GPS Speedometers

LC-8000A Series

Highly precise measurement by GPS and IMU

CAN data input is available

Old Model
(Reference only)

ONO SOKKI

Ono Sokki has the best track record for car measurement devices.

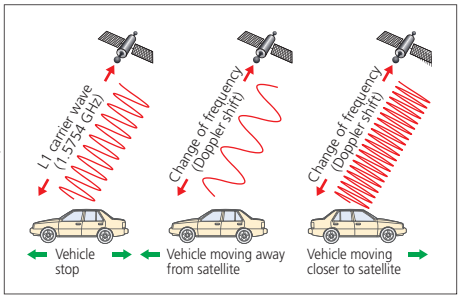
Since the 1980s Ono Sokki's speedometers have been widely praised by our clients. They have been used in a variety of vehicle development tests, such as accurate speed and distance measurement of moving objects, and data recording at vehicle testing fields.

The LC-8000A series are measuring instruments that can be used for a variety of tests. They have evolved further through numerous field tests and fulfilling needs of our customers. This renewal made it possible to record CAN transmission data and measure more items than previous models. Also measurement and list display of the data from round trip tracks (multiple testing) can be performed, and this has made the devices more useful.

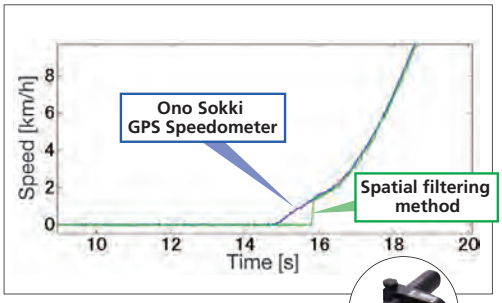
High accuracy

By the use of the Doppler effect of mobile object and carrier wave transmitted from the satellites, the LC-8000A series enable highly accurate calculation of the mobile object speed as well as longitude and latitude measurement.

In the latitude / longitude information of the GPS, the speed and the distance are represented by rough data.



Highly accurate measurement of speed and distance are enabled by Doppler effect of electric waves.

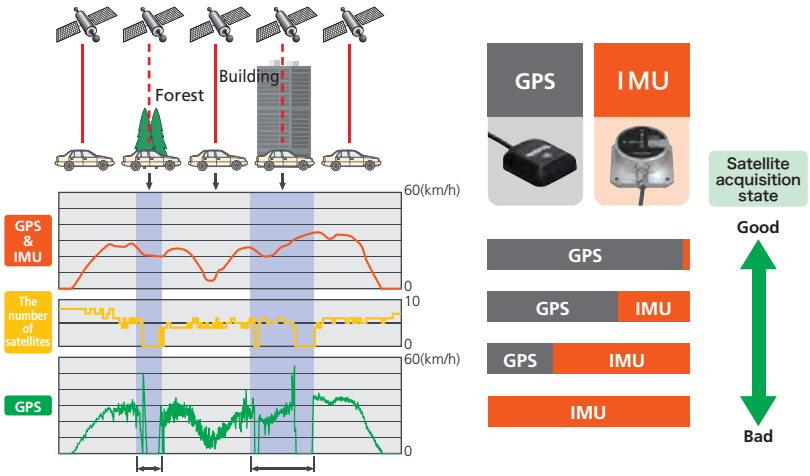


Comparison of rising time between spatial filtering method speedometer and GPS speedometer

Spatial filtering method

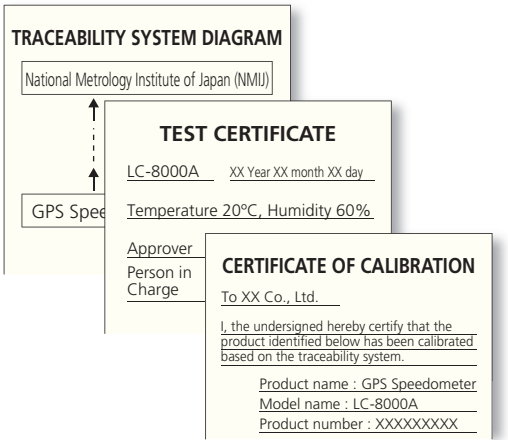
Stable measurement

Using IMU (Inertial Measurement Unit), the LC-8000A series enable stable measurement which is not affected by its satellite acquisition state.



Reliable calibration data

Generally, not many of GPS speedometers have accuracy assurance. However, as a manufacturer of measurement instruments, Ono Sokki can offer "Traceability system diagram", "Test certificate" and "Certificate of calibration" of the LC-8000A series.



➡ **Furthermore, CAN data recording is now possible! (option)**

Functions and measurement items (descriptions of icons)

Option for both LC-8100A and LC-8200A | Standard only for LC-8200A

Analog input, pulse input

LC-8100A: Option (required for LC-0850 or LC-0810A)
LC-8200A: Standard

R: BNC connector on a front panel of LC-0810A
L: D-Sub connector on a rear panel of LC-8200A

Provided with 8-ch of analog input and more than 2-ch of pulse signal input. Data logging is enabled by a PC. Input voltage range is 0 to ±10 V, 0 to ±20 V.

Analog output

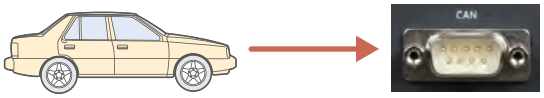
LC-8100A: Option (required for LC-0850)
LC-8200A: Standard

This function enables output of measuring data at the main unit as analog voltage. Output voltage is 10V max. Up to 16 channels can be selected for data output. Analog output function of speed is provided as standard.

Analog output setting is selectable.
Upper analog output: Item selectable
Lower analog output: Speed (standard)

CAN input

LC-8100A: Option (required for LC-0851)
LC-8200A: Option (required for LC-0851)



CAN connector (rear)

Acquisition of CAN data. Compliant with CAN ver. 2.0B, up to 32ch.

CAN output

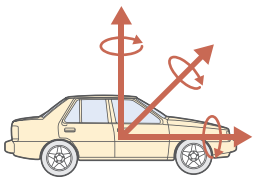
LC-8100A: Option (required for LC-0811A)
LC-8200A: Option (required for LC-0811A)

CAN connector (rear)

Output of measuring data via CAN communication. The output update rate is every 10 ms. Compliant with CAN ver.2.0B. Specified ID contents can be output as CANdb format.

Tri-axial acceleration, tri-axial angular speed

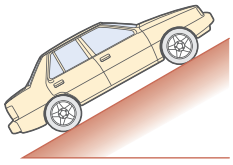
LC-8100A: Option (required for LC-0821)
LC-8200A: Standard



Measurement of acceleration, angular speed, and angle in XYZ axes of IMU (Inertial Measurement Unit).

Slope

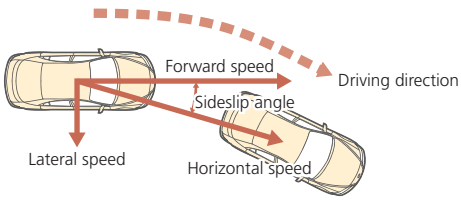
LC-8100A: Option (required for LC-0822)
LC-8200A: Standard



Vertical direction can be measured by height data acquired using GPS, Z-axis data acquired using IMU. Thereby, slope can also be measured.

Vehicle vector

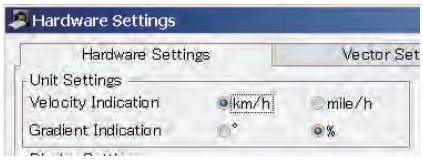
LC-8100A: Option (required for LC-0823)
LC-8200A: Standard



By measuring with two antennas, even though a vehicle is sideslipping, sideslip angle can be measured.

Measurement unit (km/mile) selection

LC-8100A: Option (required for LC-0820)
LC-8200A: Option (required for LC-0820)



The unit can be selectable, km or mile in the setting screen.

LC-8100A GPS Speedometer

Basic model for various driving tests

Options : DC OUT | DC IN | CAN IN | CAN OUT | XYZ Acc XYZ Deg | Z Dist Slope | Vector | UNIT m⇔mile

Features

- The measurement is not affected by weather or road surface conditions by using GPS.
- Performs speed measurement by using our original algorithm, with installed GPS and IMU.
- Can be used for acceleration / braking test with a delay time of 5 ms or less.
- Forward and backward acceleration, gradient are available as options.
- CAN data, OBD II data input is available. (option)
- With a variety of software options, various vehicle tests can be conducted.
- Can be upgraded to the LC-8200A by adding several options.

System configuration

Standard components

LC-0720A Patch Antenna for GPS Speedometer
Easy to mount by a magnet.

LC-0085 IMU (Inertial Measurement Unit)
This unit itself can measure tri-axial acceleration or others.
Data interpolation allows precise measurement of vehicle speed even under bad GPS signal reception.

LC-0083 Remote Box
Remote control of start / stop command, selecting measurement mode or test mode.

LC-8100A GPS Speedometer main unit

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

Optional software (sold separately)
- LC-0830: Expansion Logging
- LC-0831: Acceleration / Deceleration Test
- LC-0832: Fuel Consumption Test
- LC-0833: Track Display

CAN
- Communication data such as engine rotation, torque and air pressure
- Supports CANdb file format

LC-0084 Display Unit: large size (option)
Satellite acquisition state can be checked on the LED display screen. Easy visible with large display, has same functions as the LC-0080.

LC-0080 Display Unit: small size (option)
Display of vehicle speed, distance and the number of satellites. Enables to operate a part of the main unit when testing.

LC-0810A External Input Unit (option)
A single unit can be mounted on the main unit. It allows the LC-8100A to accept analog signal (up to 8ch) and pulse signal (up to 2ch) of engine rotation by the HT-6200 and fuel flow rate by the DF-210B etc.

LC-0850 External Input / Output Unit (option)
A single unit can be mounted on the main unit. It enables 16-ch analog output in addition to functions of the LC-0810A. Either one of the LC-0850 and LC-0810A can be installed.

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

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

LC-8200A GPS Vector Speedometer

High-end model featuring the measurement of the sideslip angle and 16-ch analog output

Provided as standard : Vector, Z Dist Slope, XYZ Acc XYZ Deg, DC OUT, DC IN

Options : UNIT m⇔mile, CAN IN, CAN OUT

Features

- High-end model of GPS speedometer from Ono Sokki.
- A single unit allows measurement of over 30 items such as forward speed, lateral speed and sideslip angle.
- By selecting from acquired data, 16-ch analog data including forward and backward acceleration and gradient angle can be output.
- If a satellite is lost, it can be recognized with LED and buzzer on the display unit.
- Input of 8-ch analog and 5-ch pulse are possible.
- CAN data, OBD II data input is available. (option)
- With a variety of software options, various vehicle tests can be conducted.

System configuration

Standard components

LC-0086 High Precision Antenna x 2
Vector can be measured with the two of the LC-0086's.

LC-0085 IMU (Inertial Measurement Unit)
This unit itself can measure tri-axial acceleration or others.
Data interpolation allows precise measurement of vehicle speed even under bad GPS signal reception.

LC-0084 Display Unit: large size
The features of the LC-0080 are inherited. The satellite acquisition state can be checked with LED.
The sideslip angle can be displayed.

LC-0083 Remote Box
Remote control of start / stop command, selecting measurement mode or test mode.

Front

Rear

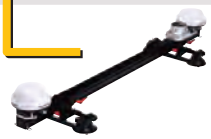
Standard software
(The CD is attached to the main unit.)
- LC-0830: Expansion Logging

Optional software (sold separately)
- LC-0831: Acceleration / Deceleration Test
- LC-0832: Fuel Consumption Test
- LC-0833: Track Display

CAN
- Communication data such as engine rotation, torque and air pressure
- Supports CANdb format

LC-8200A GPS Vector Speedometer main unit

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



LC-0818 Antenna for LC-8200A & IMU Fixing Jig (option)
Mount two LC-0086 (high precision antenna)'s and one LC-0085 (IMU) on the pedestal, and fix it to the vehicle with the four suction cups.
The position information of the sensors is the same as the initial value for the LC-8200A, much simplifying setup and installation.

LC-0720A Patch Antenna for GPS Speedometer (option)
Patch antenna included in the LC-8100A. When not using the LC-0086 High Precision Antenna, this enables the functions same as the LC-8100A.

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

LC-0815 Input Connector Box (option)
Conversion unit of the D-sub connector (of the LC-0850 or the LC-8200A) to BNC connectors.

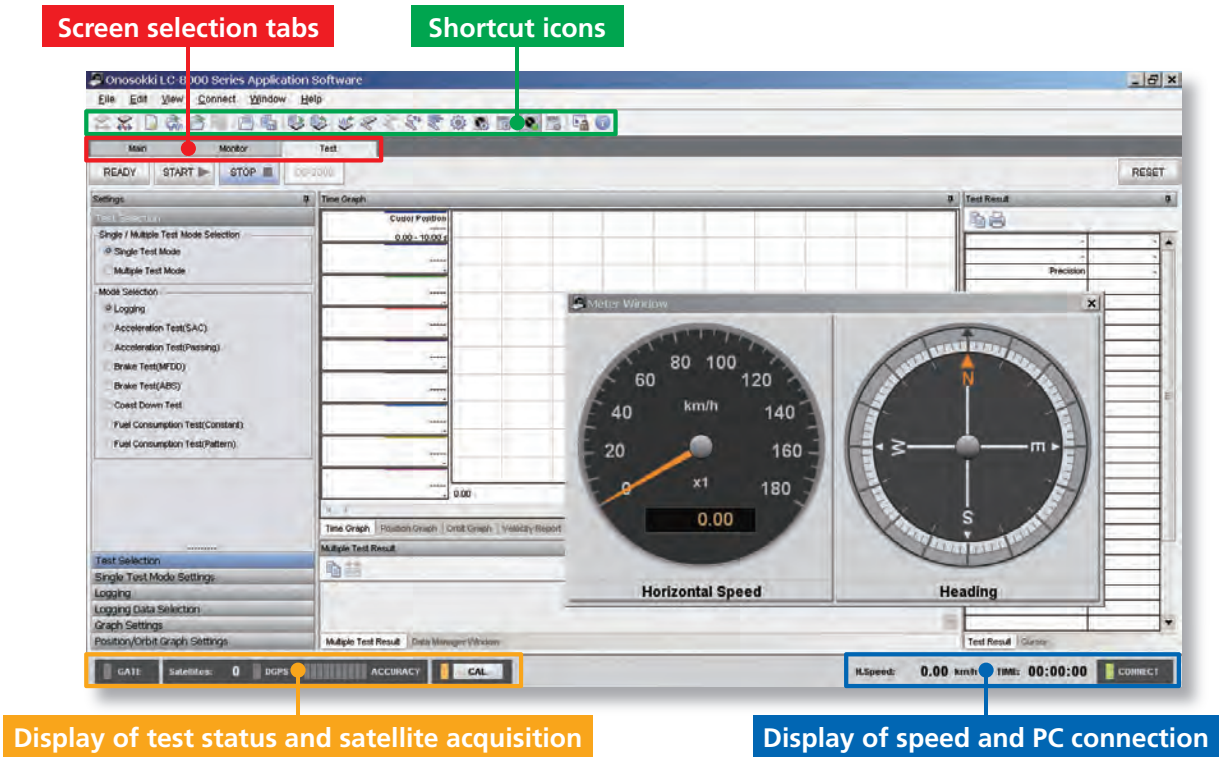
LC-0819 Output Connector Box (option)
Conversion unit of the D-sub connector (of the LC-0850 or the LC-8200A) to BNC connectors.

Application software ver.2

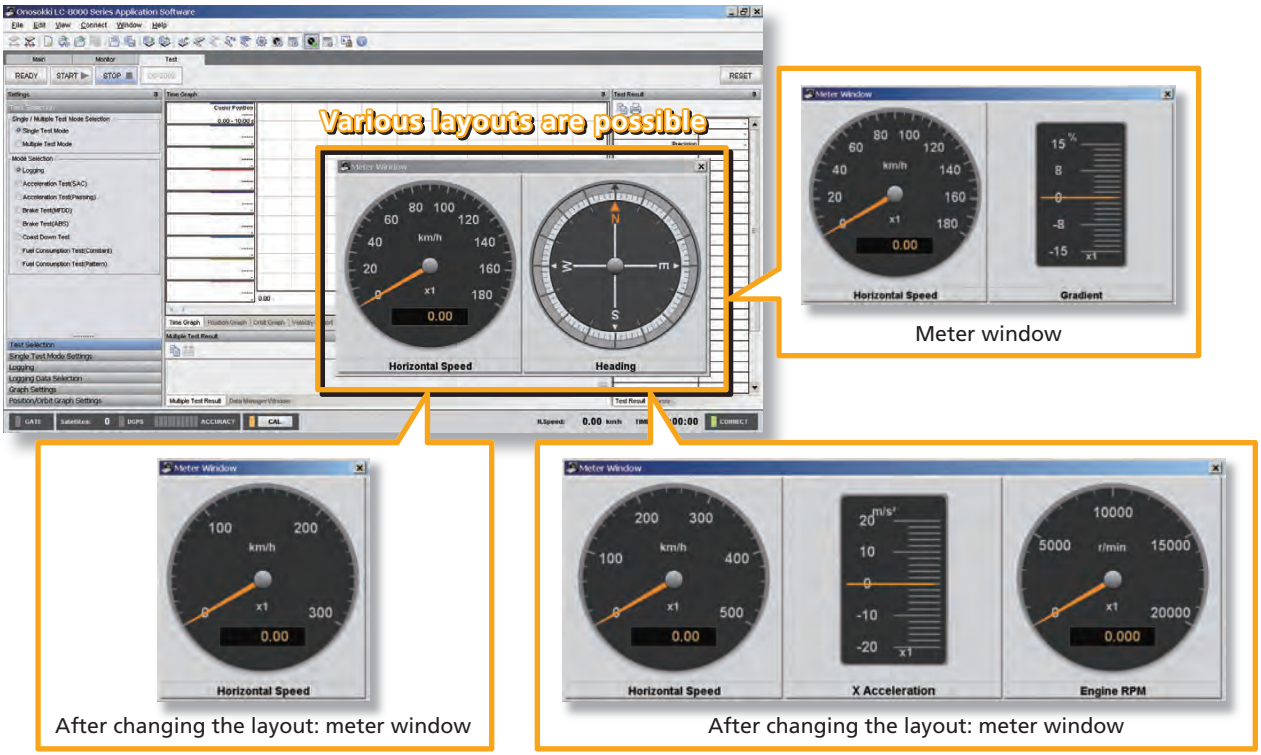
Upgraded speedometer software

Features

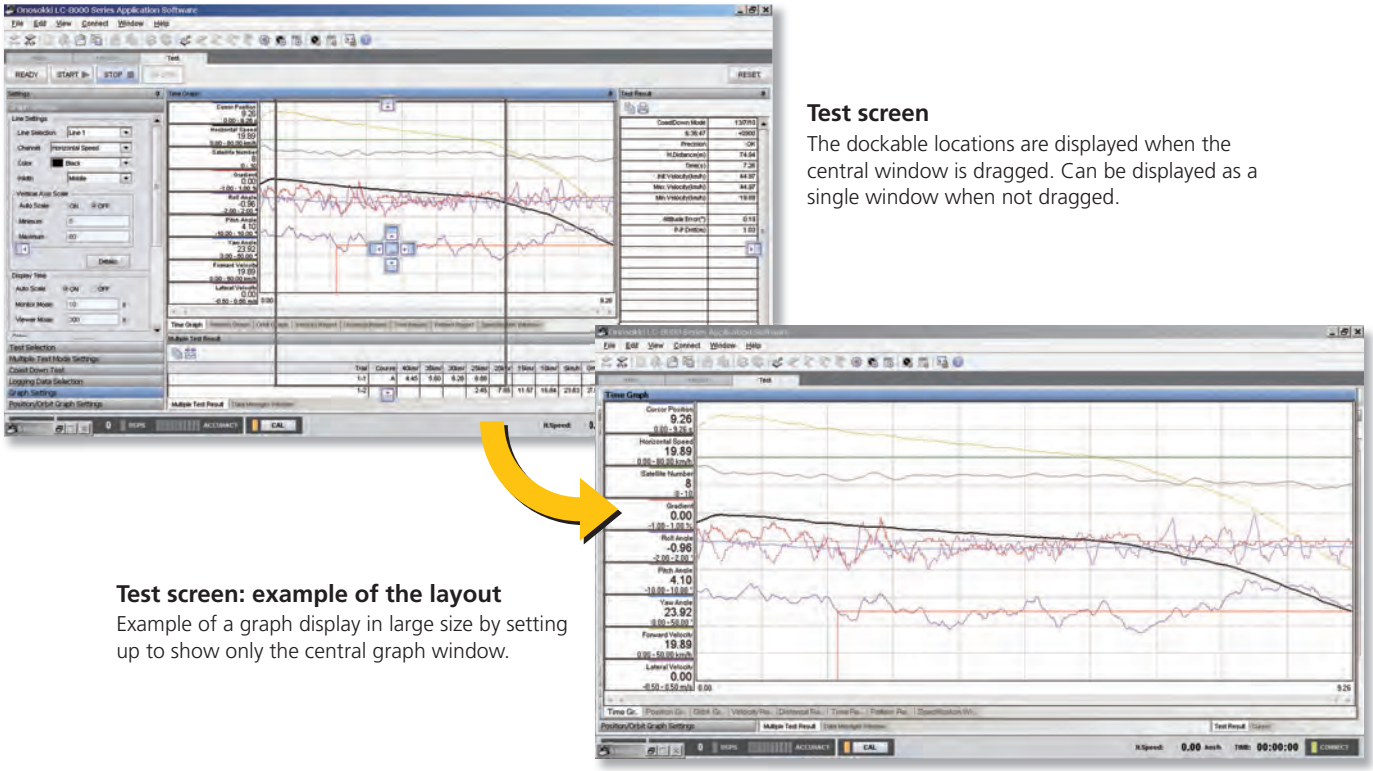
- Floating meter function (meter display can be set as a separate-frame window) have advanced the visibility of speed, etc.
- "Docking Window" enables various layout building
- Language selection of Japanese or English is available.



Meter display can be set as a window

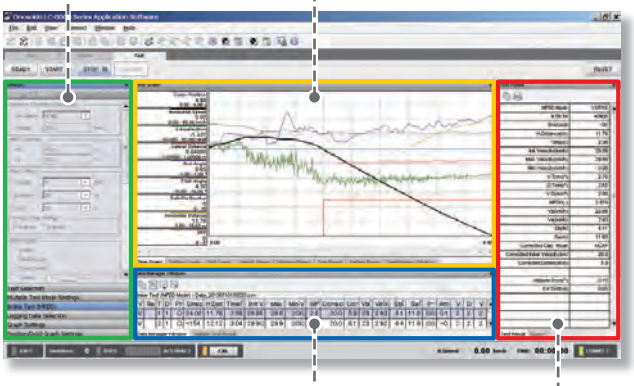


"Docking Window" enables various layout building



Test screen
The dockable locations are displayed when the central window is dragged. Can be displayed as a single window when not dragged.

Test screen: example of the layout
Example of a graph display in large size by setting up to show only the central graph window.



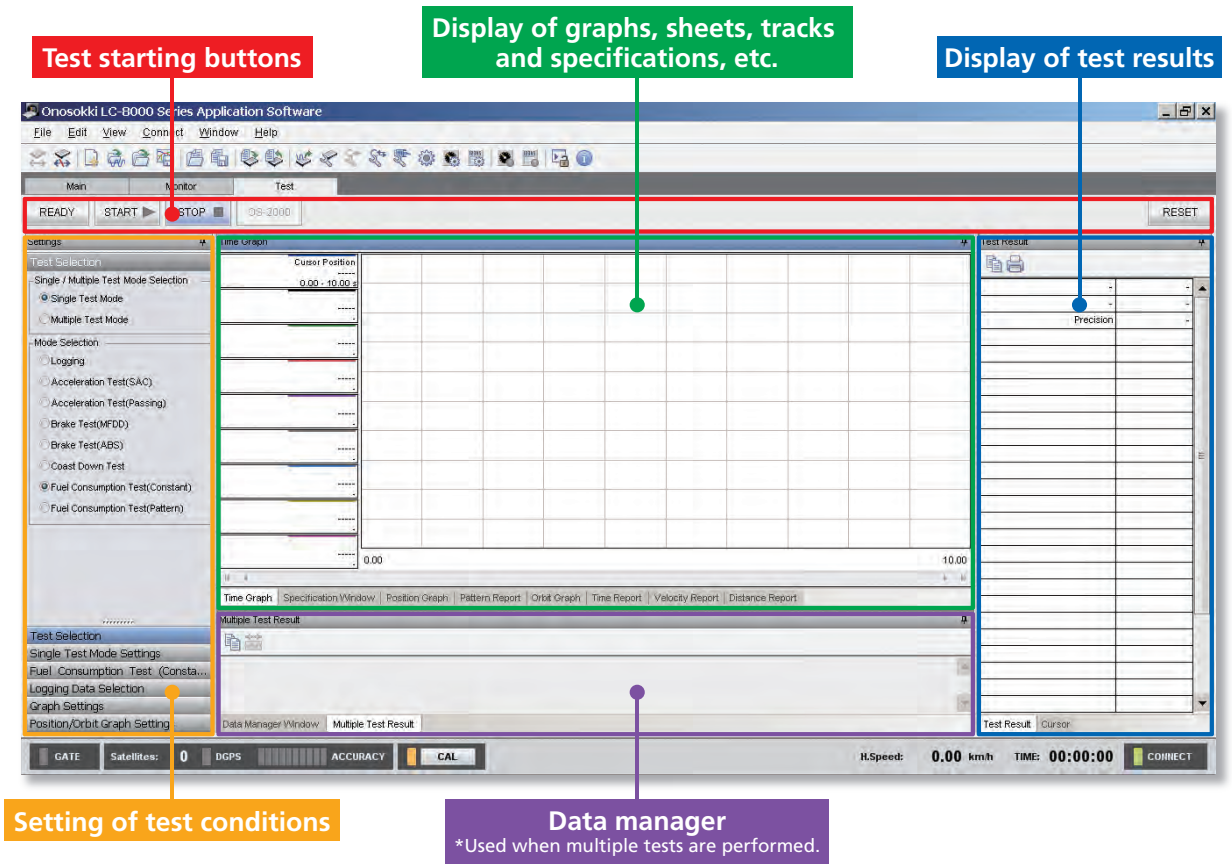
You can change the size and position of each section by dragging.

Language selection of Japanese or English is provided as standard

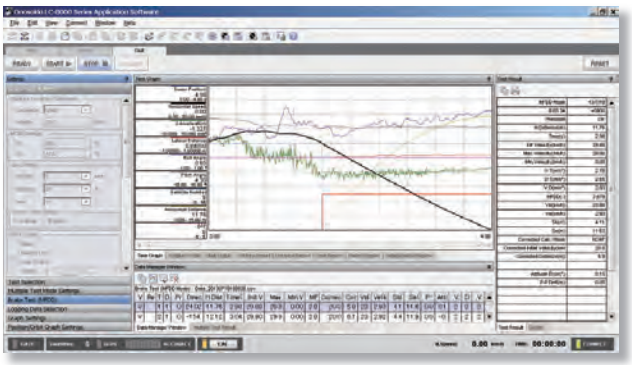
Application setting screen (part)

Application software (options) ver.2

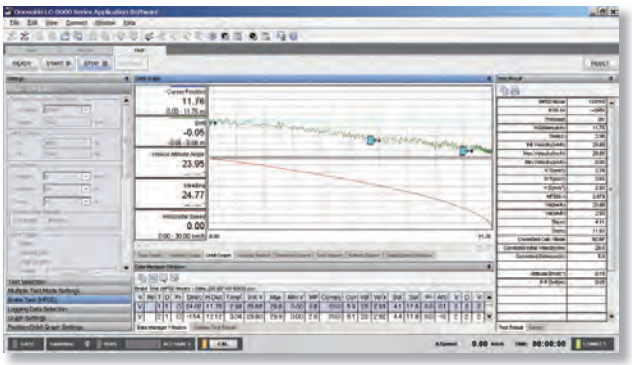
A variety of optional software is available. Also more functions.



If you have LC-0831 and LC-0833 optional software



You can perform a brake test and display the result,



you can also measure and display the vehicle path simultaneously.

- **Provided: Standard software**
  Logging of standard measurement items
  Language selection of English or Japanese
- **LC-0830: Expansion Logging software (Provided as standard with the LC-8200A)**
  Change of data sampling frequency. (Max.100Hz)
- **LC-0831: Acceleration / Deceleration Test software**
  Display of elapsed time in acceleration test (0 to 400 m / 0 to 1000m)
  MFDD calculation in braking test
  Display of deceleration speed / elapsed time in ABS test
  Data display in V-STEP / D-STEP / T-STEP modes
- **LC-0832: Fuel Consumption Test software**
  Input of the output pulse signal from the DF-210B 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 software**
  Display of vehicle path
  Amount of drift measurement in braking test
  Measurement of minimum turning radius

Since the LC-0833 Track Display software can be processed while other optional software is processed, in addition to MFDD, amount of drift can be measured simultaneously in braking test.

Added functions: multiple testing function, orientation detection function, coasting test division function, vehicle path / driving direction display function, CAN input function

Data logging function

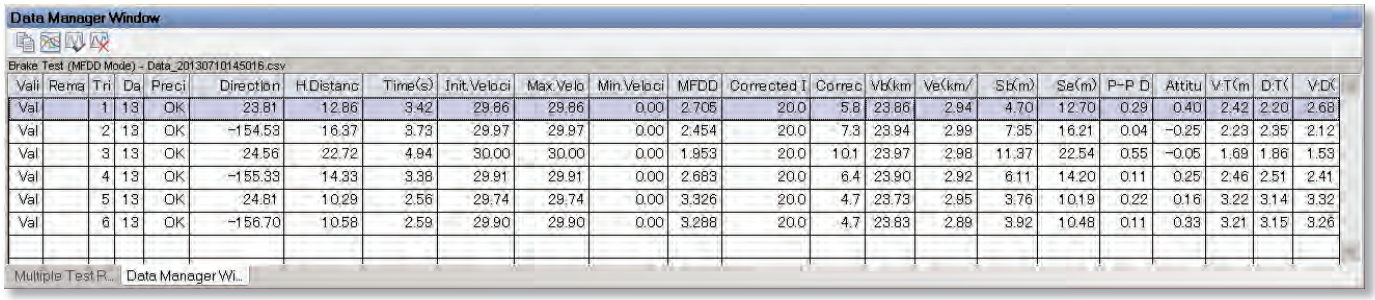
LC-0830 Expansion Logging | LC-0831 Acceleration/Deceleration Test | LC-0832 Fuel Consumption Test | LC-0833 Track Display

- Only the LC-0830 can change sampling frequency of time-series recorded data. (Sampling frequency of the other optional software: 100 Hz)
- Some items can be recorded when the optional software is installed. (See the specification table for details.)

Multiple testing function

LC-0830 Expansion Logging | LC-0831 Acceleration/Deceleration Test | LC-0832 Fuel Consumption Test

- One item of data is created with the ready → start → stop measurement sequence. Management of the data generated is important in tests in which this is repeated a large number of times. The multiple testing function manages the results of multiple tests with a data manager. This allows differences in results for each test to be easily verified.

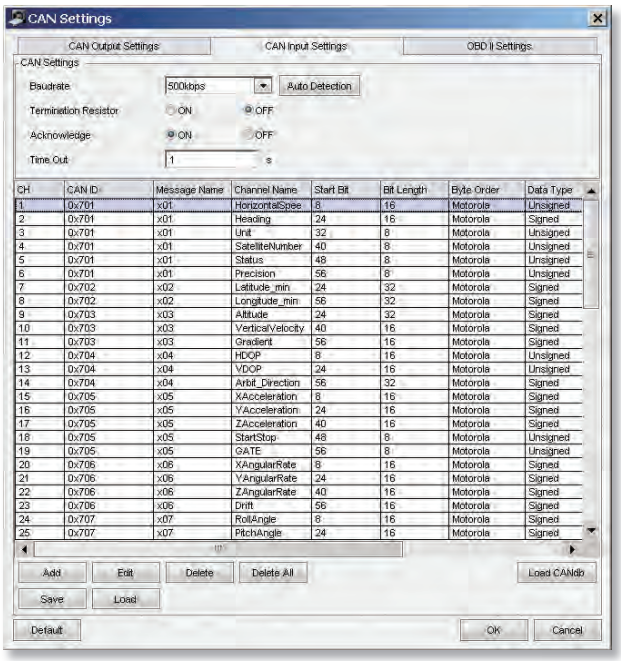


Vali	Rema	Tri	Da	Preci	Direction	H.Distanc	Time(s)	Init.Velo	Max.Velo	Min.Velo	MFDD	Corrected I	Correc	Vb(km	Ve(km/	St(m)	Se(m)	P-P D	Attitu	V-T(m	D-T(	V-D(
Val		1	13	OK	23.81	12.86	3.42	29.86	29.86	0.00	2.705	20.0	5.8	23.86	2.94	4.70	12.70	0.29	0.40	2.42	2.20	2.68
Val		2	13	OK	−154.53	16.37	3.73	29.97	29.97	0.00	2.454	20.0	7.3	23.94	2.99	7.35	16.21	0.04	−0.25	2.23	2.35	2.12
Val		3	13	OK	24.56	22.72	4.94	30.00	30.00	0.00	1.953	20.0	10.1	23.97	2.98	11.37	22.54	0.55	−0.05	1.69	1.86	1.53
Val		4	13	OK	−155.33	14.33	3.38	29.91	29.91	0.00	2.683	20.0	6.4	23.90	2.92	6.11	14.20	0.11	0.25	2.46	2.51	2.41
Val		5	13	OK	24.81	10.29	2.56	29.74	29.74	0.00	3.326	20.0	4.7	23.73	2.95	3.76	10.19	0.22	0.16	3.22	3.14	3.32
Val		6	13	OK	−156.70	10.58	2.59	29.90	29.90	0.00	3.288	20.0	4.7	23.83	2.89	3.92	10.48	0.11	0.33	3.21	3.15	3.26

CAN input function

LC-0851 CAN Input

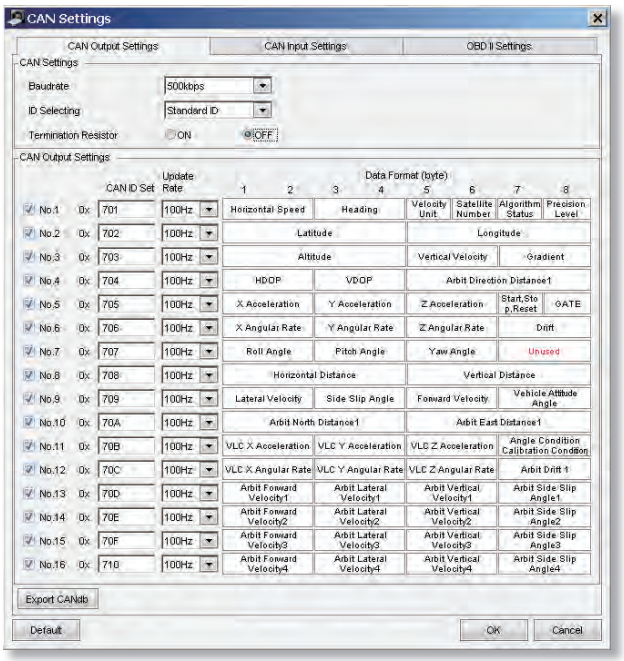
- Enables CAN data input.
- Up to 100 Hz of input sampling.
- Easy setup of measurement and recording channel, CANdb format file can be read.



CAN output function

LC-0811A CAN Output

- Enables CAN data output.
- CAN data can be output at a maximum sampling rate of 100 Hz.
- Connection to a CAN recorder is readily achieved with the CANdb format file generation function.

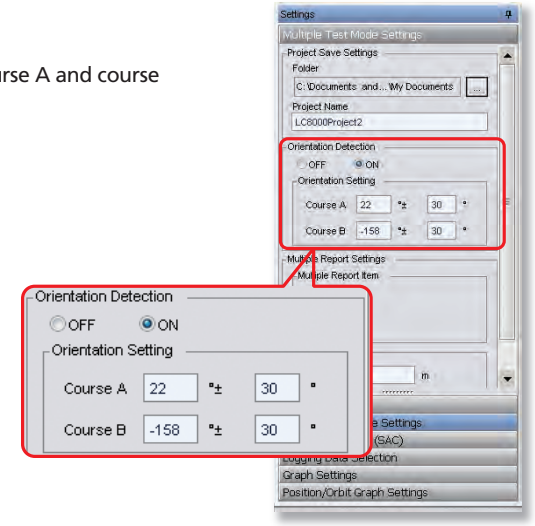


Orientation detection function

LC-0830 Expansion Logging | **LC-0831** Acceleration/Deceleration Test | **LC-0832** Fuel Consumption Test

- Function available for multiple testing.
- Used when reciprocal running tests are required.
- By setting the driving direction of the vehicle, recorded data is separated into course A and course B to manage results.
- Average values can be displayed for each course.

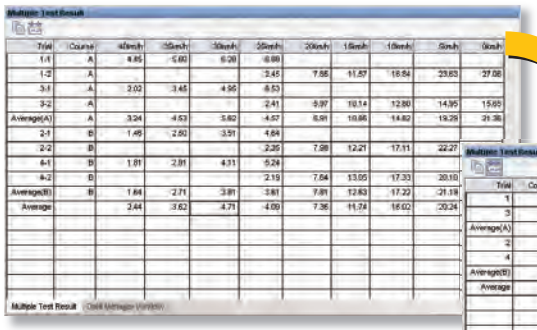
Results of multiple tests



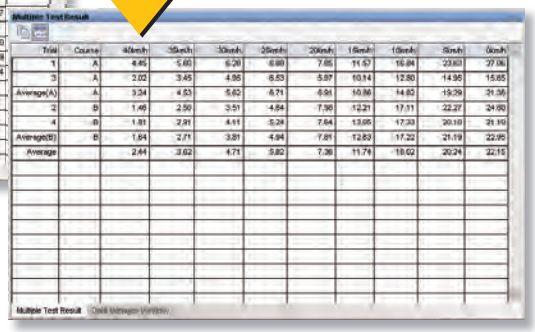
Coasting test division function

LC-0831 Acceleration/Deceleration Test

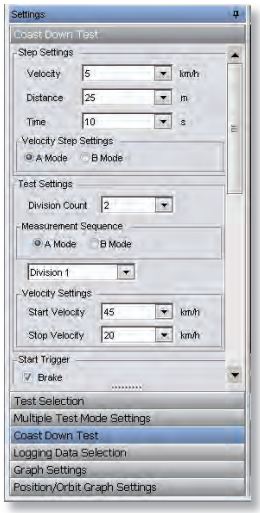
- A function available when coasting tests, multiple tests, and the orientation detection function are set.
- Test is started and finished automatically by setting the number of partitions and the test start velocity beforehand.
- Multiple recorded data are displayed together.



Results of multiple tests before merging



Results of multiple tests after merging



Coasting test division setting

Vehicle path / driving direction display

LC-8200A Vector Speedometer & **LC-0833** Track Display | **LC-0823** Vector Measurement & **LC-0833** Track Display

- Driving direction, travel orientation of the vehicle can be displayed as well as the vehicle path.
- The LC-8200A or the LC-0823 Vector Measurement is required to obtain the driving direction.

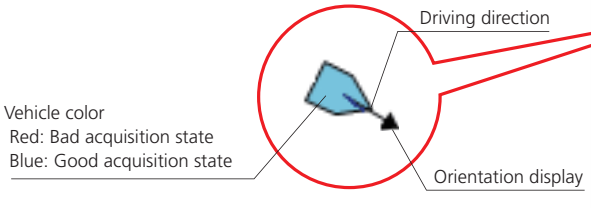


Table of measurement items (LC-8100A / LC-8200A)

○: Standard △: available as an option

Main item	Measurement		PC data logging	
	LC-8100A	LC-8200A	LC-8100A	LC-8200A
Horizontal speed	○	○	○	○
Horizontal distance	○	○	○	○
Forward speed	△*1	○*5	△*6	○*5
Forward distance	△*1	○*5	△*6	○*5
Lateral speed	△*1	○*5	△*6	○*5
Lateral distance	△*1	○*5	△*6	○*5
Vertical speed	△*2	○	△*7	○
Vertical distance	△*2	○	△*7	○
Slope	△*2	○	△*7	○
Number of satellites	○	○	○	○
Travel orientation	○	○	○	○
Latitude	○	○	○	○
Longitude	○	○	○	○
Altitude	○	○	○	○
Sideslip angle	△*1	○*5	△*6	○*5
Yaw, pitch, roll angles	△*3	○	△*8	○
XYZ acceleration (IMU coordinate axes)	△*3	○	△*8	○
XYZ angular speed (IMU coordinate axes)	△*3	○	△*8	○
XYZ acceleration (Vehicle coordinate axes)	△*4	○	△*9	○
XYZ angular speed (Vehicle coordinate axes)	△*1	○	△*9	○
Vehicle attitude angle	△*1	○*5	△*6	○*5

*1 Available by adding the LC-0823 (vector measurement function).
*2 Available by adding the LC-0822 (vertical direction measurement function).
*3 Available by adding the LC-0821 (IMU data output function).
*4 Available by adding the LC-0821 and LC-0823 (IMU data output function / vector measurement function).
*5 Available with two or more antennas.
*6 Logging available by adding the LC-0823 (vector measurement function) and LC-0830 series (software options).
*7 Logging available by adding the LC-0822 (vertical direction measurement function) and LC-0830 series (software options).
*8 Logging available by adding the LC-0821 (IMU data output function) and LC-0830 series (software options).
*9 Logging available by adding the LC-0821, LC-0823 and LC-0830 series (IMU data output function / vector measurement function / software options).

Additional notes

- Time-series data cannot be recorded on the main unit of the LC-8100A / 8200A. However, one of the data displayed on the display unit or a simple test result at the moment can be recorded. In total 32 items of data can be recorded.
- The reference position of all measurement items is the place where IMU is. Even if the vehicle gravity center position is different from the position where IMU is fixed, forward speed, lateral speed, vertical speed and sideslip angle of an arbitrary position are calculated and output by setting the distance from the arbitrary position to IMU. Four arbitrary positions can be set.
- Analog signal and pulse signal can be input to the LC-0810A External Input Unit. 8 ch of analog signal (max. ±20V) and 2 ch of pulse signal (TTL input) are available. It is featuring equipped BNC connectors for analog input (4 ch) and pulse input (2 ch). Analog signal and pulse signal also can be input to the LC-0850 External Input / Output Unit. 8 ch of analog signal (max. ±20V) and 5 ch of pulse signal (TTL input×4 ch, SIN input×1 ch) are available. Equipped BNC connectors of the LC-0850 External Input / Output Unit are for the output.

Specifications of options

Product name (Model name)		External Input / Output Unit (LC-0850)
Arbitrary analog output	Item	Selectable 16 ch from Horizontal speed, Forward speed, Lateral speed, Vertical speed, Number of satellites, Travel orientation, North speed, East speed, Sideslip angle, Yaw angle, Pitch angle, Roll angle, IMU coordinate axes XYZ acceleration, IMU coordinate axes angular speed, Gradient angle, Satellite lost flag, Vehicle coordinate axes XYZ acceleration, Vehicle coordinate axes XYZ angular speed, Vehicle attitude angle, Arbitrary position forward speed, Arbitrary position lateral speed, Arbitrary position vertical speed, Arbitrary position sideslip angle.
	Output voltage	-10.0 to 10.0 V (Can be changed by attached software.)
	Offset	Within ±50 mV
	Linearity	± 0.5 % / FS
	Temperature stability	± 0.05 % / FS / °C
	Output frequency	100 Hz
	Load resistance	10 kΩ or more
	Output delay	5 ms or less
External synchronous output	Function	Synchronous pulse output / Asynchronous clock output
	Output level	Square wave pulse output: High 5±0.5 V, Low 0.5 V or less
	DUTY	At synchronous pulse output: High approx. 1 µs At asynchronous clock output: 50±10 %
	Output frequency	100 Hz
	Load resistance	10 kΩ or more
Analog output	Number of channels	8 ch
	Voltage range	±10 V / 20 V
	Update frequency	100 Hz
	Offset	Within ±20 mV
	Linearity	±0.5 % / FS
Pulse input	Number of channels	4 ch: TTL pulse 1 ch: SIN input
	Conversion	4 ch TTL: pulse count, frequency or duty 1 ch SIN input: frequency
	Update frequency	100 Hz
	Frequency range (4 ch TTL)	Pulse count: DC to 50 kHz Frequency / duty: 1 Hz to 50 kHz
	Frequency range (1 ch SIN)	Frequency: 1 Hz to 50 kHz
	Accuracy (4 ch TTL)	Pulse count: within ±1 count Frequency: within input frequency×0.02 % ±1 Hz Duty conversion: within ±2 % (up to 1 kHz), within ±6 % (over 1 kHz)
	Accuracy (1 ch SIN)	Frequency: within input frequency×0.02 % ±1 Hz
Power source output		12 ±2 V DC (approx. 4 VA or less) ×1 ch
Outer dimensions		271(W) × 217(D) ×48(H) mm

Product name (Model name)		External Input Unit (LC-0810A)
Analog output	Number of channels	8 ch (BNC 4 ch)
	Voltage range	±10 / ±20 V
	Update frequency	100 Hz
	Offset	Within ±20 mV
	Linearity	±0.5 % / FS
Pulse input	Number of channels	2 ch (BNC×2), input: TTL pulse
	Conversion	Pulse count, frequency or duty
	Update frequency	100 Hz
	Frequency range	Pulse count: DC to 50 kHz Frequency / duty: 1 Hz to 50 kHz
	Accuracy	Pulse count: within ±1 count Frequency: within input frequency×0.02 % ±1 Hz Duty conversion: within ±2 % (up to 1 kHz), within ±6 % (over 1 kHz)
Connector		D-Sub 15pin, BNC×6
Power source output		12 ± 2 V DC (approx.4 VA or less) ×1 ch
Outer dimensions		271(W) ×217(D) ×48(H) mm

Product name (Model name)		IMU (Inertial Measurement Unit) (LC-0085)
Acceleration	Linearity	0.2 % / FS (Reference accuracy)
	Measurement range	±98 m/s² (Reference accuracy)
Angular speed	Linearity	0.1 % / FS (Reference accuracy)
	Measurement range	±150 °/s (Reference accuracy)
Cable		5 m
Protection class		IP43
Outer dimensions (weight)		79(W) ×79(D) ×41(H) mm (approx. 250 g / when magnet mounted: approx. 500 g)

Product name (Model name)	Remote Box (LC-0083)
Function	Remote control of start / stop command, clear of display
SW	START, STOP, RESET, SELECT
Outer dimensions (weight)	45(W) ×20(D) ×115(H) mm (approx. 100 g)

Product name (Model name)	CAN Input Function (LC-0851)
Standard	Conforms to ver. 2.0B
Update frequency	100 Hz
Baud rate	Selectable from 125, 250, 500 or 1000 kbps
Format	Supports standard ID / extended ID
Data	CAN input: 32 ch max. can be acquired. (OBD II protocol can acquire up to 10 items specified measured values.)
Accessory	D-Sub 9 pin connector

Product name (Model name)	CAN Output Function (LC-0811A)
Standard	Conforms to ver. 2.0B
Update frequency	100 Hz
Baud rate	Selectable from 125, 250, 500 or 1000 kbps
Format	Supports standard ID / expansion ID
Data	Speed, distance, satellite and other information in one ID (ID can be specified)
Accessory	D-Sub 9 pin connector, CAN branch cable (LC-0862)

Product name (Model name)	Display Unit: small (LC-0080)	Display Unit: large (LC-0084)
Display method	Fluorescent display tube (green)	
Function	Display settings, test start / stop commands, memory commands Display of speed, distance and number of acquired satellites, simple test results Data display format settings (1-line or 2-line, etc.) Output commands to optional DPU-414 Digital Printer	
Accessory	Cable	
Option	Windshield attachment (LC-0740)	–
Outer dimensions (weight)	Approx. 180(W)×45(D)×75(H)mm (approx. 300 g)	Approx. 210(W)×50(D)×71(H)mm (approx. 450 g)

Product name (Model name)	Input Connector Box (LC-0815)	Output Connector Box (LC-0819)
Function	Converts D-Sub input connector of an external input / output function unit to BNC connectors.	Converts D-Sub output connector of an external input / output function unit to BNC connectors.
Connector	BNC×16, D-Sub 37pin×1	
Accessory	D-Sub cable	
Outer dimensions (weight)	Approx. 230(W)×100(D)×28(H)mm (approx. 750 g)	

Product name (Model name)	Patch Antenna (LC-0720A)	High Precision Antenna (LC-0086)
Cable length	5 m	
Operating temperature range	-40 to +85°C	-40 to +70°C
Protection class	–	IP69K
Outer dimensions (weight)	Approx. 48(W)×40(D)×13(H)mm (approx. 105 g)	Approx. φ180(D)×70(H)mm (approx. 900 g)

Model name	Product name	Function
LC-0730A	Power Cable for Cigarette Lighter Socket	Enables power supply from a cigarette lighter socket.
LC-0813	Carrying Case for LC-8100(A)	Stacked LC-8100(A) main unit and an external unit can be stored.
LC-0814	Carrying Case for LC-8200(A)	Main unit and High precision antennas, etc. can be stored.
DPU-414	Digital Printer	For printing of simple test results (AC adapter: sold separately)
PE1704174	Tape Switch	Use as an external trigger (Non-voltage contact)

Recommended PC operating environment	OS: Windows® XP (SP3) [32-bit] / 7 [32 / 64-bit], memory: 1 GB or more, HDD: 80 GB or more, CPU: Intel® Core 2 Duo / 2 GHz or more, USB: 2 ports or more (USB3.0 is not supported), screen resolution: XGA (1024 x 768) or more at PC operating environment

Specifications of LC-8100A / LC-8200A

		LC-8100A GPS Speedometer	LC-8200A GPS Vector Speedometer
Update frequency		100 Hz	
Horizontal speed	Measurement range	0.1 to 500.0 km/h	
	Accuracy	±0.1 km/h*1	
Horizontal distance	Accuracy	±0.05 %*2	
Forward speed	Measurement range	– (Available by LC-0823)	-500.0 to 500.0 km/h
	Accuracy	– (Available by LC-0823)	±0.2 km/h*3
Forward distance	Accuracy	– (Available by LC-0823)	±0.10 %*4
Lateral speed	Measurement range	– (Available by LC-0823)	-20.0 to 20.0 m/s
	Accuracy	– (Available by LC-0823)	±0.08 m/s*5
Lateral distance	Accuracy	– (Available by LC-0823)	±0.15 %*6
Sideslip angle	Measurement range	– (Available by LC-0823)	-25.0 to +25.0°
	Reference accuracy	– (Available by LC-0823)	0.15°RMS*7
Yaw angle	Measurement range	– (Available by LC-0821)	-180.0 to +180.0°
	Reference accuracy	– (Available by LC-0821)	±0.1°RMS*8
Vehicle attitude angle	Measurement range	– (Available by LC-0823)	-180.0 to +180.0°
	Reference accuracy	– (Available by LC-0823)	±0.1°RMS*8
X, Y, Z acceleration	Measurement range	– (Available by LC-0821)	-98.0 to 98.0 m/s²
	Linearity	– (Available by LC-0821)	±0.2 % / FS (Reference accuracy)
X, Y, Z angular speed	Measurement range	– (Available by LC-0821)	-150.0 to 150.0°/s
	Accuracy	– (Available by LC-0821)	±0.1 % / FS (Reference accuracy)
Analog (speed) output	Voltage range	0 to 10 V / 0 to 500 km/h (Can be changed by attached software.)	
	Linearity	±0.2 % / FS	
	Load resistance	Load resistance 10 kΩ or more	
	Temperature stability	±0.05 % / FS /°C	
	Output delay	5 ms or less	
Pulse (distance) output	Resolution	1, 5, 10 mm/P Selectable	
	Output delay	5 ms or less	
	DUTY	50 % ±10 %	
	Load resistance	Load resistance 10 kΩ or more	
	Level	TTL	
Arbitrary analog output	Item	–(Available by LC-0850)	Selectable 16 ch from Horizontal speed, Forward speed, Lateral speed, Vertical speed, Number of satellites, Travel orientation, North speed, East speed, Sideslip angle, Yaw angle, Pitch angle, Roll angle, IMU coordinate axes XYZ acceleration, IMU coordinate axes XYZ angular speed, Gradient angle, Satellite lost flag, Vehicle coordinate axes XYZ acceleration, Vehicle coordinate axes XYZ angular speed, Vehicle attitude angle, Arbitrary position forward speed, Arbitrary position lateral speed, Arbitrary position vertical speed, Arbitrary position sideslip angle.
	Output voltage	– (Available by LC-0850)	-10.0 to 10.0 V (Changeable using PC software)
	Offset	– (Available by LC-0850)	Within ±50 mV
	Linearity	– (Available by LC-0850)	± 0.5 % / FS
	Temperature stability	– (Available by LC-0850)	± 0.05 % / FS /°C
	Output frequency	– (Available by LC-0850)	100 Hz
	Load resistance	– (Available by LC-0850)	10 kΩ or more
	Output delay	– (Available by LC-0850)	Within 5 ms
External synchronous output	Function	– (Available by LC-0850)	Synchronous pulse output / Asynchronous clock output
	Output level	– (Available by LC-0850)	Square wave pulse output: High 5±0.5 V, Low 0.5 V or less
	DUTY	– (Available by LC-0850)	At synchronous pulse output: High approx. 1 µs At asynchronous clock output: 50±10 %
	Output frequency	– (Available by LC-0850)	100 Hz
	Load resistance	– (Available by LC-0850)	10 kΩ or more
Analog input	Number of channels	– (Available by LC-0810A or LC-0850)	8 ch
	Voltage range	– (Available by LC-0810A or LC-0850)	±10 V / 20 V
	Update frequency	– (Available by LC-0810A or LC-0850)	100 Hz
	Offset	– (Available by LC-0810A or LC-0850)	Within ±20 mV
	Linearity	– (Available by LC-0810A or LC-0850)	±0.5 % / FS
Pulse input	Number of channels	– (Available by LC-0850)	4 ch: TTL pulse 1 ch: SIN input
	Conversion	– (Available by LC-0850)	4 ch TTL: selectable from pulse count, frequency or duty 1ch SIN input: Frequency
	Update frequency	– (Available by LC-0850)	100 Hz
	Frequency range (4 ch TTL)	– (Available by LC-0850)	Pulse count: DC to 50 kHz Frequency / duty: 1 Hz to 50 kHz
	Frequency range (1 ch SIN)	– (Available by LC-0850)	Frequency: 1 Hz to 50 kHz
	Accuracy (4 ch TTL)	– (Available by LC-0850)	Pulse count: within ±1 count Frequency: within input frequency×0.02 % ±1 Hz Duty conversion: within ±2 % (up to 1kHz), within ±6 % (over 1 kHz)
	Accuracy (1ch SIN)	– (Available by LC-0850)	Frequency: within input frequency×0.02 % ±1 Hz
Power supply output		– (Available by LC-0810A or LC-0850)	12 ± 2 V DC (within approx.4 VA)×1 ch
External trigger input / output	Input	Start, stop signal (non-voltage / voltage contacts)	
	Output	Gate signal	
PC interface		USB 2.0 (Not supports USB 3.0)	
General specifications	Power supply	9 to 32 VDC / 100 to 240 VAC (when AC adapter used: option)	
	Power consumption	30 VA max.	
	Operating temperature range	0 to +50 °C	
	Storage temperature range	-10 to +60 °C	
Accessory		Patch antenna (LC-0720A), Remote box (LC-0083), Phoenix connector (4P and 2P, 1 piece for each), IMU (LC-0085) and connection cables, DC power supply cable, USB cable, PC standard software, Instruction manual	High precision antenna (LC-0086)X 2, Large display unit (LC-0084), Remote box (LC-0083), Phoenix connector (4P and 2P, 1 piece for each), IMU (LC-0085) and connection cables, DC power cable, USB cable, PC standard software, Antenna & IMU mounting jig (magnetic sheet type), Instruction manual
Outer dimensions (weight)		271(W)×217(D)×48(H) mm (approx. 1.4 kg)	271(W)×217(D)×76(H) mm (approx. 2.2 kg)

*1 Accuracy at 30 km/h or higher horizontal speed and with 7 or more acquired satellites. ±0.3 km/h at less than 30 km/h horizontal speed and with 7 or more acquired satellites.

*2 Accuracy over 300 m measurement distance at 30 km/h or higher horizontal speed and with 7 or more acquired satellites. ±0.3% over 300 m measurement distance at less than 30 km/h horizontal speed and with 7 or more acquired satellites. ±0.5 % with fewer than 7 acquired satellites and no multipath effect.

*3 Accuracy with 2 m distance between antennas at 100 km/h horizontal speed and with 7 or more acquired satellites. ±0.8 km/h with 2 m distance between antennas at 100 km/h horizontal speed and with 4 or more acquired satellites.

*4 Accuracy with 2m distance between antennas at 100 km/h horizontal speed and with 7 or more acquired satellites. ±0.70 % with 2 m distance between antennas at 100 km/h horizontal speed and with 4 or more acquired satellites.

*5 Accuracy with 2 m distance between antennas at 100 km/h horizontal speed and with 7 or more acquired satellites. ±0.20 m/s with 2 m distance between antennas at 100 km/h horizontal speed and with 4 or more acquired satellites.

*6 Accuracy with 2 m distance between antennas at 100 km/h horizontal speed and with 7 or more acquired satellites. ±0.65 % with 2 m distance between antennas at 100 km/h horizontal speed and with 4 or more acquired satellites.

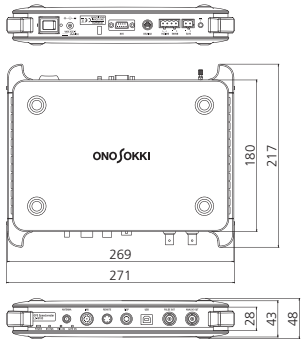
*7 Accuracy with 2 m distance between antennas at 30 km/h or higher horizontal speed and with 7 or more acquired satellites. 0.30°RMS with 2 m distance between antennas and 30 km/h or higher horizontal speed and with 4 or more acquired satellites.

*8 Accuracy with 2m distance between antennas and with 7 or more acquired satellites. ±0.2 ° RMS with 2 m distance between antennas and with 4 or more acquired satellites.

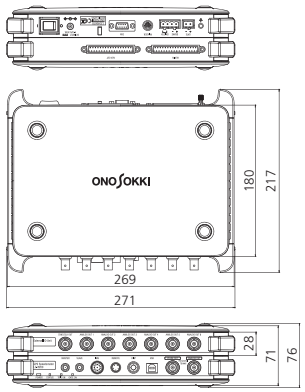
Outer dimensions

(Unit: mm)

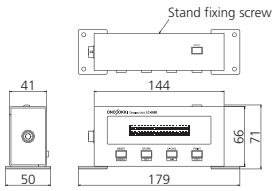
LC-8100A GPS Speedometer



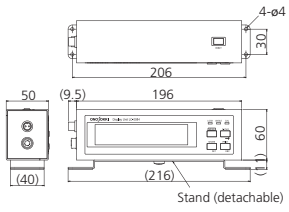
LC-8200A GPS Vector Speedometer



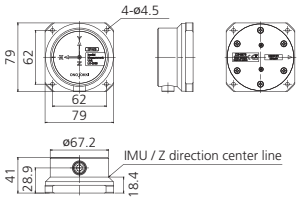
LC-0080 Display Unit: small



LC-0084 Display Unit: large



LC-0085 IMU



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