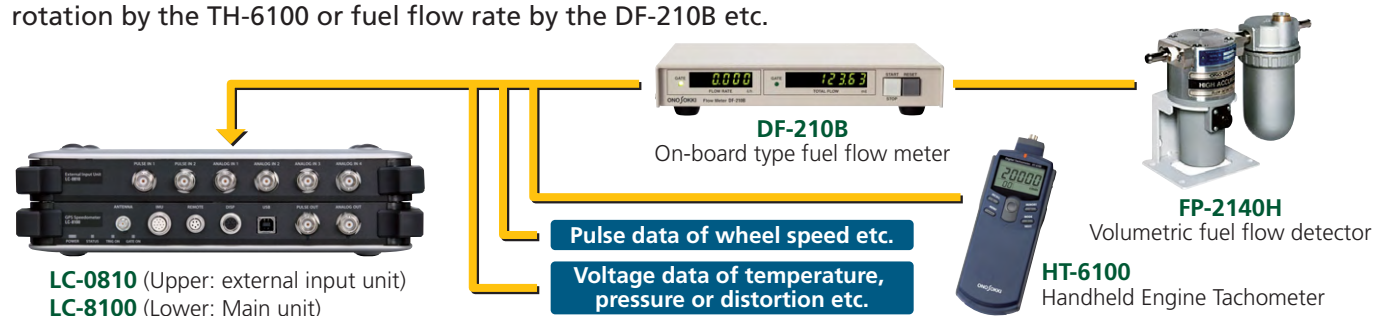
- Enables "F-CONST<sup>\*4</sup>" test and "F-PATTERN<sup>\*4</sup>" test by input of the pulse signal from the DF-210B to the LC-0810. (The same tests as the previous model LC-5200 can be performed.)
- Calculation and display of fuel consumption / fuel consumption rate / cumulated fuel consumption
- Data output in V-STEP / D-STEP / T-STEP modes<sup>\*3</sup>

### LC-0833 Track Display Software (software option)

- Display of vehicle running trace
- Can be used for measurement of vehicle track in braking test
- Can be used for the minimum turning radius measurement

## LC-0810 External Input Unit (option)

The LC-0810 allows the LC-8100 to accept analog signal (up to 8-ch) and pulse signal (up to 2-ch) of engine rotation by the TH-6100 or fuel flow rate by the DF-210B etc.



| LC-8100 GPS Speedometer           |  |
|-----------------------------------|--|
| Measurement range                 | Speed 0.1 to 500.0 km/h  |
| Accuracy                          | Horizontal speed $\pm 0.1$ km/h (speed: 30 km/h or more)*1   |
|                                   | Horizontal distance $\pm 0.05$ % (measurement distance: 300 m or more, speed: 30 km/h or more)*2   |
| Update cycle                      | 100 Hz   |
| Analog output (speed)             | Voltage range 0 to 10 V, 0 to 500 km/h   |
|                                   | Linearity $\pm 0.2$ % or less  |
|                                   | Output delay 5 ms or less  |
| Pulse output (distance)           | Resolution 1, 5, 10 mm / P selectable  |
|                                   | Level TTL  |
| External trigger input / output   | Input: Start / stop signal (non-voltage contact / voltage contact), Output: Gate signal  |
| PC interface                      | USB 2.0  |
| Measurement function of main unit | Standard <ul style="list-style-type: none"> <li>• Horizontal speed / distance measurement</li> <li>• Interval horizontal direction measurement (time duration, moving distance or speed data from start to stop)</li> <li>• Basic starting acceleration test (arrival time to the specified distance)</li> <li>• Basic brake test (MFDD*3, initial speed, stop time, stop distance)</li> <li>• Memory function of displayed value</li> </ul>   |
|                                   | Option <ul style="list-style-type: none"> <li>• Vertical direction measurement function (gradient, distance, speed)</li> <li>• Tri-axial acceleration / angle / angular speed measurement function</li> <li>• Interval vertical direction measurement function (available when mounted the vertical direction measurement function)</li> <li>• CAN output function (speed, distance, orientation, number of satellites, DOP*, latitude, longitude, gradient, trigger information, tri-axial acceleration / angle / angular speed) * Dilution of Precision</li> </ul>   |
| PC software function              | Standard <ul style="list-style-type: none"> <li>• Settings of output, GPS, IMU and measurement conditions etc.</li> <li>• Display of horizontal speed / distance, heading direction, latitude and longitude, satellite information</li> <li>• Logging of the above data (data storage, numeric display, sampling at 100Hz or less)</li> </ul>  |
|                                   | Option <ul style="list-style-type: none"> <li>• Expansion logging function (logging of vertical speed / distance / gradient and tri-axial acceleration / angle / angular speed, interval vertical direction measurement, external input signal data, values and graph display, sampling within 100 Hz)</li> <li>• Acceleration / deceleration (acceleration, brake, coasting) test function (display of time / speed / distance data, calculated result such as MFDD)</li> <li>• Fuel consumption test function (test using the flow meter)</li> <li>• Track display function (display the relative position at the time of running on a graph)</li> </ul> |
| General specification             | Power requirement 9 to 32 VDC, 100 to 240 V AC (when AC adapter in use: option)  |
|                                   | Power consumption 30 VA max.<br>Operating temperature range 0 to 50°C  |
| Accessories                       | Antenna (LC-0720), display unit (LC-0080), IMU (LC-0081), remote box (LC-0083), cables for each connection, DC power cable, USB cable, standard PC software, IMU bracket (LC-0816), instruction manual   |
| Weight                            | Approx. 1.4 kg   |
| Outer dimensions                  | 271(W) x 217(D) x 48(H) mm   |

| LC-0080 Display Unit |   |
|----------------------|---|
| Display method       | Fluorescent display tube (green)  |
| Function             | • Display of setup conditions, test start / stop command, memory command  |
|                      | • Display of speed, distance, number of capturing satellites, result of basic acceleration test, brake test or interval test etc. |
|                      | • Selectable display mode: one row or two rows  |
|                      | • Brightness setting in five levels   |
|                      | • Enables on-board measurement by an optional windshield attachment (LC-0740)   |
|                      | • Output command to the DPU-414 digital printer (sold separately)   |
| Weight               | Approx. 300 g   |
| Outer dimensions     | Approx. 179 (W) x 50 (D) x 71 (H) mm  |

| LC-0081 IMU (Output of the measurement value is available in combination with the LC-821 / LC-0822) |   |
|---|---|
| Acceleration  | Linearity 0.2% / F.S.                       |
|   | Measurement range $\pm 98$ m/s <sup>2</sup> |
| Angular speed   | Linearity 0.1% / F.S.                       |
|   | Measurement range $\pm 150^\circ$ / sec     |
| Weight  | Approx. 250 g                               |
| Outer dimensions  | 79 (W) x 79 (D) x 40 (H) mm                 |

| LC-0083 Remote Box |  |
|--------------------|--|
| Function           | Test start / stop command, clearing display area |
| Switch             | START, STOP, RESET, SELECT                       |
| Weight             | Approx. 80 g                                     |
| Outer dimensions   | 45 (W) x 20 (D) x 115 (H) mm                     |

| LC-0810 External Input Unit (Hardware option) |  |
|---|--|
| Analog input                                  | 8-ch (BNC x 4, D-Sub 15-pin x 1), input voltage: $\pm 10$ V / $\pm 20$ V         |
| Pulse input                                   | 2-ch (BNC x 2), input: TTL   |
| Measurement function                          | Selectable from pulse count / frequency / duty                                   |
| Power requirement                             | $12 \pm 2$ VDC (approx. 4 VA or less) x 1-ch                                     |
| Weight  | Approx. 700 g  |
| Outer dimensions                              | 271 (W) x 217 (D) x 48 (H) mm / 76 (H) mm (when in combination with the LC-8100) |

| LC-0811 CAN output function (Option of the main unit) |  |
|---|--|
| Applicable standard                                   | Based on Ver. 2.0 B  |
| Data  | The information on speed, distance, number of satellites, etc. are collected to an ID which can be freely setup. |
| Accessory   | D-Sub 9-pin connector  |

| Others         |   |
|----------------|---|
| Options        | Power cable for cigarette lighter socket (LC-0730) windshield attachment (LC-0740), carrying case (LC-0813), digital printer (DPU-414), tape switch |
| PC environment | OS: Windows XP (SP3) / 7[32-bit], Memory: 512 MB or more, HDD: 80 GB or more, CPU: Intel Core 2 Duo / 2 GHz or later, USB: 1 port or more           |

\*1: The described value is the accuracy when it is measured at horizontal speed of 30 km/h or more, and eight or more of satellite capture. When four or more satellite captures without multipath transmission,  $\pm 0.6$  km/h or less.

\*2: The described value is the accuracy when it is measured at horizontal distance of 300 m, horizontal speed of 30 km/h or more, and eight or more of satellite capture. When four or more of satellite capture without multipath transmission,  $\pm 0.5$  % or less.

\*3: MFDD is an abbreviation for Mean Fully Developed Deceleration.

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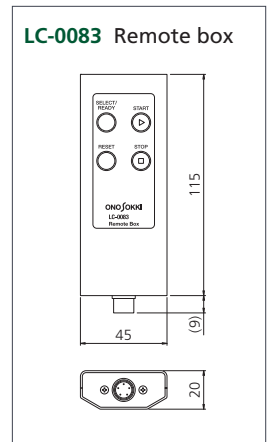
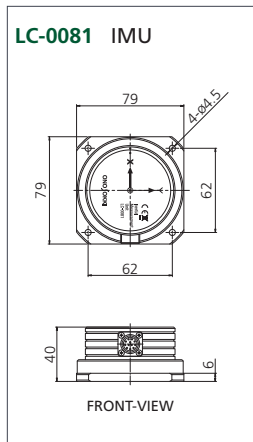
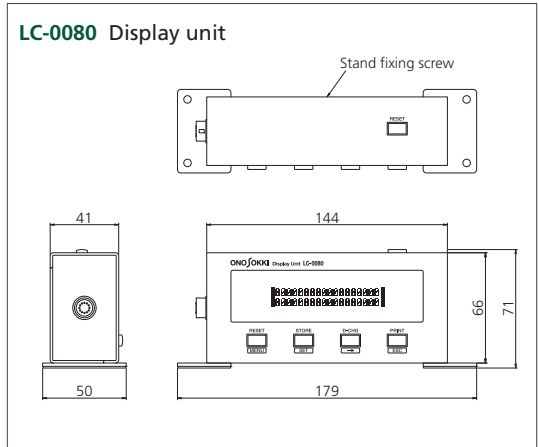
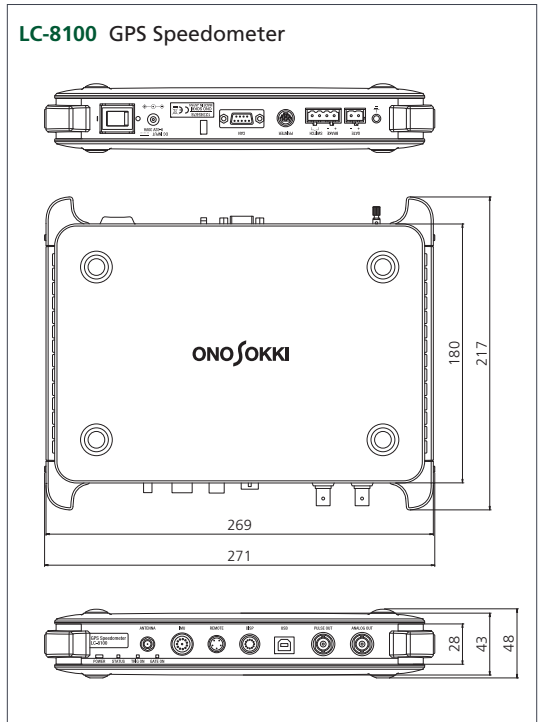
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\* Outer appearance and specifications are subject to change without prior notice.

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