

# General Product Guide

Vol.3

2020 ▶ 2021

**ONOSOKKI**

# General Product Guide

Vol. 3

2020 ▶ 2021

## Brochures and Website

For detailed product information, brochures and applications, please refer to our website (<https://www.onosokki.co.jp/English/english.htm>). For inquiries, please contact your nearest distributor or send us an e-mail ([overseas@onosokki.co.jp](mailto:overseas@onosokki.co.jp))

# Contents

Vol.3

2020 ▶ 2021

Rotation/ Line speed/ Rotation fluctuation measurement	P.4 to 7
Torque measurement	P.8 to 10
Rotary Encoder	P.11 to 12
Dimension & Displacement measurement	P.13 to 17
FFT Analyzer	P.18
Data Recorder	P.18
Sound & Vibration measurement	P.19 to 31
Automotive related product	P.32 to 40
ONO SOKKI's Quality Assurance System	P.41
Overseas Subsidiaries and Offices	P.42

**A**

Acceleration/ Deceleration Test Software..... 36  
 Accelerometer .....20/21  
 Accelerometer Calibrator ..... 21  
 Accelerometer (Accepts TEDS)..... 21  
 Accelerometer (Charge Output Type)..... 21  
 Accelerometer (with Built-in Pre-amplifier)..... 20  
 Acoustic Related Product ..... 19  
 Advanced Handheld Tachometer.....5  
 Advanced Tachometer .....5  
 Analog Engine Tachometer..... 34  
 Analysis Software for Sound & Vibration ..... 25  
 Application Software ..... 30  
 Automotive Test System.....35/39

**C**

Calibrator for Accelerometer ..... 21  
 Charge Amplifier ..... 22  
 Charge Converter ..... 22  
 Combustion Analysis Software ..... 39  
 Combustion Analysis System..... 39  
 Compact & High-Sensitive GPS Speedometer...35  
 Contact Type Handheld Digital Tachometer...5  
 Contact Type Length Measuring Device ..... 16  
 Converter for Rotation Measurement .....6  
 Crank Angle Amplifier..... 40  
 Crank Angle Detector ..... 40  
 Crank Angle Measurement Equipment..... 40

**D**

D/A Converter ..... 7/15  
 Data Recorder ..... 18  
 Diesel Engine Tachometer .....33/34  
 Digital Engine Tachometer.....33/34  
 Digital Flow Meter ..... 38  
 Digital Gauge Counter ..... 14  
 Digital Handheld Tachometer .....5/6  
 Digital Linear Gauge Related Product ..... 15  
 Digital Linear Gauge Sensor .....13/14  
 Digital Printer ..... 15  
 Digital Rotation Detector ..... 4  
 Digital Tachometer ..... 5  
 Digital Torque Meter ..... 9

**E**

Electrostatic Capacitance-Type Gap Detector... 17  
 Electromagnetic Detector ..... 4  
 Elevator Speedometer ..... 6  
 Engine Rotation Detector..... 32  
 Engine Tachometer .....33/34  
 Engine Testing System ..... 39  
 Engine Vibration Detector ..... 33  
 Envelope Intensity Visualization System..... 23  
 External Sensor Input Type Handheld Digital Tachometer... 33

**F**

F/V Converter ..... 6  
 FFT Analyzer.....18  
 FFT Comparator .....18  
 Fiber Optic Crank Angle Detector .....40  
 Fiber Optic Detector/ Fiber Sensor Amplifier.... 4  
 Field Balancing Software .....25  
 Flange Type High-Stiffness Torque Detector ..... 8  
 Flow Detector.....37  
 Flow Meter .....38  
 Fluctuation Sound Analysis Pack.....31  
 Fuel Consumption Test Software.....36  
 Fuel Flow Meter.....38

**G**

Gasoline Engine Tachometer.....33/34  
 GPS Speedometer .....35  
 GPS Vector Speedometer.....35

**H**

High Performance Sound Level Meter .....26/27  
 High-Speed F/V Converter ..... 6  
 High-Stiffness Torque Meter ..... 8

**I**

Ignition Pulse Detector.....32  
 Impulse Hammer .....23  
 Injection Amount/ Injection Ratio Meter.....39  
 Integrating Sound Level Meter.....28/29  
 Isolated Pulse Transmitter.....12  
 Isolated Signal Amplifier ..... 7

**L**

Laser Doppler Surface Velocity Meter .....16  
 Laser Doppler Vibrometer.....23  
 Line Speed/ Length Measurement.....7  
 Linear Motion Speedometer ..... 6

**M**

Magneto-electric Rotation Detector ..... 4  
 Mass-Burette Flow Detector.....38  
 Massflow Meter .....38  
 Measurement Microphone.....19  
 Microphone Pre-amplifier ..... 19  
 Motor/ Engine RPM Detector .....32  
 Motor Torque Measurement.....10  
 Motor Torque Measurement Detector.....10  
 Multi-functioned Graph Creating Tool .....30  
 Multifunction Digital Tachometer ..... 5  
 Multi-stage Injection Analyzer .....39

**N**

Noise Testing Software .....39  
 Non-contact Displacement Meter .....17  
 Non-contact Length Meter/ Speedometer ..... 16  
 Non-contact Thickness Meter.....17  
 Non-contact Type Handheld Digital Tachometer.....5

**O**

On-Board Flow Detector.....38  
 On-Board Digital Flow Meter.....38  
 Optical Detector..... 4

**P**

Passing Velocity Speedometer..... 6  
 Phase Difference Method Torque Detector Using Electromagnetic Induction Theory..... 8  
 Phase Difference Method Torque Detector Using Electromagnetic Gears ..... 9  
 Photoelectric Detector ..... 4  
 Portable 2ch/4ch FFT Analyzer ..... 18  
 Portable Data Recorder for Acoustics & Vibration.... 18

**R**

Reversible Counter..... 12/16  
 Roller Encoder.....7/16  
 Rotary Encoder ..... 11  
 Rotary Encoder Related Product ..... 12  
 RPM Detector for Diesel Engine.....32

**S**

Servo Analysis System .....25  
 Signal Conversion Box ..... 15  
 Software for GPS Speedometer .....36  
 Sound & Vibration Measurement System.....24  
 Sound & Vibration Measurement for Automotive ...39  
 Sound & Vibration Real-time Analysis System ...24  
 Sound Calibrator.....19  
 Sound Level Meter ..... 26/27/28/29  
 Sound Quality Evaluation.....31  
 Sound Quality Evaluation Pack .....31  
 Sound Source Visualization Probe Microphone ..22  
 Sound Source Visualization System .....23  
 Sound Source Visualization System 4ch Beam Forming ...23

**T**

TEDS Adapter .....21  
 TEDS Microphone .....19  
 3ch Sensor Amplifier .....22  
 Time-series Data Analysis Tool.....30  
 Torque Detector Equipped with a Hysteresis Brake .... 10  
 Torque Detector Equipped with a Powder Brake..... 10  
 Torque Detector for Torque Ripple and Cogging Torque.. 10  
 Torque Station Pro ..... 10  
 Track Display Software .....36  
 2ch Sensor Amplifier .....20

**U**

Ultraminiature Microphone.....20  
 U-shaped Crank Angle Detection System ..... 40

**V**

Vibration Comparator .....22  
 Vibration Related Amplifier .....22  
 Volumetric Type Flow Detector .....37

**A**

AP-981 ..... 4  
 AR-7240B.....34

**B**

BF-3100 .....23  
 BS-1210/1310..... 13

**C**

CA-6000B .....40  
 CF-4700.....18  
 CF-9200/9400.....18  
 CH-1200A.....22  
 CH-6130/6140.....22  
 CL-5610/5610S ..... 17  
 CP-044.....32  
 CP-5110B.....40  
 CP-5730 .....40  
 CT-6700.....34

**D**

DA-4130..... 7/15  
 DD series ..... 9  
 DF-2200 .....38  
 DG-0010/0020..... 15  
 DG-2310 ..... 14  
 DG-4320 ..... 14  
 DG-4340 ..... 14  
 DG-5100 ..... 14  
 DR-7100 ..... 18  
 DS-0227A .....25  
 DS-3000 series..... 24/25/39

**E**

EC-2100..... 6

**F**

FAMS-R5 .....39  
 FJ-8000 series.....39  
 FM-2500A/1500.....38  
 FP series.....37  
 FS-540/542/5500/ FG-1300 ..... 4  
 FT-2500 ..... 5  
 FT-7200 ..... 5  
 FV-1100..... 6  
 FV-1500..... 6  
 FX-1110/1120/1130 .....38  
 FZ-2100/2200A.....38

**G**

GE-1400 .....33  
 GE-2500 .....34  
 GN-1100 series.....39  
 GK-2110/3100/4110G20 .....23  
 GS-1713A/1730A/1813A/1830A..... 13  
 GS-3813B/3830B ..... 13  
 GS-4713A/4730A/4813A/4830A..... 13  
 GS-5050A/5100A/5051A/5101A..... 14  
 GS-6713A/6730A/6813A/6830A..... 13  
 GS-7710A/7710NA ..... 13

**H**

HR-6800..... 6  
 HT-3200 .....5  
 HT-4200 ..... 5  
 HT-5500 ..... 6  
 HT-6200 .....33

**I**

IP-292/296 .....32  
 IP-3000A .....32  
 IP-3100 .....32

**L**

LA-1441/1441A/4441A.....28/29  
 LA-7200/7500.....26/27  
 LC-0831 .....36  
 LC-0832 .....36  
 LC-0833 .....36  
 LC-8120.....35  
 LC-8220.....35  
 LC-8310.....35  
 LG-9200 ..... 4  
 LG-930..... 4  
 LV-1800.....23  
 LV-7000 series ..... 16

**M**

MB-2200M10 .....20  
 MD series..... 9  
 MF-3200 .....38  
 MI-1271/1235/1433/1531 ..... 19  
 MI-1271M12..... 19  
 MI-3111/3140/3170 ..... 19  
 MI-5420A.....22  
 MI-6420.....23  
 MP-9100/911 ..... 4  
 MP-981/9820 ..... 4  
 MT series ..... 10

**N**

NP-0081N20.....21  
 NP-2000 series .....21  
 NP-3000 series ..... 20/21

**O**

OC-1300.....30  
 OM-1200 .....32  
 OM-1500 .....32  
 OS-2500/2600/2700 ..... 30  
 OS-2740 ..... 31  
 OS-2760 ..... 31

**P**

PA-150..... 7  
 PA-330Z .....12  
 PP-932/PA-500A..... 40  
 PP-933/PA-500A..... 40  
 PS-1300 .....22

**R**

RP-1700 series ..... 11  
 RP-432Z series ..... 11  
 RP-7400 series ..... 7/16  
 RQ-2110..... 15  
 RV-3150 ..... 12/16

**S**

SC-3120/2500/2120A..... 19  
 SE-1200 .....33  
 SE-1620 .....34  
 SE-2500 .....33  
 SP-405ZA..... 11  
 SR-2210..... 20  
 SS series ..... 9  
 ST-1210 ..... 6

**T**

TH series .....8  
 TM-3100 series..... 5  
 TM-5100 ..... 5  
 TQ-2000(H) series ..... 8  
 TQ-5300 ..... 8  
 TS-2800 ..... 9  
 TS-3200A ..... 9  
 TS-8700 ..... 10

**V**

VC-2200 .....22  
 VC-3200 .....22  
 VE series..... 17  
 VP-201/1210 ..... 33  
 VP-202/1220 ..... 33  
 VT-5210/5220/5710/5720 ..... 17  
 VX-1100A .....21

## Digital Rotation Detector

### ■MP-9100/911 Electromagnetic Detector



#### ■Specifications

Output voltage	2.0 Vp-p or more (1kHz, 10kΩ load) M=1, gap=0.5mm
Detectable rotation speed	200 to 35,000 r/min (60 P/R)
Gear module	1 to 3
Operating temperature range	-10 to +90°C
Detected distance	0.5 to 1 mm
Power supply	Not required
Outer dimensions	MP-9100; φ20×58.5(L)mm MP-911 ; φ20×64(L)mm
Weight	MP-9100; Approx. 90g MP-911 ; Approx. 300g (cable included)
Others	MP-930 Oil proof MP-935 Oil proof/ heat resistant MP-9120 Low impedance

#### ■Features

- No power supply is required and suitable for the field measurement.
- Non-contact detector
- MP-911: directly attached cable type (5m)
- Various types are available including oil proof, heat resistant and ultra compact.

### ■MP-981/9820 Magneto-electric Rotation Detector (General, high speed type)



#### ■Specifications

Output waveform	Square wave
	Hi; +5±0.5V Lo; +0.5V or less
Measurement range	MP-981 ; 1Hz to 20kHz MP-9820; 1Hz to 100kHz
Detection gear	Ferromagnetic, 3mm or more gear width Module 0.5 to 3
Output format	Float earth
Output impedance	Approx. 330Ω
Operating temperature range	-10 to +70°C
Power supply	12±2VDC, approx. 40mA (at 12V)
Outer dimensions	φ22×75mm
Weight	Approx. 80g (including mounting nut×2)

#### ■Features

- Detection from nearly 0 r/min is available.
- Non-contact detector
- Rigid and durable design, can be used in harsh environment.
- Operation status and attaching position can be checked with signal indicator.

### ■AP-981 Magneto-electric Rotation Detector (Acid resistant, water resistant type)



#### ■Specifications

Output waveform	Square wave
	Hi; +5±0.5V Lo; +0.5V or less
Measurement range	1Hz to 20kHz
Detection gear	Ferromagnetic, 3mm or more gear width Module 1 to 3
Output impedance	Approx. 330Ω
Outer material	Polycarbonate
Power supply	12±2VDC, Approx. 40mA
Outer dimensions	90mm length
Weight	Approx. 130g (including signal cable)

#### ■Features

- Water and acid resistant type which conforms to IPX7 of JIS C 0920.
- Detection from nearly 0 r/min is available.
- Non-contact detector
- Acid resistant cable 2m is directly attached.
- Operation status and attaching position can be checked with signal indicator.

### ■LG-9200 Optical Detector



#### ■Specifications

Detection method	Light reflection using an optical fiber sensor
Detection distance	20 to 40mm (using 12mm square reflective mark)
Light source	Light emitting diode (red visible light)
Max. response speed	40 m/s (converted by the circumferential speed of rotating shaft)
Output waveform	Rectangular wave
	Hi; +5V±0.5V Lo; +0.5V or less
Output impedance	1kΩ or less
Operating temperature range	-10 to +60°C
Power source	12±2VDC, 60 mA or less (at 12V)
Outer dimensions	21(W)×24(H)×117(D)mm
Weight	Approx. 150g (including mounting nut×2)

#### ■Features

- Unified structure of light source, receiver and amplifier
- Compact and lightweight
- Non-contact detection by affixing the reflective mark on the rotating shaft.
- Easy to adjust a position by visible light

### ■LG-930 Photoelectric Detector



#### ■Specifications

Detection method	Light reflection using an optical fiber sensor
Detection distance	70 to 200mm (using 12mm square reflective mark)
Light source	Light emitting diode (red visible light)
Max. response speed	25 m/s (when using 12mm square reflective mark in 48mm interval)
Output waveform	Rectangular wave
	Hi; +5V±0.5V Lo; +0.5V or less (load resistance 100kΩ or more)
Output impedance	1kΩ or less
Operating temperature range	-10 to +60°C
Cable length	4.9m
Power source	12±2VDC, 85mA or less (at 12V)
Outer dimensions	23(W)×29(H)×76.5(D)mm
Weight	Approx. 200g

#### ■Features

- Maximum detectable distance: 200 mm
- Easy to attach by using L-shaped fixture (accessory)
- Easy to adjust a position by visible light and built-in operation display lamp
- Pulse lighting type

### ■FS-540/542/5500/FG-1300 Fiber Optic Sensor/Fiber Sensor Amplifier



#### ■Specifications

Detection distance	Max. 69mm (using 12mm square reflective mark)
Frequency response range	0 to 10 kHz (when duty is 1:1)
Pulse output	Rectangular wave
	Hi; +5V, Lo; +0.5V or less
Analog output	Voltage output according to the reflection light amount.
Output voltage range	0 to +10V
Power supply	100VAC±10%, approx. 8VA
Outer dimensions	144(W)×72(H)×180(D)mm (not including protruded section) (Fiber part: FS-540; 1m, FS-542/5500; 2m)
Weight	Approx. 1kg

#### ■Features

- Thin rotating shaft and a target in a limited space can be measured.
- High performance type, even a minute amount light change or light and dark is detected without being affected by disturbance light.
- Analog, pulse output

## Digital Tachometer

### ■TM-3100 series Digital Tachometer



#### ■Specifications

Input signal	Square wave 0.2 to 45 Vrms Rectangular wave Hi: +4 to +30V Lo: -1 to +1V (at pulse width: 5 μs or more)
Input frequency range	Square wave; 1Hz to 100 kHz Rectangular wave; 0.1Hz to 100 kHz
Measurement accuracy	Display value×(±0.01%)±1 count or less
Measurement method	Periodic calculation method
Display device	Fluorescent display tube
External power supply	12VDC±10% Max. 100mA
Input terminal	M3, free terminal screw
Power supply	100 to 240VAC, 50/60Hz
Outer dimensions	96(W)×48(H)×148(D)mm
Weight	Approx. 340g

#### ■Features

- Able to add more functions by optional cards.
- TM-3110: Display only
- TM-3120: BCD output
- TM-3130: Analog output
- TM-3140: Comparator output
- TM-0301 to 0350: Options

### ■TM-5100 Multifunction Digital Tachometer



#### ■Specifications

Number of input ch	2ch
Measurement method	Periodic calculation method, Gate calculation method (switch type)
Input frequency range	Square wave; 1Hz to 100kHz Rectangular wave; 0.0006Hz to 100kHz (Pulse width 4 μs or more)
2ch calculation function	Difference (B-A), Ratio (B/A×100), Fluctuation ratio (B-A/A×100)
Main display	7 segment green LED Display range; 0 to ±999,999
Sub display	LCD module
Comparator function	Output item; UPPER/GOOD/LOWER
Analog output	Voltage range; 0 to ±10V/F.S.
BCD output	6-digit parallel, Open collector
RS-232C communication	Baud rate; 2400, 4800, 9600 bps
Operating temperature range	0 to +40°C
Power supply	100 to 240VAC, 50/60Hz, 45VA or less
Outer dimensions	144(W)×72(H)×180(D)mm (not including protruded section)
Weight	Approx. 1.5kg

#### ■Features

- 2ch calculation function (rotation speed difference, rotation speed ratio, rolling reduction, draw, rotation fluctuation ratio, rotation direction)
- Dual display (main and sub)

## Digital Handheld Tachometer

### ■FT-2500 Advanced Tachometer/ FFT calculation method



#### ■Specifications

Input signal voltage	±12V, ±0.5V (FT-0501, and others) ±5V, ±0.5V, ±0.05V (IP, NP, MI, OM, VP or others)
Input signal frequency	500Hz, 2kHz, 10kHz (3 frequency ranges) 3.75Hz to 10kHz
Input connector	BNC304(BNC), R03-RB6F
Output function	Analog, pulse, comparator output
Interface	RS-232C
Applicable detector	OM-1200/1500, VP-202/1220, IP-292/296/3000A/3100, NP-3000 series, FT-0501/0801, MI series, current probe, etc.
Power supply	100 to 240VAC, 50/60Hz
Operating temperature range	0 to +40°C
Outer dimensions	144(W)×72(H)×180(D)mm (not including protruded section)
Weight	Approx. 1.2kg

#### ■Features

- Able to use for vibration detector, displacement detector, magnetic flux detector, and current probe.
- Sensor attachment processing and reflective mark are not required.

### ■FT-7200 Advanced Handheld Tachometer/ FFT calculation method



#### ■Specifications

Input signal voltage	±5V, ±0.5V, ±0.05V
Input signal frequency	250Hz, 500Hz, 2kHz(3 frequency ranges) 3.75 Hz to 2 kHz
Input connector	C02 (BNC)
Output function	Analog, pulse output
Applicable detector	OM-1200/1500, VP-202/1220, IP-292/296/3000A/3100, NP-3000 series, FT-0501+0150/0801, MI series, etc.
Power supply	Size AAA alkaline battery×4 pcs. or an exclusive AC adapter
Battery life	Approx. 6 hours (when backlight OFF) Approx. 5 hours (when backlight ON)
Operating temperature range	0 to +40°C
Outer dimensions	66.0(W)×189.5(H)×47.5(D)mm
Weight	Approx. 230g (not including batteries)

#### ■Features

- Supports rotation speed changes, acceleration and deceleration speed.
- Enables calculation of rotation speed using sound and vibration, even its rotating shaft is not come out.
- Large size LCD with backlight
- Built-in averaging function

### ■HT-3200 Contact Type Handheld Digital Tachometer



#### ■Specifications

Detection method	Contact method
Rotation speed measurement range	0.5 to 10,000 r/min
Circumferential speed measurement range	0.05 to 1,000.0 m/min(when using KS-200) 0.5 to 10,000 mm/s (when using KS-100)
Display method	5-digit LCD 7 segment
Measurement time	1s (2s update in 0.5 to 10 r/min) Lo; 0.5 to 1249.9 r/min; within ±0.1 r/min 1250.0 to 2,000.0 r/min; within ±0.2 r/min Hi; 5 to 10,000 r/min; within ±1 r/min
Accuracy	±0.1% (within ±0.1 r/min)
Data hold function	Auto power off when 30 seconds have elapsed after the end of measurement.
Power supply	Size AAA alkaline battery cell×3pcs. (when alkaline batteries are used, at 20°C)
Battery life	Approx. 20 hours
Outer dimensions	63(W)×172(H)×38.5(D)mm
Weight	Approx. 160g (not including batteries)

#### ■Features

- Built-in memory function
- A large-size display (10.5mm character height)
- Both rotation and circumferential speed is available by changing attachment (contact tip or circumferential ring).
- Storage pocket for a circumferential ring provided
- Battery replacement time indicator is provided.

### ■HT-4200 Non-contact Type Handheld Digital Tachometer



#### ■Specifications

Detection method	Red visible ray photoelectric reflection method
Rotation speed measurement range	4 to 50,000 r/min
Measurement accuracy	When 30 to 12,499 r/min; within ±1 r/min (when using one reflective mark) When 12,500 to 24,999 r/min; within ±2 r/min When 25,000 to 50,000 r/min; within ±4 r/min
Display method	5-digit 7 segment LCD
Memory function	Number of memories; 10
Data hold function	Auto power off when 30 seconds have elapsed after the end of the measurement.
Pulse number setting function	Specified values: 1,2,3,4,6,8,P/R (number of reflective mark)
Detection distance	20 to 300mm
Power supply	Size AAA alkaline battery cell×3pcs.
Battery life	Approx. 20 hours (when alkaline batteries are used, at 20°C)
Outer dimensions	62(W)×129(H)×26.4(D)mm
Weight	Approx. 90g (not including batteries)

#### ■Features

- Built-in memory function
- A large-size display (10.5mm character height)
- Measurement of wide range from 30 to 50,000 r/min, in 1r/min resolution (when using one reflective mark)
- Applicable to multiple reflective marks
- Battery replacement time indicator is provided.

■HT-5500 Digital Handheld Tachometer (contact/non-contact type) — ■HR-6800 Digital Handheld Tachometer (high-speed type) —



**Specifications**  
 Detection method Red visible ray photoelectric reflection method  
 Contact method (contact adapter attached)  
 Measurement range r/min (Hi); 6 to 99999 (20000)  
 (When the contact adapter is used) r/min (Lo); 6.0 to 600.0  
 r/s ; 0.10 to 999.99 (400.00)  
 m/min ; 0.6 to 9999.9 (400.0)  
 Measurement accuracy Displayed value  $\times (\pm 0.02\%) \pm 1$  count  
 Analog output Output voltage; 0 to 1 V/0 to F.S.  
 (Full scale is specified by user.),  
 Conversion method; 10-bit D/A  
 Pulse output Output voltage  
 Hi; +4.5 V or more, Lo; +0.5 V or less  
 Power supply Size AAA alkaline battery cell  $\times 4$  pcs.  
 or an exclusive AC adapter  
 Battery life Approx. 32 hours (when backlight is OFF.)  
 Approx. 8 hours (when backlight is ON.)  
 Outer dimensions 66(W)  $\times$  180.5(H)  $\times$  47.5(D) mm  
 Weight Approx. 220g  
 (not including battery cell)

- Features**
- Built-in memory function, up to 20 data saving.
  - Built-in peak hold function, Max/Min value display while measuring
  - Large LCD with backlight
  - Continuous measurement available using a tripod



**Specifications**  
 Measurement object Dental rotating object, texturizing machine,  
 high-speed machine tools (Target measurement  
 objects must be magnetized)  
 Measurement unit 10 r/min (Rotation speed)  
 Measurement accuracy Display value  $\times (0.02\%) \pm 1$  count  
 Analog output Output voltage; 0 to 1 V/0 to F.S.  
 (Full scale is specified by user.)  
 Monitor output Analog output for monitor after the  
 shaping of the sensor signal waveform  
 (prior to pulse waveform conversion).  
 Pulse output Output voltage Hi; +4.5V or more, Lo; +0.5V or less  
 Power supply Size AAA alkaline battery cell  $\times 4$  pcs.  
 or an exclusive AC adapter  
 Battery life Approx. 13 hours (when backlight is OFF.)  
 Approx. 8 hours (when backlight is ON.)  
 Outer dimensions 66.0(W)  $\times$  189.5(H)  $\times$  47.5(D) mm  
 Weight Approx. 230g  
 (Main unit only, not including battery cells)

- Features**
- High rotation speed measurement with the MP-5350 (electromagnetic rotation detector) and high sensitivity amplifier.
  - Low to high-speed rotation measurement from 100 to 999,990 r/min.
  - Built-in memory function, up to 20 data saving

**Elevator Speedometer**

■EC-2100 Elevator Speedometer



**Specifications**  
 Measurement range Speed: 0.1 to 2,000.0 m/min  
 Rotation speed: 1 to 20,000 r/min  
 Distance (option): 0 to  $\pm 999$  mm<sup>1</sup>  
 Measurement accuracy  $\pm 1$  count  
 Measurement time: 10 ms  
 Resolution Speed: 0.1 m/min<sup>2</sup>,  
 Rotation speed: 1 r/min<sup>2</sup>,  
 Distance: 1 mm (option)  
 Analog output Output signal: Instantaneous value  
 Voltage range: 0 to 1V/0 to F.S.  
 Pulse output Output method: Transistor output (Open collector)  
 Number of pulses: 600 P/R/ 1 rotation  
 Pulse width: Approx. 0.5 to 1.2  $\mu$ s  
 Power supply Size AA alkaline battery  $\times 3$  pcs.  
 Battery life 15 hours or more  
 Outer dimensions 60(W)  $\times$  162(H)  $\times$  38(D) mm  
 Weight Approx. 423 g  
 (Including batteries/not including a circumferential ring)

- Features**
- Built-in analog output function
  - Built-in max. value hold function
  - Built-in memory function
  - Display of remaining battery level
  - Built-in auto power off function
  - Built-in averaging function

\*1: Up to  $\pm 5000$  mm is available, more than  $\pm 999$  mm is not guaranteed  
 \*2: Averaging times are 10 or more.

**Passing Velocity Speedometer**

■ST-1210 Linear Motion Speedometer (made to order)



Sub display LCD module  
 Measurement mode Speed / passing time measurement  
 Comparator function\* Setting range; 0 to 999999  
 Number of setting stages; 2  
 Output item; UPPER/GOOD/LOWER  
 Output type; Semi-conductor relay  
 (Each 1 make contact)  
 Analog output\* Conversion type; 12-bit D/A type  
 Voltage range; 0 to 10 V/F.S.  
 BCD output\* Output type; Open collector  
 RS-232C output\* Baud rate; 2400, 4800, 9600 bps  
 Operating temperature range 0 to +40°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 144(W)  $\times$  72(H)  $\times$  180(D) mm  
 (not including protruded section)  
 Weight Approx. 1300 g

**Specifications**  
 Signal input section Hi; +4 to +30V  
 Lo; 0 to +1V  
 Number of input ch 2ch (Ach & Bch)  
 External control signal input Hi; +4 to +5.25V  
 Lo; 0 to +1V

\*Cannot be used depending on the measurement mode

**Converter for Rotation Measurement**

■FV-1100 F/V Converter



**Specifications**  
 Conversion method Constant width pulse integration method  
 Input frequency range 10 kHz (100 Hz to 100 kHz: option)  
 Response 30 ms (depending on the option frequency)  
 Input voltage AC input:  
 Sine wave; 0.2 to 50 Vrms  
 Rectangular wave; 0.6 to 70 Vp-p  
 DC input:  
 Hi; +4 to +30 V,  
 Lo; -1 to +1V,  
 Pulse width 3  $\mu$ s or more  
 Input terminal Terminal block (3.5 M), BNC (C02)  
 Output voltage 0 to 10 V (0.1 V, 1 V, and 5 V: option)  
 Output current 4 to 20 mA (0 to 16 mA selectable)  
 Output terminal Terminal block (3.5 M)  
 Linearity  $\pm 0.2\%$  or less of the maximum rated value  
 Ripple 0.1% of the maximum rated value or up to 10 mV  
 Power supply 100 VAC + 10% to 15% or less, 46 to 63 Hz  
 Outer dimensions 245(W)  $\times$  99(H)  $\times$  180(D) mm  
 (not including protruded section)  
 Weight Approx. 2 kg

- Features**
- Withstand voltage 2000 VAC 1 minute
  - Power supply for detector (12 VDC, 100mA)
  - Power supply of a main unit can be modified (option)



**Specifications**  
 Input voltage AC input signal voltage range: 0.3 to 30 Vp-p  
 DC input signal voltage range: Hi; +4 to +30 V  
 Lo; +1 V or less  
 Input frequency range 0.2 Hz to 320 kHz  
 Input terminal BNC (C02), terminal block  
 Input format Single-phase, AC/DC/non-voltage (+12V  
 pull-up for open collector devices), Two-phase  
 signal with 90° phase difference (DC input only)  
 Filter OFF/20 kHz/120 kHz low-pass filter  
 Output voltage Full scale: 0 to 10V Resolution: 16-bit  
 Deviation: -5 to +5V  
 Temperature coefficient:  $\pm 0.02\%$ /F.S./°C  
 Linearity:  $\pm 0.2\%$ /F.S. (up to 180 kHz)  
 Output update time: 1 cycle + 3.5  $\mu$ s or less  
 Output current: 0 to 16 mA or 4 to 20 mA  
 Display Fluorescent display tube  
 Display unit Selectable from Hz, r/min, m/min or USER  
 Display range 0.02 to 320,000 Hz, 0.02 to 320,000 r/min\*  
 Operating power Exclusive adapter (accessory)  
 Operating temperature range 0 to +40°C  
 Outer dimensions 210(W)  $\times$  44(H)  $\times$  200(D) mm  
 (not including protruded section)  
 Weight Approx. 1 kg

\*Rotation speed is limited by maximum frequency

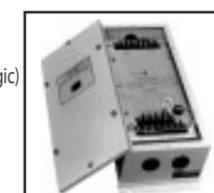
■DA-4130 D/A Converter



**Specifications**  
 Input signal BCD 5-digit and polarity  
 (TTL level, or open collector, positive logic)  
 D/A conversion quantity Upper, middle, or lower 3-digit of  
 5-digit measurement value  
 Conversion speed 40  $\mu$ s  
 Conversion accuracy  $\pm 0.1\%$   
 Output voltage 0 to  $\pm 10$  V (at 000 to  $\pm 999$ ),  
 Load resistance 1 k $\Omega$  or more  
 Output current 0 to  $\pm 16$  mA (at 000 to  $\pm 999$ ),  
 4 to 20 mA (option),  
 Load resistance 250  $\Omega$  or less  
 Operating temperature range 0 to +40°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 48(W)  $\times$  96(H)  $\times$  140(D) mm  
 (not including protruded section)  
 Weight Approx. 600g

- Features**
- Outputs the DC voltage/current signal proportional to the BCD input signal
  - Applicable model: DG-4120/4240/4320 /4340 and TM-3120

■PA-150 Isolated Signal Amplifier



**Specifications**  
 Input frequency range 1 Hz to 50 kHz  
 Input signal Sine wave or square wave (duty approx. 50%)  
 Input voltage Sine wave; 0.1 to 30 Vrms  
 Square wave; 0.3 to 30 Vp-p  
 Input/output terminal Terminal block  
 Output waveform Square wave  
 Output signal Collector output  
 Hi; +10V  $\pm 2$ V, Lo; +0.5V or less  
 Open collector output  
 Max. applied voltage; +40 V,  
 Max. input voltage; 50 mA  
 Power supply 12VDC  $\pm 5\%$ , Max. 100 mA  
 Power voltage 100VAC  $\pm 10\%$ , 50/60 Hz  
 Outer dimensions 146(W)  $\times$  112(H)  $\times$  332(D) mm  
 Weight Approx. 4 kg

- Features**
- The amplifier used for transmitting signals from the rotation/speed detector to the measurement/isolation device at distance.
  - A measure to external noise such as balanced input, float ground, filter or isolation.

**Line Speed/ Length Measurement**

■RP-7400 series Roller Encoder (low and middle speed/ length) —



**Specifications**  
 Roller outer circumference 200 mm (Allowance: 0 to -0.2 (at 20°C))  
 Number of output pulses Speed; 120 P/R, 1200 P/R  
 Length; 200 P/R  
 Speed range 0 to 600 m/min  
 Measurement unit 1200 P/R; 0.01 m/min  
 120 P/R; 0.1 m/min  
 200 P/R; 1 mm  
 Output waveform 2-phase square wave  
 Output voltage Hi; +10V or more, Lo; +0.5V or less  
 Output format Totem pole output (standard)  
 emitter output, collector output,  
 open collector output (options)  
 Applicable detector RV-3150, TM series  
 Operating temperature range 0 to +50°C  
 Vibration resistance 19.6 m/s<sup>2</sup> (each in three directions)(150 min)  
 Power supply 12VDC  $\pm 5\%$  (100 mA or less)  
 Weight Approx. 400g

- Features**
- Selectable pulse number: 120, 200, 1200 P/R
  - Totem pole output (standard)  
 Emitter output (option)  
 Collector output (option)  
 Open collector output (option)

TH series

Features

- High accuracy
  - TH-1000/2000 series:  $\pm 0.1\%$  / F.S.
  - TH-3000 series:  $\pm 0.2\%$  / F.S.
- Long service life:
  - Non-contact phase difference method is adopted in the rotating section and the signal detecting section
- Enables high rotation speed measurement (TH-2000 series/ TH-3000H series)
- Superior noise withstanding:
  - Line driver output with strong noise immunity
- Switching of the rotation direction (CW/CCW) is no longer required
- High-speed analog output
- No need for matching:
  - The matching is not required even when the cable length between the torque detector and TS-2800 Torque meter is changed. Cable can be extended up to 50m. (Signal cable: option)
- Applicable to CE marking and FCC (All TH series)
  - CE: EN61010-1, EN61326-1 FCC: Part 15B

Specifications

- TH-1000 series Torque Detector (For general use)
  - Mounting diameter is same as the SS series with same torque.
- TH-2000 series Torque Detector (For general use and high rotation speed)
  - Mounting diameter is same as the SS series with same torque.
- TH-3000(H) series Torque Detector (For micro torque)
  - (H: for high rotation speed)
  - Mounting diameter is same as the MD series with same torque.
- Applicable Torque Meter: TS-2800 Digital Torque Meter



TH-1000/2000 series

TH-1000 series (For general use)

Model name	Torque capacity (N · m)	Revolution range (r/min)
1204	2	6,000
1504	5	6,000
1105	10	8,000
1205	20	8,000
1505	50	6,000
1106	100	6,000
1206	200	6,000
1506	500	6,000

TH-2000 series

(For general use and high rotation speed)

Model name	Torque capacity (N · m)	Revolution range (r/min)
2204	2	20,000
2504	5	20,000
2105	10	20,000
2205	20	20,000



TH-3000(H) series

TH-3000 (H) series (For micro torque (H: for high rotation speed)) (H: Made to order)

Model name	Torque capacity (N · m)	Revolution range (r/min)
3502	0.05	15,000
3502H	0.05	25,000
3103	0.1	15,000
3103H	0.1	25,000
3203	0.2	15,000
3203H	0.2	25,000
3503	0.5	15,000
3503H	0.5	25,000
3104	1	15,000
3104H	1	25,000
3204	2	15,000
3204H	2	25,000

Flange Type High-Stiffness Torque Detector

TQ-2000(H) series Flange Type High-Stiffness Torque Detector



Specifications

Detection method Strain gauge type  
 Applicable torque meter TQ-5300  
 Linearity  $\pm 0.05\%$  / F.S. (includes hysteresis)  
 (Single frequency output, display value when connecting with the TQ-5300.)  
 Rotation detector and gear Accessory  
 Power supply Supplied from the TQ-5300

Model name	Torque capacity (N·m)	Revolution range (r/min)
2206/2206H	200	22,000 (25,000)
2506/2506H	500	22,000 (25,000)

\*Values within parentheses: optional specification

Features

- High-response:
  - Suitable for fluctuating torque measurement
- Supports high-speed revolution
- Standard specification: 22,000 r/min
- Optional specification: 25,000 r/min
- Slim and compact type, space saving design

TQ-5300 High-stiffness Torque Meter



Specifications

Measurement item Torque, revolution  
 Applicable detector Torque; 2000 (H) series  
 Revolution; MP-981/9820  
 Revolution detection 60, 120, 180, 240, 360, 720 (P/R) signal  
 Display method Fluorescent display tube  
 Display unit Torque; N·m, kN·m  
 Revolution; r/min  
 0 to  $\pm 10V$  / F.S.  
 Analog output Torque, revolution; Outputs after pulling up the open collector output to +5V with resistance 330 $\Omega$   
 Pulse output Torque, revolution; Outputs after pulling up the open collector output to +5V with resistance 330 $\Omega$   
 Comparator Torque 3ch, non-voltage contact output  
 Remote Revolution direction CW/CCW switchable input, auto zero input, measurement ready output  
 Power supply 24 VDC, (18 to 30 VDC)  
 Outer dimensions 170(W)  $\times$  49(H)  $\times$  150(D) mm (not including protruded section)  
 Weight Approx. 700g

Features

- Four kinds of digital interface (option)
  - Ether CAT<sup>®</sup>, PROFIBUS<sup>®</sup>, CAN, RS-232C
- Supports factor high resolution function (TQ-0521 option)
- Analog output of torque and revolution simultaneously

MD series Micro Capacity and High Rotation Speed Type (Made to order)



Specifications

Detection method Phase difference method using electromagnetic gears  
 Applicable torque meter TS-2800, TS-3200A  
 Overall accuracy  $\pm 0.2\%$  / F.S.  
 Applicable detector MD-0110 series (option)  
 Power supply 100 VAC  $\pm 10\%$ , 50/60 Hz

Model name	Torque capacity (mN · m)	Revolution range (r/min)
201C	2	10,000
501C	5	10,000
102C	10	10,000
202C	20	10,000

Features

- Low moment of inertia and small starting torque
- Wide revolution range
- Available up to 20,000 r/min by adjustment (Excluding MD-201C)

SS series Small/ Medium Capacity Type



Specifications

Detection method Phase difference method using electromagnetic gears  
 Applicable torque meter TS-2800, TS-3200A  
 Overall accuracy  $\pm 0.2\%$  / F.S.  
 Applicable detector MP-981 (option)  
 Power supply 100VAC  $\pm 10\%$ , 50/60 Hz

Model name	Torque capacity (N · m)	Revolution range (r/min)
002	0.2	6,000
005	0.5	6,000
010	1	6,000
020	2	6,000
050	5	6,000
100	10	8,000
200	20	8,000
500	50	6,000
101	100	6,000
201	200	6,000
501	500	6,000
102	1000	5,000
202	2000	5,000

Features

- In-stock items, cost effective type
- Wide revolution range
- Excellent at overload resistance

DD series Radial/ Thrust Load Resistance Type / High Rotation Speed Type (Made to order)



Specifications

Detection method Phase difference method using electromagnetic gears  
 Applicable torque meter TS-2800, TS-3200A  
 Lubricating system Dropping lubricating system  
 Overall accuracy  $\pm 0.2\%$  / F.S.  
 Applicable detector Cannot be attached to the main unit  
 Power supply 3-phase 200 VAC, 50/60 Hz

- Radial/Thrust Load Resistance Type
- High-Speed Rotation Type

Model name	Torque capacity (N · m)	Revolution range (r/min)
505	50	10,000
106	100	10,000
206	200	10,000
1506B	500	8,000
1107B	1,000	8,000
1207B	2,000	8,000
507	5,000	6,000
108	10,000	4,000

Model name	Torque capacity (N · m)	Revolution range (r/min)
503	0.5	20,000
104	1	20,000
204	2	20,000
504	5	20,000
105	10	20,000
205	20	20,000

TS-2800 Digital Torque Meter



Specifications

Measurement item Torque, revolution  
 Applicable detector Torque; Phase difference type torque detector by Ono Sokki  
 Revolution; MP-981/9820  
 Display method LCD  
 Display unit Torque; N · m, Revolution; r/min  
 Analog output Torque;  $\pm 10V$ ,  
 Time constant SS type; 63/500 ms  
 TH type; 1.6/16/63/500 ms  
 Revolution; 10V (at 200 to 100,000 r/min),  
 Time constant SS type; 63 ms  
 TH type; Outputs with one cycle delay  
 Digital output BCD, RS-232C  
 Power supply 100 to 240 VAC, 28VA or less  
 Outer dimensions 76(W)  $\times$  142(D)  $\times$  262(D) mm (not including protruded section)  
 Weight Approx. 2 kg

Features

- Can be connected all the phase difference type torque detectors made by Ono Sokki.
- Analog voltage is isolated and easy to connect to control system, data processing devices etc.
- Enables N-0 compensation

TS-3200A Digital Torque Meter



Specifications

Measurement item Torque, revolution, output  
 Applicable detector Torque; Phase difference method using gears torque detector by Ono Sokki  
 Revolution; MP-981/9820  
 Display method LCD (with backlight ON/OFF)  
 Display unit Torque ; mN·m, N·m, kN·m  
 Revolution; r/min, r/s, Hz  
 Output ; mW, W, kW, PS  
 Analog output 2ch, 1ch addition by installing the TS-0328 (option), Max.  $\pm 10V$ ,  
 Time constant 16ms to 64s\*  
 High-response software Outputs in every 1ms by using the TS-0321A (option)\*  
 Interface Sold separately, selectable from BCD, RS-232C, or GPIB  
 Power supply 100 to 240VAC, 75VA or less  
 Outer dimensions 360(W)  $\times$  99(H)  $\times$  301(D) mm (not including protruded section)  
 Weight Approx. 5 kg

Features

- 10 kinds of detector setting can be memorized.
- Displays maximum, minimum, p-p value, and absolute value
- Available panel fixing with optional mounting fixture
- 10 points of N-0 compensation for each CW, CCW

\*There are restrictions on detectors that can be used.

## Motor Torque Measurement Detector

### MT series Torque Detector for TS-8700



MT-82T52, MT-84M22 for small capacity (XYZ stage and base:option.)



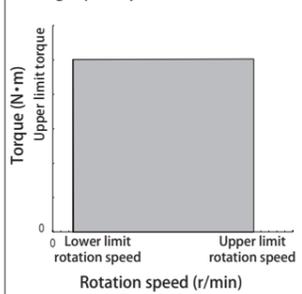
MT-82T25, MT-85M14 for medium capacity (Stand with XYZ stage:option.)

#### Specifications

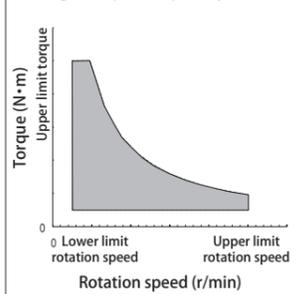
Type	Series	ID code	Torque (N·m)	Braking capability (W)	Rotation speed range (r/min)	Torque measurement accuracy (%/FS)
For torque ripple/cogging torque measurement	High performance type with TH (successor of MT-6200B series)	82T52	0.05	-	2 to 15	±0.2
		82T13	0.1	-	2 to 15	±0.2
		82T23	0.2	-	2 to 15	±0.2
		82T53	0.5	-	2 to 15	±0.2
		82T14	1	-	2 to 15	±0.2
		82T24	2	-	2 to 15	±0.1
		82T54	5	-	2 to 15	±0.1
		82T15	10	-	0.5 to 5	±0.1
		82T25	20	-	0.5 to 5	±0.1
		For torque ripple/cogging torque measurement	Standard type with MD/SS (successor of MT-6200B series)	82M21	0.002	-
82M51	0.005			-	0.5 to 5	±0.2
82M12	0.01			-	0.5 to 5	±0.2
82M22	0.02			-	0.5 to 5	±0.2
82M52	0.05			-	0.5 to 5	±0.2
82M13	0.1			-	0.5 to 5	±0.2
82M23	0.2			-	0.5 to 5	±0.2
82M53	0.5			-	0.5 to 5	±0.2
82M14	1			-	0.5 to 5	±0.2
82M24	2			-	0.5 to 5	±0.2
82M54	5	-	0.5 to 5	±0.2		
82M15	10	-	0.5 to 5	±0.2		
82M25	20	-	0.5 to 5	±0.2		

#### Braking capability (It can be used within the shaded range in the chart below.)

MT-82 series Driving capability chart of built-in motor



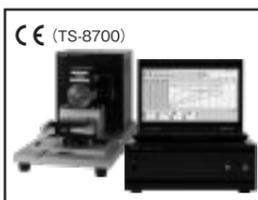
MT-84, MT-85 series Braking absorption capability chart



\* MT-84/85 series can be used within the upper range and the braking capability W. Braking capability W=Torque N·m × Rotation speed r/min × 0.10472

## Motor Torque Measurement

### TS-8700 Torque Station Pro



#### Features

Torque measurement system for motor basic property with high precision and high response. Using with the motor torque detector MT series which includes the high accuracy and high response type TH series torque detector, up to 5.12 kHz sampling, ±0.1% of accuracy are achieved. Link with OC-1300 series, OS-2000 series helps effective data processing from measurement to data organization.

#### Specifications

Measurement target	: DC motor, AC motor (excluding stepping motor)
Measurement item	: Torque, rotation speed, voltage signal input data, temperature*, power meter digital input*
Torque input	: Use signals from Ono Sokki's exclusive detector (MD/SS,TH/TQ*), external torque analog input*
Rotation input	: Use signals from Ono Sokki's MP-981 or RP series detectors
Analog input	: 0 to ±10 V DC, 16 channels, 16 bit A/D
Temperature input	: Type T thermocouple*
Measurement accuracy	: Torque** ±0.1%/F.S.(TH-1000/2000,TQ*) ±0.2%/F.S.(MD/SS,TH-3000/H,TQ-1505*) Revolution speed** ±0.02%/F.S. ±1 count Analog Linearity: ±0.1%/F.S. or less (1 second average) Temperature drift: ±0.01%/F.S./°C Conversion accuracy: within ±[0.5% of span + 0.5 °C (thermosensitive element accuracy)] **After N-0 compensation. 1-second averaged value. Excluding the influence of fluctuation component which comes from equipment component and resonance component including the measurement target.
Computing equation	: 4 operations (four arithmetic operations) Can be defined calculation items from input signal, existing computed data
Measurement condition setting	: Setting of torque detector, revolution detector
Control method	: Revolution/torque
Measurement mode	: Automatic/Manual (can be saved with a file name)
Measurement function	: Fixed value, Sweep, Step, Pattern
Monitor display	: Numeric value display: Max. 100 items can be displayed simultaneously
Trend display	: Time axis display

\*: option

Type	Series	ID code	Torque (N·m)	Braking capability (W)	Rotation speed range (r/min)	Torque measurement accuracy (%/FS)
TN/TI characteristics measurement	High performance type with TH (successor of MT-6400B series)	84T22	0.02	5	100 to 9,000	±0.2
		84T52	0.05	8	100 to 11,000	±0.2
		84T13	0.1	12	100 to 20,000	±0.2
		84T23	0.2	23	100 to 15,000	±0.2
		84T53	0.5	75	100 to 12,000	±0.2
		84T14	1	75	100 to 12,000	±0.2
		84T24	2	160	100 to 10,000	±0.1
		84T54	5	200	100 to 10,000	±0.1
		84T15	10	350	100 to 7,000	±0.1
		84T25	20	600	100 to 7,000	±0.1
	High performance type with TH (successor of MT-6500B series)	85T14	1	20	5 to 1,800	±0.1
		85T24	2	50	5 to 1,800	±0.1
		85T54	5	130	5 to 1,800	±0.1
		85T15	10	320	5 to 1,800	±0.1
		85T25	20	450	5 to 1,800	±0.1
TN/TI characteristics measurement	Standard type with MD/SS (successor of MT-6400B series)	84M22	0.02	5	100 to 20,000	±0.2
		84M52	0.05	8	100 to 20,000	±0.2
		84M13	0.1	12	100 to 20,000	±0.2
		84M23	0.2	23	100 to 15,000	±0.2
		84M53	0.5	75	100 to 12,000	±0.2
		84M14	1	75	100 to 12,000	±0.2
		84M24	2	160	100 to 10,000	±0.2
		84M54	5	200	100 to 10,000	±0.2
		84M15	10	350	100 to 7,000	±0.2
		84M25	20	600	100 to 7,000	±0.2
	Standard type with SS (successor of MT-6500B series)	85M14	1	20	5 to 1,800	±0.2
		85M24	2	50	5 to 1,800	±0.2
		85M54	5	130	5 to 1,800	±0.2
		85M15	10	320	5 to 1,800	±0.2
		85M25	20	450	5 to 1,800	±0.2

## Rotary Encoder

### RP-1700 series General purpose industrial type (Bottom-mount/Flange-mount type)



Bottom-mount type RP-1710/20 series



Flange-mount type RP-1730/40 series

#### Features

- Excellent resistance to shock and load of shaft
- High resolution, wide range of output pulse types (61 types, max. 120000 P/R)
- Line driver output can be selected for long distance transmission
- Worldwide power supply (AC and DC)
- Selectable connection for either terminal board or connector
- IP65 (Applicable by affixing an oil seal to the rotating shaft and selecting terminal board as an option)
- RP-1710 and 1720 are successors of RP-110 series.
- RP-1730 and 1740 are successors of RP-130 series.

#### Specifications

Output waveform	2-phase square waveform
Output voltage	Hi; +10V or more, Lo; +0.5V or less
Output method	Totem pole: Load resistance 470 Ω or more *Collector: Load resistance 10k Ω or more *Open collector: DC 40V, 50 mA or less *Line driver *: option
Power supply	100VAC (50 mA) to 240VAC (63 mA) / 12VDC (83 mA) to 24VDC (42 mA)
Response frequency	100 kHz (500 kHz for line driver output)
Connection method	Terminal board or connector

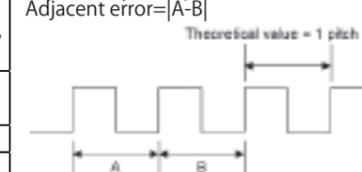
#### Adjacent error

Adjacent error	Number of pulses (P/R)
1/200 P or less	60, 100, 180, 250, 256, 300, 750, 4500, 6000
1/8.3 P or less	120, 200, 240, 360, 400, 500, 512, 600, 720, 900, 1000, 18000, 22500, 24000, 30000
1/4.6 P or less	480, 800, 1440, 1800, 2000, 2048, 2400, 2500, 2560, 7500, 36000, 45000, 48000, 60000
1/3.3 P or less	960, 1600, 2880, 4000, 4096, 4800, 72000, 96000
1/2.5 P or less	3600, 5000, 5120, 15000, 90000, 120000

\*When rotation fluctuation measurement is performed with pulse interval, use the pulse of adjacent error 1/200 P.

Max. rotation speed	5000 r/min
Allowable shaft load	Radial 80N Thrust 50N
Starting torque	15 mN·m * When the rotating shaft is affixed with an oil seal.
Moment of inertia	161 g·cm <sup>2</sup>
Weight	3.7 kg
Operating temperature range	-5 to +55°C
Storage temperature range	-20 to +70°C
Humidity	95%RH (40 °C / 8h, the rotating shaft is affixed an oil seal, with no condensation)
Protection class	IP65 (When selected terminal board and oil seal)
Vibration resistance	98 m/s <sup>2</sup> (Axial direction for 4h, up/down/left/right for 2h each)
Shock resistance	980 m/s <sup>2</sup> (Three times each in X, Y and Z directions)
Number of output pulses	60, 100, 120, 180, 200, 240, 250, 256, 300, 360, 400, 480, 500, 512, 600, 720, 750, 800, 900, 960, 1000, 1024, 1200, 1250, 1280, 1440, 1500, 1600, 1800, 2000, 2048, 2400, 2500, 2560, 2880, 3000, 3600, 3750, 4000, 4096, 4500, 4800, 5000, 5120, 6000, 7500, 9000, 12000, 15000, 18000, 22500, 24000, 30000, 36000, 45000, 48000, 60000, 72000, 90000, 96000, 120000 P/R

Adjacent error is an absolute value of pitch variation between any two adjacent pulses.  
Adjacent error=|A-B|



### SP-405ZA Series Ultra-compact Type (Some output pulses are made to order)



#### Features

- Economy type response to OEM
- Ultra compact and light weight (φ38 mm, approx. 100g)
- Two-phase square wave and zero mark signal output
- 13 types of output pulses

#### Specifications

Output waveform	2-phase square waveform + zero mark
Output voltage	Hi; Power -20V or more Lo; +0.5V or less
Output method	*Open collector: 30 V DC, 35 mA or less
Power supply	5 to 12 VDC ±10% (50 mA)
Response frequency	100 kHz
Connection method	Direct connected cable (1 m)
Max. rotation speed	16000 r/min
Allowable shaft load	Radial 25N Thrust 15N
Starting torque	2 mN·m

Moment of inertia	6 g·cm <sup>2</sup>
Weight	Approx. 0.1 kg
Operating temperature range	-10 to +70°C
Storage temperature range	-20 to +80°C
Humidity	90%RH (no condensation)
Protection class	IP40
Vibration resistance	98 m/s <sup>2</sup> (X,Y,Z direction for 2h)
Shock resistance	980 m/s <sup>2</sup> (Three times each in X, Y and Z directions)
Number of output pulses	Standard 60, 100, 200, 300, 360, 500, 600 P/R Option 40, 50, 250, 400, 800, 900 P/R/60

### RP-432Z Series Compact Multi-use Type



#### Features

- Compact and economical design for general purpose
- Ideal for OEM applications
- 5VDC or 12VDC operation
- Easy-to-use signal output connector
- Two-phase square wave and zero mark square wave outputs

#### Specifications

Output waveform	2-phase square waveform + zero mark
Output voltage	5 V power is used: Hi; +4 V or more, Lo; +0.2 V or less 12 V power is used: Hi; +10 V or more, Lo; +0.3 V or less
Output method	Totem-pole: Load resistance 1 kΩ or more
Adjacent error	±1/20 P
Power supply	5 VDC ±5% (100 mA) or 12 VDC ±5% (100 mA)
Response frequency	50 kHz

Connection method	7-core connector (cable side: TRC116-12A10-7F)
Max. rotation speed	5000 r/min
Allowable shaft load	Radial 20N Thrust 10N
Starting torque	1.5 mN·m
Moment of inertia	24 g·cm <sup>2</sup>
Weight	Approx. 0.25 kg
Operating temperature range	0 to +50°C
Storage temperature range	-20 to +80°C
Humidity	85%RH (40 °C / 8h, no condensation)
Vibration resistance	49 m/s <sup>2</sup> (X,Y,Z direction for 2h)
Shock resistance	490 m/s <sup>2</sup> (Three times each in X, Y and Z directions)
Number of output pulses	120, 360, 600, 1000, 1024

## Rotary Encoder Related Product

### PA-330Z Isolated Pulse Transmitter



#### Specifications

Input waveform Square wave (Duty: approx. 50%)  
 Input resistance 470Ω  
 Input voltage Hi; +8 to +12.5V  
 Lo; 0 to +4V  
 Response frequency 50 kHz  
 Delay time Approx. 2 μs between input and output  
 Output voltage Hi; +10±2V (5kΩ load)  
 Lo; +0.5V or less (5kΩ load)

#### Features

- Receives the square wave signals from the rotary encoder with photo coupler, and converts it to low impedance signals suitable for long distance transmission after isolation, amplifying, and wave-shaping by the light.
- Provides 12VDC power to the rotary encoder.

Output resistance Collector resistance 330Ω  
 Supplied power 12VDC, 0.15A  
 Power requirement 100VAC, approx. 12VA  
 Operating temperature range -5 to +40°C  
 Weight Approx. 4 kg  
 Option Open collector output  
 Change of power-supply voltage  
 Change of input/output resistance

### RV-3150 Reversible Counter



#### Specifications

Sensor input signal Single phase or 90° phase difference rectangular wave  
 Voltage signal (Hi; +4 to +30V, Lo; 0 to +1V)  
 Line receiver (compliant to RS-422A)  
 Input frequency range DC to 100 kHz  
 Power supply for sensor 5±0.25VDC, 12±0.6VDC (selectable)  
 External control signal Type of input signal:  
 Reset, gate, offset, key protect  
 Format of input signal:  
 Voltage input (Hi; +4 to +5.25V, Lo; 0 to +1 V) non-voltage contact input

#### Features

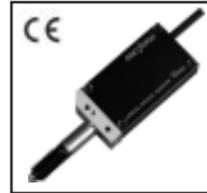
- Multiplication ratio switching, ratio compensation, offset, decimal point selection and counting direction selection
- External output: Comparator (4 kinds of comparator setting values can be stored as conditions), analog, BCD, RS-232C communication

#### Function

Multiple (1/2/4),  
 Ratio (0.000001 to 0.999999),  
 Offset (0 to ±999999),  
 Comparator (setting range: 0 to ±999999, 2-step display)  
 Outer dimensions 144(W)×72(H)×180(D) mm (not including protruded section)  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Weight Approx. 1.3 kg

## Digital Linear Gauge Sensor

### BS-1210/1310 Baby Gauge Sensor



#### Features

- Ultra compact design
- Conforms to protection class IP66 (dust-proof and splash-proof)
- High durability, high vibration resistance, high shock resistance

#### Specifications

Model name	BS-1210	BS-1310
Measurement range (mm)	10	
Resolution (μm)	10	1
Accuracy (at +20°C) (μm)		3
Max. spindle velocity* (m/s)	1(4)	0.3(1.2)
Measurement force (downward) (N)		1.47 or less
Protection class		IP66
Stem diameter (mm)		Φ8 <sup>+0</sup> <sub>-0.03</sub>
Operating temperature range (°C)		0 to +50
Outer dimensions (mm) (Whole length)		94.5
Weight (g) (including cable, connector)		Approx. 110

\*When used with Ono Sokki's Gauge Counter. The values within parentheses ( ) is the maximum spindle velocity with the DG-4320/4340/5100. (AA-8910 conversion cable is required for connecting with the DG-5100.)

### GS-7710A/7710NA Pen-figured Type



#### Features

- Φ8 mm slim body
- Conforms to protection class IP67 (dust-proof and splash proof)
- 2 types provided: standard stem, nut-mounted stem type

#### Specifications

Model name	GS-7710A	GS-7710NA
Measurement range (mm)		10
Resolution (μm)		0.5*
Accuracy (at +20°C) (μm)		2
Max. spindle velocity* (m/s)		0.5
Measurement force (downward) (N)		1.08 or less
Protection class		IP67
Stem diameter (mm)	Φ8 <sup>+0</sup> <sub>-0.022</sub>	Φ9 <sup>+0</sup> <sub>-0.02</sub>
Operating temperature range (°C)		-10 to +55
Cable length (m)		Approx. 2
Outer dimensions (mm) (Whole length)		112.8
Weight (g) (including cable, connector)		Approx. 140

\*Please use with the DG-2310/4320/4340/5100. (AA-8910 conversion cable is required for connecting with the DG-5100.)

### GS-3813B/3830B High Resolution Type



#### Features

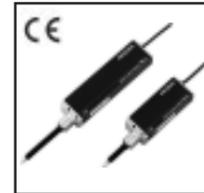
- High resolution (0.1 μm) type
- Conforms to protection class IP66G (vibration resistance structure, dust-proof, splash-proof and oil-proof)
- Achieve longer bearing life and high environment resistance

#### Specifications

Model name	GS-3813B	GS-3830B
Measurement range (mm)	13	30
Resolution (μm)		0.1
Accuracy (at +20°C) (μm)		1
Max. spindle velocity* (m/s)		0.3(1.2)
Measurement force (downward) (N)	2.3 or less	2.7 or less
Protection class		IP66G
Stem diameter (mm)		Φ15 <sup>+0</sup> <sub>-0.009</sub>
Operating temperature range (°C)		0 to +40
Outer dimensions (mm) (Whole length)	146.5	218.5
Weight (g) (including cable, connector)	Approx. 350	Approx. 420

\*The values within parentheses ( ) is the electrical response velocity when using the DG-5100.

### GS-1713A/1730A/1813A/1830A Basic Type



#### Features

- Compact general purpose
- Conforms to protection class IP64 (dust-proof and splash-proof)
- Cut or modified signal cable connector is not applicable to CE marking.
- Using ball bearing increases the maximum number of sliding times of the spindle.

#### Specifications

Model name	GS-1713A	GS-1730A	GS-1813A	GS-1830A
Measurement range (mm)	13	30	13	30
Resolution (μm)		10		1
Accuracy (at +20°C) (μm)		3		3
Max. spindle velocity* (m/s)		1(4)		0.3(1.2)
Measurement force (downward) (N)	1.3 or less	1.9 or less	1.3 or less	1.9 or less
Protection class				IP64
Stem diameter (mm)				Φ15 <sup>+0</sup> <sub>-0.009</sub>
Operating temperature range (°C)				0 to +40
Outer dimensions (mm) (Whole length)	141.5	205.5	141.5	205.5
Weight (g) (including cable, connector)	Approx. 250	Approx. 310	Approx. 250	Approx. 310

\*When used with Ono Sokki's Gauge Counter. The values within parentheses ( ) is the maximum spindle velocity with the DG-4320/4340/5100. (AA-8910 conversion cable is required for connecting with the DG-5100.)

### GS-6713A/6730A/6813A/6830A Vibration Resistant Type



#### Features

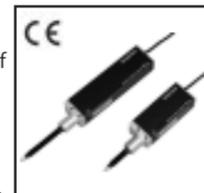
- Compact general purpose
- Conforms to protection class IP64 (dust-proof and splash-proof)
- Vibration resistant and shock resistant structure
- Suitable for mounting on automatic machine

#### Specifications

Model name	GS-6713A	GS-6730A	GS-6813A	GS-6830A
Measurement range (mm)	13	30	13	30
Resolution (μm)		10		1
Accuracy (at +20°C) (μm)		3		3
Max. spindle velocity* (m/s)		1(4)		0.3(1.2)
Measurement force (downward) (N)	1.3 or less	1.9 or less	1.3 or less	1.9 or less
Protection class				IP64
Stem diameter (mm)				Φ15 <sup>+0</sup> <sub>-0.009</sub>
Operating temperature range (°C)				0 to +40
Outer dimensions (mm) (Whole length)	141.5	205.5	141.5	205.5
Weight (g) (including cable, connector)	Approx. 250	Approx. 310	Approx. 250	Approx. 310

\*When used with Ono Sokki's gauge counter. The values within parentheses ( ) is the maximum spindle velocity with the DG-4320/4340/5100. (AA-8910 conversion cable is required for connecting with the DG-5100.)

### GS-4713A/4730A/4813A/4830A Tough Gauge Type



#### Features

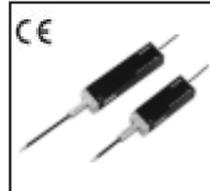
- Long life and high environment resistance
- Two times longer bearing life than the existing model
- Dust-proof, splash-proof and oil-proof (protection class IP66G)
- Cut or modified signal cable connector is not applicable to CE marking.

#### Specifications

Model name	GS-4713A	GS-4730A	GS-4813A	GS-4830A
Measurement range (mm)	13	30	13	30
Resolution (μm)		10		1
Accuracy (at +20°C) (μm)		3		3
Max. spindle velocity* (m/s)		1(4)		0.3(1.2)
Measurement force (downward) (N)	1.8 or less	2.4 or less	1.8 or less	2.4 or less
Protection class				IP66G
Stem diameter (mm)				Φ15 <sup>+0</sup> <sub>-0.009</sub>
Operating temperature range (°C)				0 to +40
Outer dimensions (mm) (Whole length)	145.5	209.5	145.5	209.5
Weight (g) (including cable, connector)	Approx. 325	Approx. 385	Approx. 325	Approx. 385

\*When used with Ono Sokki's gauge counter. The values within parentheses ( ) is the maximum spindle velocity with the DG-4320/4340/5100. (AA-8910 conversion cable is required for connecting with the DG-5100.)

## GS-5050A/5100A/5051A/5101A Long Stroke Type



### Features

- Long stroke type
- Protection class IP5X
- Displacement measurement of large objects such as building materials and large molded products can be measured with high accuracy

### Specifications

Model name	GS-5050A	GS-5100A	GS-5051A	GS-5101A
Measurement range (mm)	50	100	50	100
Resolution ( $\mu\text{m}$ )	10			
Accuracy (at +20°C) ( $\mu\text{m}$ )	10	12	4	5
Max. spindle velocity* (m/s)	1(4) 0.3(1.2)			
Measurement force (downward) (N)	2.9 or less	5.2 or less	2.9 or less	5.2 or less
Protection class	IP5X			
Stem diameter (mm)	$\Phi 15^{+0}_{-0.009}$			
Operating temperature range (°C)	0 to +40			
Outer dimensions (mm) (Whole length)	258.5	355	258.5	355
Weight (g) (including cable, connector)	Approx. 570	Approx. 655	Approx. 570	Approx. 655

\*When used with Ono Sokki's Gauge Counter. The values within parentheses ( ) is the maximum spindle velocity with the DG-4320/4340/5100. (AA-8910 conversion cable is required for connecting with the DG-5100.)

## Digital Gauge Counter

### DG-5100 0.1 $\mu\text{m}$ Resolution Type



### Specifications

Applicable gauge sensor GS-3813B/3830B\*  
 Display method Fluorescent display tube 7-digit  
 Input signal 90° phase difference square wave signal  
 Line driver output method or voltage output method

External control input signal Hold, reset  
 Peak hold function MAX, MIN, RANGE (MAX to MIN)  
 Offset function 0 to  $\pm 9999999$   
 Factor function 0.001 to 1000  
 Operating temperature range 0 to +50°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 96(W)  $\times$  48(H)  $\times$  148(D) mm  
 Weight Approx. 370g

\*When using other than GS-3800 series sensor, conversion cable AA-8910 is required.

### Features

- Function can be added by the optional board DG-0522: BCD output (open collector)
- DG-0530: Analog output (voltage/ current)
- TM-0340: Comparator output card
- TM-0350: RS-232C card
- TM-0301: DC power card

### DG-4340 Color Comparator Display Type



### Specifications

Display method Liquid crystal display 5.5 digits and polarity (-)  
 Display range 0.000 to  $\pm 199.999$  mm or 0.00 to  $\pm 1999.99$  mm  
 Applicable sensor BS/GS series linear gauge sensor (GS-3800 series is not applicable.)  
 Input signal 90° phase difference sine wave signal DC to 300 kHz

Comparator 5 digits polarity  
 I/O BCD open collector output  
 External control command Reset, hold, comparator, start, stop, busy  
 Operating temperature range 0 to +40°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 72 (W)  $\times$  72(H)  $\times$  114(D) mm  
 Weight Approx. 300g

### Features

- Pass/fail judgment with backlight of the LCD (red: NG/ green: OK) according to the setting value of comparator
- Multiplication switching/ offset/ Multiplier setting function
- BCD output: Open collector output (positive/ negative logic switchable)
- MAX, MIN, RANGE (MAX to MIN) calculation function
- DG-0430 power supply (12V)

### DG-4320 Open Collector BCD Type



### Specifications

Display method Liquid crystal display 5.5 digits and polarity (-)  
 Display range 0.000 to  $\pm 199.999$  mm or 0.00 to  $\pm 1999.99$  mm  
 Applicable sensor BS/GS series linear gauge sensor (GS-3800 series are incompatible)  
 Input signal 90° phase difference square wave signal, DC to 300 kHz

External control command (BCD connector) Reset, hold, start, stop, busy  
 Digital output BCD open collector output  
 Operating temperature range 0 to +40°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 72(W)  $\times$  72(H)  $\times$  114(D) mm  
 Weight Approx. 300g

### Features

- Multiplication switching/ offset/ Multiplier setting function
- BCD output: Open collector output (positive/ negative logic switchable)
- MAX, MIN, RANGE (MAX to MIN) calculation function
- DG-0430 power supply (12V)

### DG-2310 2ch with Addition/Subtraction Function



Display method Main display; Polarity (-) & 6 digits of number in red LED  
 Sub display; LCD 16 words  $\times$  2 lines  
 Comparator output display; UPPER (red), GOOD (green), LOWER (red)  
 Input signal 90° phase difference sine wave DC to 100 kHz  
 External control input signal Input method; Voltage input, Non-voltage contact input

Input type ; Reset, Peak hold, Hold, Key protect  
 Output signal (BCD, polarity, judgment, error); open collector  
 BCD input/ output signal  
 Analog output signal 0 to  $\pm 10$  V/ F.S. (F.S. is optionally setting)  
 RS-232C communication Baud rate; 2400/4800/9600 bps  
 Comparator output signal Output item ; LOWER/ GOOD/ UPPER  
 Output amount; Max. contact amount 30 VDC, 0.1A  
 Peak hold function Maximum value (MAX), Minimum value (MIN), Max. value - Min. value (RANGE)

Offset function Setting range; 0 to  $\pm 9999999$   
 Resolution 0.5  $\mu\text{m}$ , 1  $\mu\text{m}$ , 10  $\mu\text{m}$   
 switching function  
 Operating temperature range 0 to +40°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 144(W)  $\times$  72(H)  $\times$  180(D) mm (not including protruded section)  
 Weight Approx. 1.3 kg

### Features

- With addition/ subtraction function: Ach, Bch, (A+B)ch, (A-B)ch
- Various calculation functions: MAX, MIN, RANGE (MAX-MIN)
- 0.5  $\mu\text{m}$  resolution with the combination with the GS-7000 series

### Specifications

Applicable sensor: GS/BS series gauge sensor (GS-3800 series are not applicable)  
 Number of inputs: 2ch

## Digital Linear Gauge Related Product

### DG-0010/0020 Signal Conversion Box



DG-0010

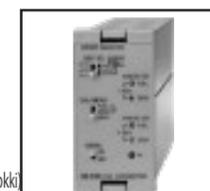
### Features

- Compact signal converter
- DG-0010: Open collector output
- DG-0020: Line driver output
- Direct connection to a PLC is available

### Specifications

Amplification format 2ch waveform shaped  
 Signal waveform 90° phase difference signal in square wave  
 Input level Hi; +3 to +5.25 V, Lo; 0 to +1.4 V  
 Input impedance Approx. 47 k $\Omega$   
 Frequency range DC to 300 kHz (When using sensor of Ono Sokki)  
 Open collector output Withstand voltage; Max. 30 V (max)  
 Sink current ; 100mA (max)  
 Residual voltage ; 1V or less  
 Line driver output Hi; +2.5 V or more  
 Lo; +0.5 V or less  
 Operating temperature range 0 to +40°C  
 Power voltage 12 to 24 VDC  
 80 mA or less (at 12VDC) (DG-0010)  
 120 mA or less (at 12VDC) (DG-0020)  
 Outer dimension 23 (W)  $\times$  29 (H)  $\times$  90 (D) mm (not including protruded section)  
 Weight Approx. 100 g

### DA-4130 D/A Converter



### Specifications

Input signal BCD 5 digits and polarity (TTL level or open collector, positive logic)  
 D/A conversion range Upper, middle or lower 3 digits of BCD 5 digits  
 Conversion time 40  $\mu\text{s}$  or less  
 Output voltage 0 to  $\pm 10$  V (at 000 to  $\pm 999$ )  
 Load resistance 1 k $\Omega$  or more  
 Output current 0 to  $\pm 16$  mA (at 000 to  $\pm 999$ )  
 (4 to 20 mA: option)  
 Load resistance 250  $\Omega$  or less  
 Operating temperature range 0 to +40°C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 Outer dimensions 48(W)  $\times$  96(H)  $\times$  140(D) mm (not including protruded section)  
 Weight Approx. 600 g

### Features

- 3 ranges selectable by changeover switch
- Conversion accuracy is  $\pm 0.1\%$  when conversion speed is 40  $\mu\text{s}$
- Applicable models DG-4120/4240/4320/4340, TM-3120 etc.

### RQ-2110 Digital Printer



- Creating D (Displacement) chart which shows the time-series change of measurement data
- Display and print out of pass/fail judgment with LED and a printer

### Specifications

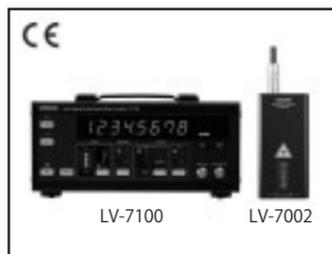
Combined digital DG-525H/825/925 linear gauge  
 Printing method Line thermal 384 dot  
 Printing speed 1 line/ 0.8s  
 Power supply AC adapter (6V/ 2A), size AA alkaline battery (LR6) or nickel hydrogen battery (Ni-MH)  $\times$  4  
 Weight Approx. 390 g (only main unit)  
 Outer dimensions 94(W)  $\times$  75.2(H)  $\times$  201(D) mm  
 Accessory AC adapter, printing paper 1 roll, strap

### Features

- Various statistics parameters: Number of samples (N), max. value (MAX), min. value (MIN), range (R), average value (X), standard deviation ( $\sigma$ ,  $\sigma n - 1$ ), process capability index (CP, CPK), number of faults ( $\pm$ NG), percent defective (P)

## Non-contact Length Meter/ Speedometer

### LV-7000 Series Laser Doppler Surface Velocity Meter



#### Overview

LV-7000 series detects speed, uneven speed, moving distance, length of moving object or rotating object by non-contact detection with high sensitivity and high response. You can install and measure easily in the place where had been difficult in measurement so far. (Laser safety class: Class 2) The LV-7000 series enables evaluation of product features and helps to understand the phenomena more accurately. Non-contact and accurate laser detection is useful for improving parts quality, and useful for reducing loss of material.

#### Specifications

##### <LV-7002 Laser Doppler Surface Velocity Sensor>

Detection method	Laser Doppler system, back-scattering differential type	Detection range (depth)	±4mm detection error: ±0.2 (of reading) % or less
Distance accuracy	±0.2 % or less (At 25°C by distance evaluation on the standard surface of Ono Sokki)		±10mm detection error: ±5 (of reading) % or less
Laser safety class	Class 2 IEC60825-1: 2007: 2014 (JIS6802:2014)	Detection speed range	0 to ±1800 m/min
Laser beam spot size	2mm x 1mm	Max. tracking acceleration	800 m/s <sup>2</sup> or more
Center of detection length	200 mm *from the bottom surface of the sensor	Outer dimensions	75(W)x 40(H) x 155(D) mm
		Weight	Approx. 750 g (not including cable/ option)

##### <LV-7100 Laser Doppler Surface Velocity Meter Controller>

Detection velocity range	0 to ±1800 m/min (option: 0 to ±3600 m/min)	Max. display length	9999.999 m
Tracking acceleration	800 m/s <sup>2</sup> : When [FAST] is selected at RESPONSE(1600 m/s <sup>2</sup> : option) 400 m/s <sup>2</sup> : When [SLOW] is selected at RESPONSE(800 m/s <sup>2</sup> : option)	Unit selection	Speed unit: m/s, mm/min, m/min Distance unit: m, mm
Speed output voltage	±10 V (20 Vp-p)	Serial interface	RS-232C
Speed range	5 ranges: (180 (m/min)/V to 1 (m/min)/V)	Operating temperature	0 to 40°C
Low-pass filter	OFF (5 kHz)/ 1 kHz/ 300 Hz	Operating humidity	20 to 80%
Phase difference output	90° ±60° Output format: Line driver output/ Totem-pole output Pulse width (A, B Phase): Dividing ratio; 1to 256	Input voltage	100 to 240 VAC 50/60Hz
Display unit	7-segment LED (green) 7-digit +polarity (1-digit)	Power consumption	Less than 70 VA
		Outer dimensions	310(W)x 135(H)x 176(D) mm or less (not including handle/protruded section)
		Weight	Approx. 3 kg (Controller only)

#### Features

- Non-contact and no-load detection with laser light hardly gives affection on a measurement target, such as slippage, scratches due to scratching, wrinkles, deformation, etc.
- "Laser Safety Class 2", no need of safety requirement for detection such as laser protection glasses, laser control regions/controller.
- Indicator on a compact sensor allows you easily to check and make positioning the target and operating condition at the same time.
- High speed response of 800 m/s<sup>2</sup>. Steep start and stop from zero speed are able to be detected.
- Selectable from speed output, phase difference output and RS-232C.
- By installing the option, speed and acceleration twice the standard speed can be detected.

## Roller Encoder

### RP-7400 series Roller Encoder (low and middle speed/ length) — RV-3150 Reversible Counter



#### Specifications

Roller outer circumference	200 mm (Allowance: 0 to -0.2 (at 20°C))
Number of output pulses	Speed; 120 P/R, 1200 P/R Length; 200 P/R
Speed range	0 to 600 m/min
Measurement unit	1200 P/R; 0.01 m/min 120 P/R; 0.1 m/min 200 P/R; 1 mm
Output waveform	2-phase square wave
Output voltage	Hi; +10V or more, Lo; +0.5V or less
Output format	Totem pole output (standard) Emitter output, collector output, open collector output (option)
Applicable detector	RV-3150, TM series
Operating temperature range	0 to +50°C
Vibration resistance	19.6 m/s <sup>2</sup> (Each in three directions: X, Y, Z) (150 minutes each)
Power source	12VDC±5% (100 mA or less)
Weight	Approx. 400g

#### Features

- Selectable pulse number: 120, 200, 1200 P/R
- Totem pole output (standard)  
Emitter output (option)  
Collector output (option)  
Open collector output (option)



#### Specifications

Sensor input signal	Single phase or 90° phase difference rectangular wave Voltage signal (Hi; +4 to +30V, Lo; 0 to +1V) Line receiver (compliant to RS-422A)
Input frequency range	DC to 100 kHz
Power supply for sensor	5±0.25VDC, 12±0.6VDC (selectable)
External control signal	Type of input signal: Reset, gate, offset, key protect
Format of input signal:	Voltage input (Hi; +4 to +5.25V, Lo; 0 to +1 V) non-voltage contact input
Function	Multiple (1/2/4), ratio (0.000001 to 0.999999), offset (0 to ±999999), Comparator (setting range: 0 to ±999999, 2-step display)
Outer dimensions	144(W)×72(H)×180(D) mm (not including protruded section)
Power supply	100 to 240 VAC, 50/60 Hz
Weight	Approx. 1.3 kg

#### Features

- Multiplication ratio switching, ratio compensation, offset, decimal point selection and counting direction selection
- External output: Comparator (4 kinds of comparator setting values can be stored as conditions), analog, BCD, RS-232C communication

## Electrostatic Capacitance-type Non-contact Thickness/ Displacement Meter

### CL-5610/5610S Non-contact Thickness Meter (CL-5610S: made to order)



#### Features

- Minimum display resolution: 0.02 μm (When using VE-2011/5010/5011 sensor and CL-0200 High-resolution calculation function option)
- Maximum measurement gap is 8 mm (When using VE-8020/8021 sensor)
- Up to 11.5 m separation between the main unit (CL-5610S) and a sensor.
- Easy to view with fluorescent display tube
- Gap and thickness outputs as analog voltage, and judgment output by comparator function. (CL-0110 Output function (option) is used)
- Thickness of the insulator such as glass or plastic can be measured (CL-0300 Insulator measurement function (option) is used)
- Stable measurement even the grounding impedance of the measurement target is high (CL-0210 High impedance grounding mode function (option) is used.)

#### Specifications (CL series Non-contact Thickness Meter)

Model name	CL-5610	CL-5610S
Measurement item	Thickness, gap (A, B)	
Display mode	Measurement value, deviation value, maximum value, minimum value, max-min value (Range)	
Linearity (10 to 100 % at F.S.)	±0.15 % F.S., when attached high resolution calculation function option (CL-0200): ±0.12 % F.S.	
Sensor cable	1.5 m	
Gap converter	Built-in the main unit	CL-0420 (2.5 m length signal cable is supplied as standard, can be optionally extended up to 10 m.)
Measurable objects	Conductors, semiconductors, insulators	
Display	Fluorescent display tube	
Comparator function	Available when CL-0110 output function (option) is attached, [Setting value] upper and lower limit value, [Number of outputs] 3, Open collector output (three window comparator or three conditions (UPPER/OK/LOWER))	
Analog output	Available when CL-0110 output function (option) is attached, [Output voltage] ±5 V, [Output signal] [SENS-A/ SENS-B terminal] Gap signal of sensor A, B, [A-OUT terminal] select from THICK/GAP-A/GAP-B/A-B	
Applicable printer	DPU-414	
Power supply	100 to 240 VAC, 50/60 Hz	
Operating temperature range	0 to +40°C (guaranteed accuracy range 23±2°C)	
Outer dimensions	210(W) x 99(H) x 275 (D) mm (not including protruded section)	210(W) x 99(H) x 275 (D) mm, CL-0420: 56(W) x 42.4(H) x 122(D) mm (not including protruded section)
Weight	Approx. 4.2 kg	Approx. 4.2 kg, CL-0420: Approx. 0.5 kg

### VT-5210/5220/5710/5720 Non-contact Displacement Meter (made to order)



#### Features

- Measurement range: wide range of 20 μm to max. 8 mm
- ±0.2 % F.S. of measurement accuracy (combination of converter and sensor) (VT-5210/5710)
- Max. 10 kHz high frequency response: High speed response in dynamic change (VT-5220/5720)
- Since it is non-contact, there is no influence to the measurement object
- All conductors can be measured- Not be affected by color, roughness, reflectivity, and light of measurement object.
- Compact converter ideal for application of embedded system (VT-5710/5720)

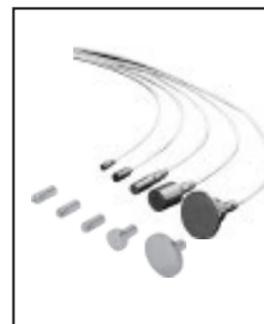
#### Measurement target

Objects made with a conductor material

#### Specifications (VT series Electrostatic capacitance type converter)

Model name	VT-5210	VT-5220	VT-5710	VT-5720
Detection method	Electrostatic capacitance-type			
Output	0 to 5 V/ 0 to 100% F.S			
Linearity (10 to 100 % at F.S.)	±0.2% F.S.	±0.25% F.S.	±0.2% F.S.	±0.25% F.S.
Temperature characteristics	±0.05% F.S./°C or less			
Response frequency	DC to 4 kHz	DC to 10 kHz	DC to 4 kHz	DC to 10 kHz
Indicated section	0 to 100 %/ LED (divided into 20)		0 to 100 %/ LED (divided into 10)	
Operating temperature range	0 to +40°C (guaranteed accuracy range: 23±2°C)			
Power requirement	100 to 240 VAC, 10 VA		±15VDC (±0.5 V or less), 100mA	
Outer dimensions	95(W) x 150 (H) x 195 (D) mm (not including protruded section)		56 (W) x 42.4 (H) x 122 (D) mm (not including protruded section)	
Weight	Approx. 2 kg		Approx. 500g	

### VE series Electrostatic capacitance-type Gap Detectors (VE-5011: made to order)



#### Overview

VE series is a displacement sensor with high accuracy which can measure the gap between the sensor and measurement target. Used together with the VT series (non-contact displacement meter) or CL series (non-contact thickness meter), it demonstrates its best performance for thickness/shape measurement of target objects, and for vibration measurement of rotating shafts or rotating surface (turbine, electric motors, compressors, machine tools etc.).

- Cable for VE series (1.5 m)

Exclusive cable for connector connection type sensor

VL-1520: straight connector for both sides

VL-1521: L-shape – straight connector

#### Specifications

	VE-2011	VE-5011	VE-1021	VE-8021
Measurement range (μm)	20 to 200	50 to 500	100 to 1000	800 to 8000
Diameter of target (mm)	φ3 (hold part φ10)	φ6 (hold part φ10)	φ8 (hold part φ10)	φ40 (hold part φ10)
Cable connecting method	Connector (using exclusive cable (1.5 m))			
Operating temperature range	0 to +80°C			

	VE-5010	VE-1020	VE-1520	VE-3020	VE-8020
Measurement range (μm)	50 to 500	100 to 1000	150 to 1500	300 to 3000	800 to 8000
Diameter of target (mm)	φ6	φ8	φ10	φ20	φ40 (hold part φ20)
Cable connecting method	Directly attached cable (1.5 m)		Connector (using exclusive cable (1.5 m))		
Operating temperature range	0 to +80°C				

## FFT Analyzer

### CF-9200/9400 Portable 2ch/4ch FFT Analyzer



#### Overview

The CF-9200/9400 is all-in-one portable 2 ch/4 ch FFT Analyzer. Two on-board, large capacity lithium ion secondary batteries enable continuous cordless operation up to 5 hours. The intuitive and light operation is possible by a large hard key and a capacitance type touch panel. New developed 100 kHz analysis front end has a 24-bit A/D converter, dynamic range 120 dB or more. Real-time FFT analysis at 100 kHz is possible.

#### Features

- 2ch/4ch 24-bit A/D isolation input
- High dynamic range of 120 dB or more
- Real-time 2ch/4ch 100 kHz FFT analysis
- Simultaneous recording and analysis
- Cordless driving with on-board secondary batteries
- Batteries can be changed while the power is ON
- Noise and vibration-free operation in a fan-less, spindle-less design
- Large hard key and touch panel allow quick operation
- Three amplitude values can be read out in real-time tripartite graph
- VC curve line can be displayed on 1/3 octave tripartite graph

- Cordless screen printing with the connection of Bluetooth<sup>®</sup>\*1
- Waveform observation and main body operation with a tablet terminal by wireless LAN connection<sup>†</sup>
- Applicable to RTA/ tracking analysis/ Log sweep analysis, excitation control<sup>†</sup>
- External control with LAN and automatic analysis with auto sequence function<sup>†</sup>

#### Specifications

A/D converter	24-bit $\Delta\Sigma$ Type
Frequency range	100 mHz to 100 kHz
Analysis points	Max. 6400 points
Voltage range	1 Vrms/ 31.62 Vrms (2 ranges)
Data record	2ch/ 4ch 100 kHz range (MAX)

#### Option

Model name	Product name
CF-0922	Tracking Analysis Function (software)
CF-0923	RTA Analysis Function (software)
CF-0942	Log sweep/ Excitation control function (software) <sup>2</sup>
CF-0947	LAN External Control Function (software)
CF-0971	1ch Signal Output Module (hardware)

\*1 Option

\*2 CF-0971 is required

### CF-4700 FFT Comparator



#### Features

- 1ch portable FFT analyzer
  - Dynamic range 110 dB or more
  - Directly touching the 8.4-inch color crystal liquid screen to input setting
  - Simultaneous storing of binary, text and BMP files to the main unit
  - Backup of memory data, condition memory to the PC or USB memory by using the USB interface
  - TEDS (Ver. 0.9, 1.0) applicable accelerometer and microphone can be used.\*
- \*TEDS information may not be read depending on the type of a TEDS tip included in a sensor.

#### Option

Model name	Product name
CF-0471	Tracking Analysis Function
CF-0472	Shape Comparator Function
CF-0473	Amplitude Modulation Component Extraction Function (band-pass envelope monitor function)
CF-0477*	USB Mass Storage Function
CF-0478	Power Source Backup Function

\* CF-0703 USB connection cable is attached.

#### Specifications

Number of CH	1ch
Input terminal	BNC (C02 type)
Processing function	Time-axis waveform, power/ Fourier spectrum, octave (1/1 bundled, 1/3 bundled), amplitude probability density function, amplitude probability distribution function
Frequency range	1 Hz to 40 kHz
Voltage range	1 Vrms, 31.62 Vrms (2 ranges)
Dynamic range	110 dB or more
Analysis point	Max. 16384 points/ 6400 lines
Preprocessing function	High pass filter (HPF) 1, 3, 10 Hz Low pass filter (LPF) 1 k, 10 kHz HPF: 10 Hz, LPF: 1 kHz conforms to vibration severity standards
AC adapter	100 to 240 VAC, 50/60 Hz
Outer dimensions	220 (W) x 185 (H) x 220 (D) mm (not including protruded section)
Weight	Approx. 3.3 kg (when full option is equipped)

## Acoustic Related Product

### MI-1271/1235/1433/1531 Measurement Microphone



#### Features

- Back electret type microphone
- MI-1271: 1/2-inch Back electret-type high performance microphone (Temperature characteristics, wide range, high sensitivity)
- MI-1235: 1/2-inch Back electret-type general-usage microphone (precision type)
- MI-1433: 1/2-inch Back electret-type general-usage microphone (standard type)
- MI-1531: 1/4-inch high performance microphone

#### Specifications

	MI-1271	MI-1235	MI-1433	MI-1531
Frequency range	1 Hz to 20 kHz	10 Hz to 20 kHz	20 Hz to 8 kHz	10 Hz to 100 kHz (without protection grid) 10 Hz to 20 kHz (with protection grid)
Response type	Free sound field type			
Bias voltage	0 V			
Sensitivity (re.1 V/Pa)	-26±1.5 dB 50 mV/Pa (1 kHz)	-29±3 dB 36 mV/Pa (1 kHz)		-48±3 dB 4 mV/Pa (250 Hz)
Max. sound pressure level	135 dB (when using MI-3170)	135 dB (when using MI-3111)		157 dB (when using MI-3140)
Self noise level (typical value)	14 dB (A) (when using MI-3170)	19 dB (A) (when using MI-3111)		30 dB (A) (when using MI-3140)
Operating temperature range	-30 to +80°C	-10 to +50°C		-30 to +60°C
Outer dimensions	φ 13.2x16.9 mm	φ 13.2x13.7 mm	φ 13.2x13.5 mm	φ 6.9x10.5 mm
Weight	Approx. 6 g			Approx. 1.5 g

### MI-3170/3111/3140 Microphone Preamplifier



#### Features

- Constant current type preamplifier
- MI-3170: Preamplifier for 1/2-inch Back electret-type high performance microphone
- MI-3111: Preamplifier for 1/2-inch Back electret-type microphone
- MI-3140: Preamplifier for 1/4-inch Back electret-type microphone

#### Specifications

	MI-3170	MI-3111	MI-3140
Applicable microphone	MI-1271/1235/1234/1233/1433/1432/1431	MI-1235/1234/1233/1433/1432/1431	MI-1531
Frequency range	1 Hz to 40 kHz	10 Hz to 20 kHz	10 Hz to 100 kHz
Self loss (Typical value)	0.15 dB	1.0 dB	0.25 dB
Max. output voltage	±8 V (peak) (sound pressure conversion 135 dB)	±5.6 V (peak) (sound pressure conversion 135 dB)	±8 V (peak) (sound pressure conversion 157 dB)
Self noise level (effective value)	3.3 μV or less (A)	5.0 μV or less (A)	2.5 μV or less (A)
Total harmonic distortion (at 1 kHz)	0.0316 % or less (Input effective voltage: 1V)	1 % or less (Input effective voltage: 3.15V)	3 % or less (Input effective voltage: 8V)
Operating temperature range	-30 to +80°C	-10 to +50°C	-30 to +60°C
Power voltage current	2 to 4.5 mA (18 to 26 VDC)	0.5 to 5 mA (15 to 25 VDC)	2 to 20 mA (15 to 25 VDC)
Outer dimensions	φ 12.7x80.5 mm	φ 12.7x63.5 mm	φ 6.35x44 mm
Weight	Approx. 35 g	Approx. 25 g	Approx. 5.5 g
Recommended signal cable	MX-1000 series	MX-2000 series	NP-0130 series + NP-0021 conversion connector

### MI-1271M12 TEDS Microphone



#### Features

- Microphone and preamplifier integrated type,
- Applicable to TEDS: IEEE 1451.4.2004

#### Specifications

MI-1271M12			
Response type	Free sound field	Input driving power	CCLD
Microphone sensitivity	-26.0±1.5dB re.1 V/Pa (50 mV/Pa)	Driving current	2 to 4.5 mA (rated value 4 mA)
Frequency range	1 Hz to 20 kHz (±2 dB)	Driving power voltage	18 to 26 VDC (rated value 24 V)
Electrostatic capacity	12 pF (typical value)	Output connector	C02 (BNC)
Max. sound pressure level (total harmonic distortion 3%)	135 dB or more	Outer dimensions	φ 13.2 x 91.9 mm
Self noise level (A-weighting)	14.0 dB (typical value)	Weight	Approx. 41 g
Operating temperature range	-30 to +80 °C	Accessory	Instruction manual x1, calibration chart x1, preamplifier holder (MI-0301)
Operating relative humidity range	0 to 90%RH (with no condensation)		

## Data Recorder

### DR-7100 Portable Data Recorder for Acoustics & Vibration



#### Features

- 4ch, 40 kHz range, 24-bit (\*40 kHz: option, 20 kHz: standard)
- Dynamic range: 90 dB (Frequency range 20 kHz, 1 V range, TYP)
- Input exclusive for rotation speed signal
- Unit synchronicity function option (Synchronize units to make the unit 8 channels)
- A5-size

#### Specifications

Number of CH	Input x4, rotation speed/ external trigger input x1, output x4, monitor PHONE output x1
Input terminal	BNC (Voltage input/ Switch to CCLD)
TEDS	Conforms to IEEE1451.4 (TEDS) (Ver. 1.0 or later)*
A/D converter	Quantization bit rate: 24-bit
Frequency range	DC to 100 Hz/ 500 Hz/ 1 kHz/ 5 kHz/ 10 kHz/ 20 kHz/ 40 kHz, 7 steps (*40 kHz: option)
Input voltage range	0.01 to 10 V (7 steps)

Rotation input	AC: sine wave or square wave DC: rectangular wave with pulse width 5 μs or more (Duty ratio: 20 % or more)
Dynamic range	90 dB or more (frequency range 20 kHz, 1 V range)
File format	ORF format (Ono Sokki Record Format)
Recording media	SD (capacity 256 MB), SDHC (Max. 32 GB) (Only the memory that operation has been checked can be used.)
Recording time	Up to 2 GB can be recorded continuously
Power supply	Battery cell (Type AA battery, alkaline or nickel hydride) x4 External DC: +10 to +18 VDC
Battery life	4.0 hours or more when nickel hydride 1900 mAh is used (frequency range: 20 kHz, 4ch, CCLD ON) 5.0 hours or more when nickel hydride 2400 mAh is used (frequency range: 20 kHz, 4ch, CCLD ON) Approx. 43 minutes (when 4ch recording), Approx. 174 minutes (when 1ch recording), 20 kHz range (sampling frequency 51.2 kHz, 24-bit, 2GB recording)

\* TEDS information may not be read depending on the type of a TEDS tip included in a sensor.

### SC-3120/2500/2120A Sound Calibrator



#### Features

- SC-3120  
Used for calibration of Class 1 and Class 2 sound level meter  
Since large sound pressure (114 dB) is generated, it reduces the influence of ambient noise.
- SC-2500  
Used for calibration of Class 1 and Class 2 Sound level meter  
Since the SC-2500 uses the sound pressure feedback control method to control fluctuations in sound pressure caused by static pressure, it can generate a stable sound pressure even if the operating environment changes. Cost-effective model.
- SC-2120A  
Dynamic speaker type  
Simple type for quick operation check, cost-effective model

#### Specifications

	SC-3120	SC-2500	SC-2120A
Applicable standard	IEC 60942:2003 Class 1/C JIS C 1515:2004 Class 1/C	IEC 60942:2017 Class 1 ANSI S1.40-2006 (R2011) JIS C 1515:2004 Class 1	IEC 60942:2003 Class 2 JIS C 1515:2004 Class 2
Method	Piston phone	Dynamic speaker	
Applicable microphone	1/2-inch microphone: MI-1211/1233/1234/1235/1271/1431/1432/1433 1/4-inch microphone: MI-1531 (SC-0313 adapter which is attached to MI-3140 1/4-inch preamplifier is required.)	1/2-inch microphone: MI-1431/1432/1433	
Sound pressure level	Nominal sound pressure level: 114 dB Sound pressure deviation: ±0.4 dB or less*	Nominal sound pressure level: 114 dB Sound pressure deviation: ±0.25 dB or less*	Nominal sound pressure level: 94 dB Sound pressure deviation: ±0.5 dB or less*
Distortion rate	2.5% or less		
Frequency	Nominal frequency: 250 Hz Frequency deviation: ±0.4% or less*	Nominal frequency: 1000 Hz Frequency deviation: ±0.5% or less*	Nominal frequency: 1000 Hz Frequency deviation: ±1% or less*
Operating environment	Air temperature: -10 to +50°C (with no condensation), Static pressure: 65 to 108 kPa, Relative humidity: 25 to 90% (Excluding a combination of air temperature and humidity that exceeds dew-point temperature of 39°C or higher.)		
Power requirement	Size AA battery (R6P or LR6) × 3	Size AA battery (LR6 or HR6) × 2	9 V flat battery (6F22 or 6LR61) × 1
Battery life	2.5 hours continuous operation (when using R6P)	4 hours continuous operation (when using LR6)	20 hours continuous operation (when using 6F22)
Outer dimensions (not including protruded section)	60(W)x38(H)x200(D) mm	84(W)x53(H)x76(D) mm	52(W)x45(H)x130(D) mm
Weight (not including battery cells)	Approx. 600 g	Approx. 200 g	Approx. 300 g

\*The value under the standard environment (standard environmental condition: air temperature: 23 °C, static pressure: 101.325 kPa, relative humidity: 50 %)

### SR-2210 2ch Sensor Amplifier



#### Specifications

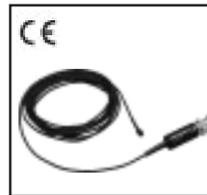
Operating frequency range 1 Hz to 20 kHz ( $\pm 0.5$  dB) (Output load impedance 100 k $\Omega$  or more)  
 Gain -10, 0, 10, 20, 30, 40, 50, 60 dB  
 Frequency weighting characteristics A/C/FLAT (Z) (Applicable standard: IEC 61672-1, JIS C 1509-1)  
 Output cutoff frequency Approx. 0.2 Hz (load impedance 100 k $\Omega$  or more)  
 Approx. 0.4 Hz (load impedance 50 k $\Omega$  or more)

#### Features

- 2ch input
- Connection to CCLD type microphone preamplifier or accelerometer
- Providing frequency weighting filter (A, C)

Input/output connector BNC (C02)  
 Power supply Size AA batteryx4 or exclusive AC adapter  
 Battery life 20 hours or more (with alkaline battery cell (LR6)x4)  
 Outer dimensions 140(W)x40(H)x125(D) mm (not including protruded section)  
 Weight Approx. 500 g (with batteries)

### MB-2200M10 Ultraminiature Microphone



#### Specifications

Sensitivity (1 kHz) -37.0  $\pm$  3 dB re.1 V/Pa (14 mV/Pa)  
 Frequency (1 kHz reference) 200 Hz to 16 kHz ( $\pm 2.5$  dB)  
 Max. sound pressure level 114 dB or more  
 Inherent noise level 36 dB or less (A-weighting)  
 Operating temperature range -30 to +80  $^{\circ}$ C (within 2500 mm from tip of the sensor part), 0 to +50  $^{\circ}$ C (until the connector part of a preamplifier)  
 Storage humidity range 0 to 90 % RH (with no condensation)  
 Operating humidity range -10 to +60  $^{\circ}$ C (sensor section, preamplifier section)  
 Storage temperature range 0 to 90 % RH (with no condensation)  
 Power requirement CCLD (Constant current drive)/ 2.2 mA to 4.9 mA (Rated 4.0 mA)/ 18 V to 26 V DC (Rated 24 V)  
 Outer dimensions Sensor: 4.7 (W) x 7.1 (D) x 3.3 (H) mm  
 Preamplifier:  $\phi$  13.6 x 46.8 mm (including BNC connector)  
 Cable : 2850 mm (including bush)  
 Weight Approx. 48 g (sensor section only: approx. 0.3 g)

#### Features

- Ultra compact. Easy sound pressure measurement even in limited spaces.
- Super lightweight. Can be fixed with double-sided tape
- Stable measurement at multiple-point
- TEDS supported, conforms to CE marking

## Accelerometer

### NP-3000 series (single-axis) Accelerometer with Built-in Preamplifier



#### Features

- Built-in preamplifier reduces cable noise influence.
- Direct input to FFT Analyzer CF-9200/9400/7200A\*, DS series, Vibration comparator VC-2200/3200, and Portable data recorder for acoustics & vibration DR-7100.

\*Discontinued product

#### Specifications

Model name	NP-3211	NP-3412	NP-3414	NP-3418	NP-3110	NP-3120
Features	Ultra compact, lightweight	Compact, lightweight	Compact, lightweight	Compact, lightweight	Compact, general-purpose usage	General-purpose usage
Sensitivity	1.02 mV/(m/s <sup>2</sup> ) $\pm$ 15%	1 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	1 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	1 mV/(m/s <sup>2</sup> ) $\pm$ 10%	0.5 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	1 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB
Weight	0.5 g	5.5 g	3.5 g	1.9 g	5.4 g	20 g
Frequency range	0.3 Hz to 20 kHz $\pm$ 3 dB	0.8 Hz to 16 kHz $\pm$ 3 dB	0.8 Hz to 16 kHz $\pm$ 3 dB	0.8 Hz to 16 kHz $\pm$ 3 dB	5 Hz to 15 kHz $\pm$ 3 dB	5 Hz to 12 kHz $\pm$ 3 dB

Model name	NP-3121	NP-3130	NP-3131	NP-3310	NP-3331B
Features	General-purpose usage, floating	High sensitivity	High sensitivity, floating	Waterproof, directly attached cable	Waterproof, CE, floating
Sensitivity	1 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	10 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	10 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	1 mV/(m/s <sup>2</sup> ) $\pm$ 1 dB	5 mV/(m/s <sup>2</sup> ) $\pm$ 10%
Weight	34 g	46 g	69 g	59 g (not including cable)	50 g
Frequency range	5 Hz to 10 kHz $\pm$ 3 dB	5 Hz to 10 kHz $\pm$ 3 dB	5 Hz to 8 kHz $\pm$ 3 dB	5 Hz to 10 kHz $\pm$ 3 dB	2 Hz to 10 kHz $\pm$ 3 dB

### NP-3000 series (tri-axial) Accelerometer with Built-in Preamplifier



#### Features

- CCLD built-in preamplifier reduces cable noise influence
- Direct input to FFT Analyzer CF-9200/9400/7200A\*, DS series, Vibration comparator VC-2200/3200, and Portable data recorder for acoustics & vibration DR-7100

\*Discontinued product

#### Specifications

Model name	NP-3560B	NP-3572	NP-3574
Features	Compact tri-axial, 10 mm Cube	General-purpose, tri-axial, 14 mm Cube	General-purpose, tri-axial, 14 mm Cube
Sensitivity	1.02 mV/(m/s <sup>2</sup> ) $\pm$ 10%	1 mV/(m/s <sup>2</sup> ) $\pm$ 10%	10 mV/(m/s <sup>2</sup> ) $\pm$ 10%
Weight	5.3 g	8.1 g	8.1 g
Frequency range	2 Hz to 5 kHz $\pm$ 5% (X-axis) 2 Hz to 10 kHz $\pm$ 5% (Y, Z-axis)	1 Hz to 5 kHz $\pm$ 10% (X, Y-axis) 1 Hz to 8 kHz $\pm$ 10% (Z-axis)	1 Hz to 5 kHz $\pm$ 10% (X, Y-axis) 1 Hz to 8 kHz $\pm$ 10% (Z-axis)

### NP-3000 series Accepts TEDS\* Accelerometer with Built-in Preamplifier



#### Features

- Accepts TEDS\* (IEEE1451.4 Ver.1.0)
- When connecting TEDS\* accepted unit, unique information (sensitivity, serial number, etc.) of the sensor can be read.
- Tri-axial cube type (NP-3576N20, 3578N20), 14 mm Cube shape, adhesive attachment on any surface except for connector surface
- CE marking applicable (NP-3331N30). More accurate measurement even in the vibration measurement of machine generating electromagnetic noise.

\*TEDS: Transducer Electronic Data Sheet

#### Specifications

Model name	NP-3576N20	NP-3578N20	NP-3331N30
Features	General-purpose tri-axial, 14 mm Cube	General-purpose tri-axial, 14 mm Cube	Simple waterproof, CE, floating
Sensitivity	1 mV/(m/s <sup>2</sup> ) $\pm$ 10%	10 mV/(m/s <sup>2</sup> ) $\pm$ 10%	5 mV/(m/s <sup>2</sup> ) $\pm$ 10%
Weight	11.1 g	11.1 g	50 g
Frequency range	1 Hz to 5 kHz $\pm$ 1 dB (X-axis) 1 Hz to 8 kHz $\pm$ 1 dB (Y, Z-axis)	1 Hz to 5 kHz $\pm$ 1 dB (X-axis) 1 Hz to 8 kHz $\pm$ 1 dB (Y, Z-axis)	2 Hz to 4 kHz $\pm$ 5% 2 Hz to 10 kHz $\pm$ 3 dB

### NP-2000 series Charge Output Type Accelerometer



#### Features

- Due to charge output type, it can be used under high temperature (160 $^{\circ}$ C, NP-2710 : 260 $^{\circ}$ C)
- Low-frequency (5 Hz or less) vibration measurement is available
- Applicable charge amplifier: CH-1200A, 6130, 6140\*
- \*Charge converter for direct input to FFT Analyzer CF-9200/9400/7200A\*\*/DS series, Vibration comparator VC-2200/3200 and Portable data recorder for acoustics & vibration DR-7100.

\*\*Discontinued product

#### Specifications

Model name	NP-2106	NP-2110	NP-2910	NP-2810
Features	Ultra compact, lightweight, directly attached cable	Compact, lightweight, directly attached cable	Compact, general-purpose	Compact
Sensitivity	0.035 pC/(m/s <sup>2</sup> ) $\pm$ 20%	0.16 pC/(m/s <sup>2</sup> ) $\pm$ 2 dB	0.3 pC/(m/s <sup>2</sup> ) $\pm$ 20%	1.2 pC/(m/s <sup>2</sup> ) $\pm$ 2 dB
Weight	0.2 g (not including cable)	0.6 g (not including cable)	2 g	12 g
Frequency range	fc to 20 kHz $\pm$ 3 dB	fc to 20 kHz $\pm$ 3 dB	fc to 20 kHz $\pm$ 3 dB	fc to 15 kHz $\pm$ 3 dB

Model name	NP-2120	NP-2506	NP-2710
Features	General-purpose usage	Ultra compact, tri-axial, directly attached cable	Compact, high-temperature
Sensitivity	5 pC/(m/s <sup>2</sup> ) $\pm$ 2 dB	0.04 pC/(m/s <sup>2</sup> ) $\pm$ 20%	0.306 pC/(m/s <sup>2</sup> ) $\pm$ 10%
Weight	25 g	1.2 g (not including cable)	2 g
Frequency range	fc to 12 kHz $\pm$ 3 dB	fc to 20 kHz $\pm$ 3 dB	Applicable to 260 $^{\circ}$ C, fc to 20 kHz $\pm$ 3 dB

\*fc: Lower limit frequency which is decided by the number of time constant of charge amplifier.

## Calibrator for Accelerometer

### NP-0081N20 TEDS Adapter



#### Configuration

- The main unit and detector is one to one combination (cannot be combined with multiple detectors)
- When changing the combination detector or recalibrating it, rewriting the TEDS information is required before use.

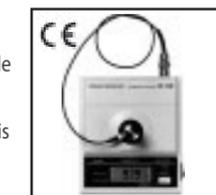
#### Specifications

TEDS standard IEEE1451.4-2004 Template Ver.1.0  
 Connector Sensor side; 10-32 Coaxial (miniature) Measurement side; C02 (BNC)  
 Applicable sensor NP-3000 series  
 Operating temperature range -40 to +85 $^{\circ}$ C  
 Outer dimensions  $\phi$  15 x 40 mm  
 Weight Approx. 20 g

#### Features

- Makes the accelerometer with built-in preamplifier being applicable to TEDS.
- Adds the TEDS function to the sensor without changing the sensor features.

### VX-1100A Accelerometer Calibrator



#### Specifications

Exciter frequency 159.2 Hz $\pm$ 1%  
 Exciter acceleration 10 m/s<sup>2</sup> (rms)  $\pm$ 3%  
 Excitation speed 10 mm/s (rms)  $\pm$ 4 %  
 Excitation displacement 10  $\mu$ m (rms)  $\pm$  5 %  
 Harmonic distortion rate 3 % or less  
 Sensitivity measurement  $\pm$ 3% $\pm$ 1 digit or less accuracy

#### Features

- Standalone unit having three functions of an exciter, sensor amplifier, and display
- Charge output type accelerometer and accelerometer with built-in preamplifier can be calibrated.
- With carrying case

Applicable accelerometer weight 110 g or less  
 Sensor power Constant current: 2.0 mA/4.0mA (switchable) Voltage 24V  
 Power requirement Size AA battery x 4  
 Battery life Approx. 8 hours (Detector weight: Approx. 25 g, with the use of alkaline dry cell battery)  
 Outer dimensions 120 (W) x 140 (H) x 50 (D) mm (not including protruded section)  
 Weight Approx. 1 kg

\*BNC/miniature conversion adapter (NP-0021) is required depending on the model of the sensor.

Note: The VX-1100A cannot be used for NP-2106, 2506.

## Vibration Related Amplifier

### CH-1200A Charge Amplifier



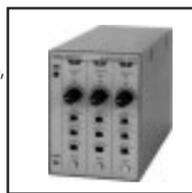
#### Specifications

Max. input charge	±100,000 pC
Frequency response function	Acceleration; 1.0 Hz to 15 kHz ±0.5 dB, 0.2 Hz to 50 kHz ±3 dB
	Velocity ; 3.0 Hz to 3 kHz ±0.5 dB
	Displacement; 3.0 Hz to 500 Hz ±1 dB (*160 Hz: 0 dB)
Rated output voltage	±10 V
Filter	HPF; Through, 3 Hz, 10 Hz (-18 dB/oct) LPF; Through, 1 kHz, 10 kHz (-18 dB/oct)
CAL signal	160 Hz ±5%, 1 Vo-p±2% sine wave (at 25°C ±3°C)
Sensitivity	0.01 to 999 pC/EU*
Input connector	Miniature connector(Model C25 by Tajimi Electronics Co., LTD, or equivalent)
Output connector	C02 type (BNC)
Operating temperature (humidity) range	-10 to +50°C (90% RH or less)
Power requirements	10 to 15 VDC, 120 mA at 12 V (When using exclusive AC adapter; 100 VAC)
Outer dimensions	28 (W) x 121 (H) x 194 (D) mm (not including protruded section)
Weight	Approx. 510 g *1 EU: Engineering unit

#### Features

- Oscillator for calibration built-in

### PS-1300 3ch Sensor Amplifier



#### Specifications

Frequency response function	Acceleration; 1.0 Hz to 30 kHz ±0.5 dB Velocity ; 3.0 Hz to 3 kHz ±0.5 dB/-1.0 dB Displacement; 3.0 Hz to 500 Hz ±1 dB (*160 Hz: 0 dB)
CCLD power	Constant current; 2.4 mA ±20%, voltage; +24 VDC
Number of channels	3ch
Rated output voltage	AC OUT ±5 Vmax
Input connector	Miniature connector(Model C25 by Tajimi Electronics Co., LTD, or equivalent)
Output connector	C02 type (BNC)
Filter	3rd Butterworth type, -18 dB/oct HPF; Thru, 3 Hz, 10 Hz LPF; Thru, 1 kHz, 10 kHz
Power supply	10 to 15 VDC, 300 mA or less at 12 VDC IN (When using the exclusive AC adapter; 100 VAC)
Operating temperature (humidity) range	-10 to +50°C (90% RH or less)
Outer dimensions	92(W) x 121 (H) x 194 (D) mm (not including protruded section)
Weight	Approx. 1 kg

#### Features

- Used in combination with a tri-axial accelerometer
- Fine adjustment of output gain is available
- High pass filter and low pass filter are installed for each channel

### VC-2200 Vibration Comparator (2-band)



#### Specifications

Input section	Number of input channels; 1ch
Analysis section	Band filter; (Number of setting bands; 2) HPF, LPF; THR, 100, 300, 500, 1 k, 3 k, 5 k, 10 k (Hz)
Calculation section	Measurement mode; rms value, peak value, max hold, peak hold switching selection, calculation display of each measurement value
Comparator output	Judgment factor is selectable for each band from rms value, peak value

\*Sensor, cable and magnetic base : option.

#### Features

- Digital display function
- With analog output
- Comparator gate input is available
- Headphone connection is available

#### General specifications

Power supply	24 VDC ±10%
Operating temperature range	0 to +50°C
Operating humidity range	85% RH or less (with no condensation)
Outer dimensions	DIN 96 x 96 x 112 mm
Weight	Approx. 500 g

### VC-3200 Vibration Comparator (3-band)



#### Specifications

Input section	Number of input channels; 1ch
Analysis section	Band filter; (Number of setting bands; 3) HPF, LPF; THR, 50, 100, 200, 300, 500, 1 k, 2 k, 3 k, 5 k, 10 k (Hz)
Calculation section	Measurement mode; rms value, peak value, peak/ maximum rms factor (peak/rms) value, max hold, peak hold, peak/ max rms factor (peak/rms) hold switching selection, calculation display of each measurement band
Comparator output	Judgment is made independently for each band. Judgment factor is selectable for each band from rms value, peak value, peak/ max rms factor value

\*Sensor, cable and magnetic base : option.

#### Features

- Digital display function
- With analog output
- Comparator gate input is available
- Headphone connection is available
- Condition/ data memory function are provided

#### General specifications

Power supply	24 VDC ±10%
Operating temperature range	0 to +50°C
Operating humidity range	85% RH or less (with no condensation)
Outer dimensions	DIN 96 x 96 x 112 mm
Weight	Approx. 500 g

### CH-6130/6140 Charge Converter



#### Specifications

Gain	1 mV/pC <sup>1</sup> (CH-6130), 10mV/pC <sup>1</sup> (CH-6140)
Frequency range	5 Hz to 15 kHz (±0.5 dB) <sup>2</sup> ; 2 Hz to 45 kHz (±3 dB) <sup>2</sup>
Max. output voltage	10 Vp-p or more
Output bias	10 VDC ±2 VDC
Driving power supply	Constant current; 2 to 20 mA, Voltage; 18 to 36 V
Input connector	Miniature connector (Screw No. 10 to 32 UNF)
Output connector	C02 (BNC plug)
Operating temperature range	0 to +50°C
Operating humidity range	85% RH or less
Outer dimensions	φ15 x 40 mm
Weight	Approx. 20 g

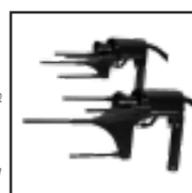
\*1: at 160 Hz  
\*2: The gain at 160 Hz to be 0 dB.  
Note: The output polarity is reversed.

#### Features

- Separate charge amplifier is not required.
- Direct connection to BNC connector which has CCLD\* function

\*CCLD:  
Constant Current Line Drive

### MI-5420A Sound Source Visualization Probe one



- Short-distance object measurement by a camera with wider viewing angle  
The measurement from close to a target produces less reflection waves and less environmental influences including noise, making it easier to detect the sound and vibration signals.

#### Specifications

Sound pressure sensitivity	-38 dB ±3 dB (0 dB = 1 V/Pa, 1 kHz)
Max. sound pressure level	110 dB (1 kHz, THD= 3%)
Self-noise level	39 dB (A weighting)
Operating temperature range	0 °C to 50 °C
Operating humidity range	80 % RH or less (with no condensation)
Storage temperature range	-10 °C to 60 °C
Storage humidity range	90 % RH or less (with no condensation)
Weight	120 mm probe head Approx. 785 g 60 mm probe head Approx. 655 g
Power source	DC24V, 4 mA/ch, CCLD
Camera	CMOS USB camera

#### Features

- Measurement in wider analysis frequency  
Sound source searching from 500 Hz to 8 kHz\*  
(\*recommended analysis frequency)

## Impulse Hammer

### GK-2110/3100/4110G20 Impulse Hammer



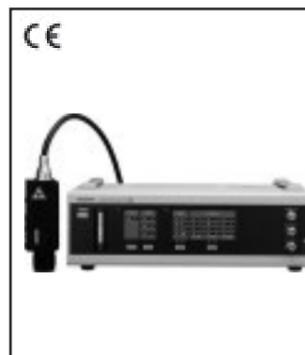
#### Features

- Checking of excitation, excitation force, and excitation band easily
- Selectable from three types of impulse hammers according to the measurement target
- Excitation force and excitation frequency band changeable by replacing the impact tip
- Built-in force sensor with built-in preamplifier enables direct connection to power supply unit or CCLD compatible analyzer

Model name	GK-2110	GK-3100	GK-4110G20
Measurement range	220 N	2,200 N	22,000 N
Detection element	Crystal piezoelectric element		
Sensitivity	22.5 mV/N	2.3 mV/N	0.23 mV/N
Resonance frequency	100 kHz or more	31 kHz or more	12 kHz or more
Excitation frequency range (when hard tip is used)	Up to 20 kHz	Up to 8 kHz	Up to 1 kHz
Hammer weight	Approx. 4.8 g (when attached with a plastic hammer handle)	Approx. 140 g	Approx. 1100 g
Head diameter	6.3 mm	15 mm	51 mm
Tip diameter	2.5 mm	6.3 mm	51 mm
Hammer length	107 mm	203 mm	370 mm
Output connector	Aluminum hammer handle: 5-44 coaxial connector Plastic hammer handle: directly attached cable, miniature connector (10-32)	BNC (C02)	BNC (C02)
Output signal	Voltage output with CCLD compatible	Voltage output with CCLD compatible	Voltage output with CCLD compatible, Applicable to TEDS
Output impedance	100 Ω or less		
CCLD power supply	2 to 20 mA, +18 to +30 VDC		

## Laser Doppler Vibrometer

### LV-1800 Laser Doppler Vibrometer



#### Features

- Compact, high-sensitivity, and high resolution non-contact vibration sensor with built-in interacting system to the sensor head.
- Laser radiation part can be checked on the PC screen with the LV-0181 built-in positioning camera on the sensor head.
- Excellent for measuring amplitude of piezoelectric element, micro-amplitude of MEMS or thin film, non-contact vibration detection of large structure, measurement of ultrasonic tool

#### Specifications

Frequency measurement range	0.3 Hz to 3 MHz <sup>*1</sup>
Velocity measurement range	0.3 μm/s to 10 m/s
Measurement distance	More than 100 mm
Laser spot	20 μm (at minimum measurement distance)
Light source	He-Ne Laser (632.8 nm 1mW or less)
Laser safety standard	Class 2

#### LV-1800 Laser Doppler Vibrometer

- LV-0181 Built-in positioning camera
- LV-0800 Small velocity range board
- LV-0111/0112 Acceleration/displacement output board
- LV-0121A Digital displacement meter<sup>\*2</sup>
- LV-0160 20MHz unit
- LV-3800 3D optical unit<sup>\*3</sup>
- LV-0383 3D microscope unit<sup>\*3</sup>
- LV-0381 Microscope unit

\*1: More than 0.01 Hz, less than 20 MHz ranges are available as options.

\*2: LV-0041 (connection set) is necessary for connecting with the LV-1800.

\*3: Signal operation system (option) is required.

## Sound Source Visualization System

### Sound Source Visualization System 4ch Beam Forming



#### Features

- Visualizing Sound Source using only 4 microphones  
Finds out the sound source location accurately by new calculation method of BeamForming.
- Real-time monitoring of sound source (20 times/sec.)  
You can monitor the occurring sound in real-time. Having good performance of follow-up, you can visualize various sounds including transient sound as well as stationary sound.
- Wide variety of sensor connection allows expanding analysis (up to 8 input channels)

#### System Configuration

- Sound Source Visualization Probe Microphone: MI-5420A
- BF Monitor: BF-3200
- BF Offline Analysis: BF-0310
- Time-series data analysis tool: OS-2720/0281
- Data Station: DS-3204/0371



#### Features

- Transient sound source search
- High time resolution: Approx. 20 (μsec/ sampling)
- Compact and lightweight, easy to handle

#### System Configuration

- 3D SI probe: MI-6420 (tetra-phone) (with small camera)
- Microphone amplifier: CF-0610
- Analyzer: DS-3104/3204 (DS-2104)
- EI analysis software

#### Specifications

Position accuracy	±5° (within the camera angle)
Measurement frequency range	for low-frequency : 315 Hz to 2 kHz for high-frequency : 800 Hz to 5 kHz
Camera angle	Horizontal angle : 54° Vertical angle : 42°

## Sound and Vibration Measurement System

### DS-3000 series Sound and Vibration Real-time Analysis System



#### Features

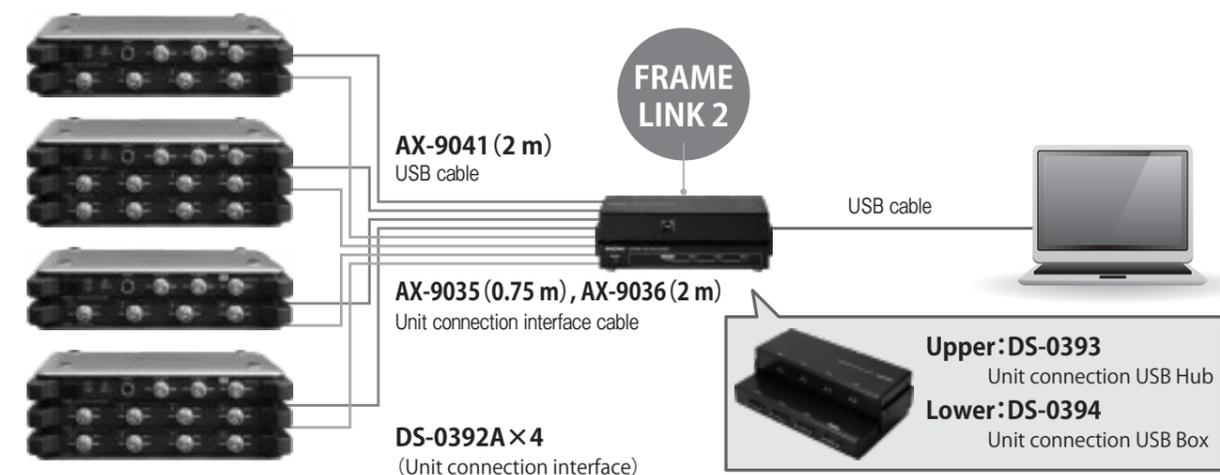
- USB 3.0 interface enables easy connection and fast data transmission to a PC.
- Up to 4 units (128 ch) can be connected.
- Available 2 types of units, 40 kHz unit and 100 kHz unit
- Fast real-time rate and high performance of throughput function
- High dynamic range of 110 dB and max. 16384 points of FFT calculation processing
- B5 size, compact, approx. 2.2 kg lightweight unit (2ch/ 4ch)
- Integrated several analysis functions into one software such as FFT analysis, tracking analysis, and octave analysis to provide commonization of procedure.
- Real-time analysis and recording system: enables automatic recording of backup data and real-time analysis at the same time.
- Unit connecting function "FRAME LINK2" : Provides flexible building of multi-channel measurement system only by connecting two units of the DS-3000 via a cable and an interface. (Can be increased up to 64ch.)
- Operating software: Windows® 7 (32/64-bit) and Windows® 10 (64-bit).

#### Hardware specifications

Max. number of channels	32 ch (1unit), 128 ch (4 units)
PC interface	USB 3.0 interface (Supports USB 2.0 and 3.0. Data transmission using USB 2.0 is slower than USB 3.0.)
Power voltage/ power consumption	100 to 240 VAC, 15 VDC/ 25 to 95 VA (at 15 VDC)
Outer dimensions	269(W) x 71 to 267 (H) x 217 (D) mm (including protector)
Weight	Approx. 2.2 kg (4ch system) to approx. 8.2 kg (32ch system)
Cooling fan	Required for a system of 5 units or more (Provided as standard with the system of 5 units or more.)
CE marking	Applicable
Accessory	Instruction manual, AC adapter, Power cable for AC adapter

#### Overview

The DS-3000 series can perform real-time analysis of noise and vibration generated from products in various industries such as vehicles, railways, home appliances, wind power generation or environmental facilities. The hardware (DS-3000 series Data Station) at overwhelming processing speed and easy handling software exactly satisfy the needs.



#### Software specifications

Function	Item	Specification
Recording function (Throughput, recording function)	Recording range/ channel	40 kHz range/ 16ch, 20 kHz range/ 32ch
	Analysis frequency range	4 mHz to 40 kHz
FFT analysis function	FFT real-time rate	40 kHz range/ 8ch, 20 kHz range/ 16ch, 10 kHz range/ 32ch
	Number of FFT samplings	Max. 16384 points (6400 lines)
	Analysis function(time-axis)	Time waveform, Impulse response, Cepstrum
	Analysis function(frequency-axis)	Power spectrum, cross-spectrum, frequency response function, coherence function, etc.
Tracking analysis function	Tracking method	Constant ratio tracking, constant width tracking
	Schedule method	Rotation schedule, time schedule
Real-time octave analysis function	Octave type	1/ 1 OCT, 1/3 OCT (option: 1/6, 1/12, 1/24 OCT)

#### DS-3000 series Software

DS-0321A	FFT Analysis Software
DS-0321L	FFT Analysis Software (off-line license)
DS-0322	Tracking Analysis Software
DS-0323	1/1 and 1/3 Real-time Octave Analysis Software
DS-0323L	1/1 and 1/3 Real-time Octave Analysis Software (off-line license)
DS-0324	1/N Real-time Octave Analysis Software
DS-0325A	Tripartite Graph Function
DS-0350	Recording Function Software
DS-0342	Servo Analysis Software

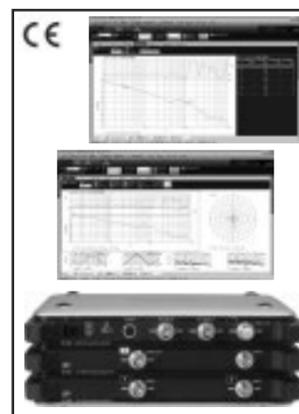
#### Software for special analysis

DS-0225A	3D Sound Intensity Analysis Software
DS-0227A	Field Balancing Software

#### Hardware

DS-3200	Main Unit (40 kHz, 100 kHz)
DS-3202	40 kHz range 2ch input main unit
DS-3204	40 kHz range 4ch input main unit
DS-0362	40 kHz range 2ch input unit
DS-0364	40 kHz range 4ch input unit
DS-0366	100 kHz range 2ch input unit
DS-0371	40 kHz range 1ch output unit
DS-0372	40 kHz range 2ch output unit
DS-0373	100 kHz range 1ch output unit
DS-0374	100 kHz range addition function
DS-0392A	Unit connection interface
DS-0393	Unit connection USB Hub
DS-0394	Unit connection Box
DS-0395	Remote Controller

### DS-3000 series Servo Analysis System



#### Features

- The mechanical control characteristics measurement (servo analysis mode) and noise vibration measurement (FFT analysis mode) are selectable only by switching the mode on the DS-3000 series.
- Frequency response function (FRF) can be displayed in graph simultaneously, such as bode diagram, Nyquist diagram.
- Time waveform and frequency waveform of measurement signal can be monitored simultaneously.
- Two types of measurement mode (FRA mode, FFT mode)
- Accuracy of amplitude and phase differences between input channels has been improved compared to the previous model. (100 kHz input/output unit)
- Auto resolution function is equipped. This is the function to improve the resolution near the resonance frequency automatically.
- Addition function (DS-0374) is provided as an option. Addition input terminal which adds external noise while measuring control characteristics can be built-in the main unit. (available only with 100 kHz unit).

#### Specifications

Number of channels	2ch or 4ch (input)/ 1ch (output)
Measurement mode	FFT mode or FRA mode
Measurement frequency range	0.01 Hz to 100 kHz (FRA mode)
Dynamic range	140 dB (FRA mode), 90 dB (FFT mode, 100 kHz unit), 110 dB (FFT mode, 40 kHz unit)
Isolation	Between inputs or between input and output
Amplitude accuracy between ch	±0.05 dB or less (0 to 20 kHz), ±0.1 dB or less (20 k to 100 kHz)
Phase accuracy between ch	±0.3 deg or less (0 to 20 kHz), ±0.7 deg or less (20 k to 100 kHz)
Measurement display graph	Bode graph, Nyquist graph, Co-quad graph, Nichols graph, Cole-Cole plot, Time-axis waveform
Amplitude control function	The amplitude can be controlled to be constant at acceleration, speed and displacement level for an arbitrary channel

#### Overview

The DS-3000 Servo analysis system measures the transfer function (frequency response function) of control circuits and mechanical structures with high accuracy. It can measure characteristics (phase margin, gain margin) of the control circuit, resonance frequency of the structure, and impedance.

#### Example of 100 kHz Servo Analysis System

100 kHz hardware (2ch inputs + 1ch output): DS-3200+DS-0366+DS-0373  
Servo Analysis Function Software : DS-0342

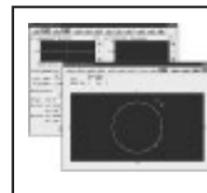
\*Servo analysis function (software) can be used with an existing DS-3000 40 kHz hardware.

\*Connecting units by Frame Link function is not available.

\*Addition function option (DS-0374) is required to operate control characteristics measurement by using the external noise.

## Analysis Software for Sound and Vibration

### DS-0227A Field Balancing Software



#### Overview

DS-0227A is the software to measure the unbalance of the rotation axis which is the main cause of the abnormality of rotary machine. It automatically performs various troublesome calculations required for balancing correction, and supports the balance correction work in the field.

#### Features

- Procedure for balance correction, operation instruction, result display, etc. are graphically displayed on screen, understandable and easy operation
- Reliable operation by adopting the large button applicable to touch panel.
- Expandable measuring system with the combination of the DS-2000/3000 series.
- Field balancing of 1-plane 1-condition/ 1-plane 2-condition/ 2-plane 2-condition

#### Specifications

Balancing mode	1-plane 1-condition/ 1-plane 2-condition/ 2-plane 2-condition
Applicable rotation speed	Rotation 1-speed/ Rotation 2-speed 100 to 48,000 r/min
Corrected position	Position of correction weight is displayed at divided angle format.
Applicable measurement unit	DS-2000/3000 series (4ch or more), CF-3650/3850 series

# Sound Level Meter

## LA-7200/7500 High Performance Sound Level Meter



### Overview

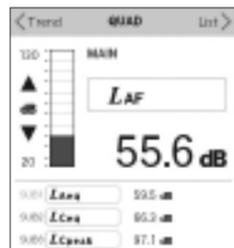
LA-7000 series allows "measuring while listening to sound" in addition to the original features of a sound level meter such as measurement and calculation. By listening to the sound instantly at the measuring place, you can confirm condition of a target, perform sound source probing, and check that the sound is unfailingly being recorded. The LA-7000 series sound level meter is a great help for reliable measurement at measurement place where any mistakes cannot be allowed. By adding various options, the LA-7000 series is able to be upgraded to a sound analyzer, frequency analyzer, and a sound recorder (options), performing more than just a sound level meter. The measurement performance is substantially improved only using LA-7000 series which does multiple duties, such as sound measurement, sound recording, frequency analysis, and sound probing of abnormal sound.

### Features

- 4.3 inch color LCD
- Intuitive operation by a touch panel
- Capturing function
- Language selection from English and Japanese
- USB power supply allows long time measurement
- Windscreen correction function
- Start recording with one-touch operation
- Achieves 35% of size reduction in volume of conventional model.
- Home key leads you to return to the first page
- External power supply ON/OFF function
- Listening function
- Strap provided as an accessory

	LA-7500 Class1	LA-7200 Class2
Applicable standard	JIS C 1509-1 :2017 Class1/JIS C 1516 :2014 Class1 IEC 61672-1 :2013 Class 1/ ANSI S1.4-2014/Part1 Class1	JIS C 1509-1 :2017 Class2/ JIS C 1516 :2014 Class2 IEC 61672-1 :2013 Class 2/ ANSI S1.4-2014/Part1 Class2
Measurement frequency range	10 Hz to 20 kHz	10 Hz to 8 kHz
Measurement level range (IEC, JIS)	A: 24 to 138 dB/ C: 32 to 138 dB/ Z: 38 to 138 dB	A: 23 to 138 dB/ C: 30 to 138 dB/ Z: 36 to 138 dB
Self noise level	A: 16 dB or less/ C: 24 dB or less/ Z: 30 dB or less	A: 17 dB or less/ C: 24 dB or less/ Z: 30 dB or less
Microphone/Preamplifier	MI-1271/MI-3270	MI-1471/MI-3270
Linearity range	Wide range: 110 dB / Normal range: 80 dB	
Level range	20 to 130 dB (wide)/60 to 130 dB/50 to 120 dB/40 to 110 dB/30 to 100 dB/20 to 90 dB/10 to 80 dB	
Reference range	50 to 120 dB	
Time weighting e.g.: LAE	F (fast), S (slow), I (impulse) and 10 ms	
Frequency weighting e.g.: LAF	A, C and Z	
Measurement items	$L_p, L_{eq}, L_E, L_{max}, L_{min}, L_{peak}, L_N$ ( $L_5, L_{10}, L_{50}, L_{90}, L_{95}, L_{high}, L_{low}, L_{ave}$ , and two more of any $L_N$ data)	
Sampling interval	15.6 $\mu s$ ( $L_p, L_{eq}, L_E, L_{max}, L_{min}, L_{peak}$ ), 100 ms ( $L_N$ )	
Measurement time	e.g.: If you want to perform 24 hours of repeated measurement that measures 10-minute of period on every hour, M.T: 10 minutes, P.T: 1 hour, and T.T: 24 hours.	
	Measurement time Manual (OFF), user-specified setup: 0.1 to 199 hour 59 min. 59.9 sec. resolution: 0.1 sec.	
	Period time 1 min. to 24 hours, resolution: 1 min.	
	Total time 0.1 sec. to 999 hour 59 min. 59.9 sec., resolution: 0.1 sec.	
Start mode	Manual start, timer start, count down start, level start	
Display function	Display device 4.3-inch LCD with color backlight (touch panel type)	
	Digital display 4-digit/ resolution: 0.1 dB/ update cycle: 1 s	
	Bar indicator Wide range: 100 dB of display range/ Normal range: 70 dB of display range	
	Remaining battery level 4-step display	
Memory function	Stored in an SD/SDHC card (SDHC card: up to 32 GB.)	
	Memory mode MANUAL (CSV file), AUTO (instantaneous value, calculated value, CSV file).....standard function LOGGING (instantaneous value, 10 ms or 100 ms, CSV file).....standard function RECORD (WAVE file: 64 kHz sampling).....required for the LA-0704	
	Panel condition memory Internal memory (internal condition : 5, EZ condition : 5, power off memory : 1), SD or SDHC card memory.	
	Basic measurement mode 5 modes (EZ1: LAeq+LCpeak, EZ2: Record, EZ3: Logging 100 ms, EZ4: NC, EZ5: Loudness)	
	Clock function Built-in (year/ month/ day/ hour/ minute) continuous operation time approx. 1 year (charging time: 24 hours from entire discharge state)	
	Calibration history function Built-in memory (number of stored points: approx. 100 points), Content (calibration value, VR position for control, internal reference signal of used sound calibrator, calibration date)	
	Resume function Stores measurement conditions into the built-in memory	
Calibration	Reference signal (when connecting external device) Electronic calibration by built-in transmitter (1 kHz sine wave) , Normal range: -6 dB of full-scale/wide range: -16 dB of full-scale	
	Recommended calibrator SC-3120, SC-2500 SC-3120A, SC-2500, SC-2120A	
Output/ Input	Phone output (Headphone output) Actual sound or recorded sound (playback sound), Selected 1 band of actual sound or recorded sound (playback sound) in 1/1 octave filter (standard function) or 1/3 octave filter mode (option: LA-0702) When "UD" of level simulator (LSIM: LA - 0707) is selected, level editing sound. When "AP" is selected, real sound. Maximum output: 0.03 mW (63 $\Omega$ : at 1kHz) Connector: stereo $\Phi$ 3.5	
	AC output Outputs one of A, C, or Z interlocked with the main display	
	AC output level Output level: 0.707 Vrms $\pm$ 5% (normal range), 2.236 Vrms $\pm$ 5% (wide range) when range full-scale input, 1M $\Omega$ loaded, Distortion rate (range full scale): 0.2% or less, Load resistance: 10 k $\Omega$ or more, Offset voltage: $\pm$ 30 mV or less, Output impedance: 50 $\Omega$ $\pm$ 2%	
	AC/DC output Selectable form DC, AC-Z or Through	
	DC output level 2.5 V $\pm$ 20 mV (normal range, wide range) when range full-scale input, 1M $\Omega$ loaded, Scale factor: 0.25 V $\pm$ 10 mV/10 dB, Load resistance: 10 k $\Omega$ or more, Output impedance: 50 $\Omega$ $\pm$ 2%	
	AC-Z output level Output level: 0.707 Vrms $\pm$ 5% (normal range), 2.236 Vrms $\pm$ 5% (wide range) when range full-scale input, 1M $\Omega$ loaded, Distortion rate (range full scale): 0.2% or less, Load resistance: 10 k $\Omega$ or more, Offset voltage: $\pm$ 30 mV or less, Output impedance: 50 $\Omega$ $\pm$ 2%	
	Through output level 0.707 Vrms $\pm$ 5% (normal range/ wide range) when full-scale input, 1M $\Omega$ loaded, Distortion rate: 0.2% or less	
	External control input Operation: Reset and start, Control voltage: non-voltage contact input, input pulse width: 200 ms or more, Absolute max. input voltage: 24.0 V	
Interface	RS-232C Baud rate: 9600, 115200 bps, multi I/O cable (sold separately)	
	USB Compliant with USB high speed storage class specification ver. 2.0, USB connection cable: USB (A) male-USB (mini) male (sold separately) Function: Command control or mass storage (Supported ver.2.0 or higher version of firmware)	
	External memory SD/SDHC memory card (SDHC : up to 32 GB)	
Applicable extension <sup>1)</sup>	103 m (CE conforming cable: up to 30 m).....AG-3400 series *Cable extension exceeding 5m : with correction function	
Power supply	Size AA battery (alkaline battery cell or Ni-MH secondary battery) x 4 pieces/ USB bus power (operating input voltage range: 4.75 to 5.25 VDC)/ AC adapter (PB-7090, power consumption: approx. 7 VA when using 100 VAC)	
External power operation function	The power supply operation of the main unit performed in conjunction with the power supply from the AC adapter. (This function is not available by battery cells.) Switch on/off can be done with the switch in the battery box (standard function)	
Windscreen correction function	Function to correct the influence of windscreen *Applicable to the IEC61672-1 even if the windscreen is installed.	
Battery life (continuous use) <sup>2)</sup>	Alkaline battery cell LR6: approx. 12 hours, Ni-MH secondary battery: approx. 12 hours	
Operating (storage) temperature range	-10 to 50 $^{\circ}$ C (-20 to 60 $^{\circ}$ C)	
Operating (storage) humidity range	20% to 90% RH (10% to 90% RH) with no condensation	
Outer dimensions	Approx. 90 (W) x 279 (H) x 42 (D)mm	
Weight	Approx. 540 g (including batteries)	

Please use a recommended SD card when you use the SD memory function.  
\*1: The described value is extendable length when the exclusive cable is used.  
\*2: It depends on the using status such as operation mode, memory mode, and backlight.



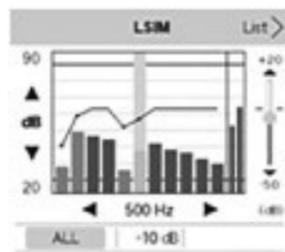
Ex.) Laeq, Lpeak(multiple calculation)



Ex.) Measurement of remote sound (Listening function)



Ex.) Sound probing of abnormal sound



Ex.) Sound simulation (frequency level)

### Multi-calculation function (DUAL, QUAD) <Standard function>

Simultaneous display of four calculation types such as LAeq, Lcpeak is available.

### Listening function (Phone output) <Standard function>

You can measure while checking the sound of microphone.

- Effective for measurement in anechoic rooms and environmental noise measurement in remote locations.
- \* Extension cable, headphone: sold separately

### Simplified sound source probing function (Filter band to only the interested sound and point microphone.)

Listening function and Band filter function (FILTER display)

- Effective for finding the place from which the sound is occurring used with the octave band filter. It allows listening only the specified frequency. <Standard function>
- Sound distinguish in 33 steps with the 1/3 octave function <with LA-0702(option)>
- FFT function (Narrowband constant width analysis: 400, 800, and 1600 lines) <with LA-0703(option)>

### Level simulator function (Increase or decrease of the sound frequency in every 11 bands can be performed.)

You can make the sound pressure level increase or decrease for each frequency band and listen its sound.

- 11 bands (octave frequency), increase and decrease amount (+20 dB to -50 dB)

### Easy recording function <with LA-0704 (option)>

Helpful function when you do not have time on the site. You can listen and analyze the recorded file later.

- Sampling frequency (64kHz)
- File format :wav (audio data) and CSV (trend data for playback: Lz at 1 second intervals)
- Recording time: 16 bit (approx. 8 hours for 4 GB, approx. 4.5 hours for 2 GB) 24 bit (approx. 5.5 hours for 4 GB, approx. 3 hours for 2GB)
- \* When reading LA data by OS-2000: up to 2 GB
- Useful recalculation and reanalysis functions

### Sound quality evaluation (Effective for evaluation of disturbing sound)

Effective when comparing sounds that is difficult to know the difference, such as between Leq (Equivalent sound level) and Lpeak (Peak sound level).

- Not only loudness (steady sound) but also sharpness
- New evaluation parameter as disturbing sound, CI value (Comfort Index) can be displayed.

### <Option>

LA-0702	1/3 Real-time Octave Analysis function
LA-0703	FFT Analysis function
LA-0704	Sound Recording function
LA-0705	Level Judgment function
<b>NEW</b> LA-0707	Level Simulator function
<b>NEW</b> LA-0708A	Sound Quality Evaluation function

# Sound Level Meter

## LA-1441/1441A/4441A Integrating Sound Level Meter



### Overview

LA-1441/1441A/4441A sound level meter are applicable to IEC 61672-1: 2013, JIS C 1509-1:2017. Adopted curved surface body with less reflection of sound. Cost effective sound level meter with the following features.

### Features

- All models have the functions indispensable for on-site measurement.
- The time averaging sound level (Leq) measurement function which is necessary for noise measurement.
- Abundant simultaneous measurement items.
- 100 dB wide linearity range unnecessary for level range switching.
- Easy menu format enables simple operation.
- Measurement condition resume function enables to start measurement with the same condition as the previous measurement.
- BNC connector and CCLD type preamplifier are adopted. Easy to extend the cable.
- Equipped with USB and RS-232C interfaces. (LA-1441A/4441A)

### LA-1411

Class 2 sound level meter for product testing and measuring the sound level generated from machines etc. High-performance and cost-effective model

### LA-1441A

Class 2 sound level meter for measuring the working environment and environmental noise. Auto measurement function by timer and trigger. Level trend can be recorded at the interval from 1 ms.

### LA-4441A

Class 1 sound level meter for sound analysis and product testing. Time weighting (10 ms, Impulse) corresponding to the fast sound fluctuation. Level trend can be recorded at the interval from 1 ms.

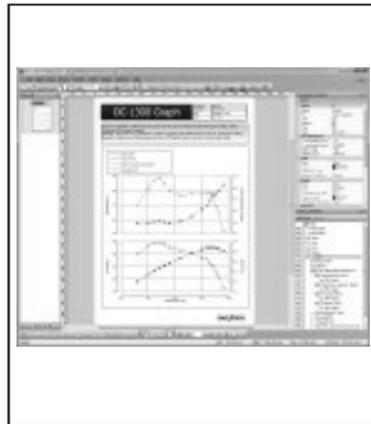
### Specifications

	LA-1411	LA-1441A	LA-4441A
Applicable standard	IEC 61672-1 : 2013 Class 2 JIS C 1509-1 : 2017 Class 2 JIS C1516 : 2014 Class 2		IEC 61672-1 : 2013 Class 1 JIS C 1509-1 : 2017 Class 1 JIS C1516 : 2014 Class 1
Microphone	1/2-inch backelectret-type condenser microphone MI-1433 Nominal sensitivity level:-29 dB		1/2-inch backelectret-type condenser microphone MI-1235 Nominal sensitivity level:-29 dB
Microphone Preamplifier	MI-3111		
Linearity range	100 dB (Wide range), 80 dB (Normal range)		
Total linearity range	A : 26 to 135 dB (IEC, JIS) C : 31 to 135 dB (IEC, JIS) Z : 36 to 135 dB (IEC, JIS)		A : 27 to 135 dB (IEC, JIS) C : 30 to 135 dB (IEC, JIS) Z : 35 to 135 dB (IEC, JIS)
Frequency range	10 Hz to 8 kHz (IEC, JIS)		10 Hz to 20 kHz (IEC, JIS)
Frequency weighting	A, C, Z		
Self noise (typical)	A : 20 dB, C : 25 dB, Z : 30 dB or less		A : 19 dB, C : 22 dB, Z : 27 dB or less
Level range	20 to 90 dB, 30 to 90 dB, 40 to 100 dB, 50 to 110 dB, 60 to 120 dB, 70 to 130 dB (Normal range)/ 40 to 120 dB (Wide range)		
Time weighting	FAST, SLOW		FAST, SLOW, Impulse, 10 ms
Measurement items	$L_p, L_{eq}, L_E, L_{max}, L_{min}, L_{peak}, L_N (L_S, L_{10}, L_{50}, L_{90}, L_{95}, L_{high}, L_{low}, L_{ave})$		
Sampling interval	31.25 $\mu$ s (other than $L_N$ ), 100 ms( $L_N$ )		20.83 $\mu$ s (other than $L_N$ ), 100 ms( $L_N$ )
Measurement time	Manual, arbitrary setup (199 h 59 m 59 s max.)		
Total measurement time	-	Arbitrary setup (199 h 59 m 59 s max.)	
Start mode	Manual	Manual, timer (time setting: in increment of 1 minute), trigger (can be started after a lapse of specified time [0 to 10 seconds, in increment of 1 second] after trigger detection (trigger delay function))	

	LA-1411	LA-1441A	LA-4441A
Internal calibration signal (REFOUT)	1 kHz sine wave (For upper limit level range : -6 dB (normal range), -16 dB (wide range))		
Recommended sound calibrator	SC-2500, SC-3120, SC-2120A		SC-2500, SC-3120
Display	Semitransparent LCD with LED backlight (124 x 64-dot), Measurement value display by numeric and bar indicators List display and trend graph display for various kinds of calculated values Display of date, time, measurement time, and conditions of various kinds of instruments		
Display update time	Display by numeric:1 s, bar indicator: 0.1 s, trend graph: 0.2 s		
Memory function	Manual memory	Total calculated values: 100 addresses	
	Auto memory	-	$L_{eq}$ : 1000 addresses x 200 blocks Total calculated values: 100 addresses x 200 blocks
	$L_p$ Record	-	Sound level with time weighting is stored at the specified interval. (1000 addresses x 200 blocks), Storing intervals (1 ms, 2 ms, 5 ms and 10 ms)
Measurement condition memory function	Condition memories (9 kinds)		
Resume function	You can select the setting at power on from the followings; the last setting, the setting at the factory shipment, the setting that is memorized to the specified condition memory.		
Analog output	Select one from three:AC output with selected frequency weighting, AC output with Z-weighting, DC output with selected frequency weighting and time weighting		
	Rated AC output	0.707 Vrms/F.S (normal range), 2.236 Vrms/F.S. (wide range), Load resistance 10 k $\Omega$ or more (with upper-limitation value of bar indicator) *Frequency weighting can be selected: interlocking setting or fixed to Z-weighting	
	Rated DC output	2.5 V/F.S. (with upper-limitation value of bar indicator), Amount of voltage fluctuation per 10 dB: 0.25V Load resistance: 10 k $\Omega$ or more	
External control input	-	Operation: toggle operation of start/place in pause Specifications of hardware: negative pulse input (voltage level: Low:0.0 to 0.5 V, Hi:3.0 to 5.0 V) Pulse width: 100 ms or more, Absolute maximum rated input voltage: 5 V	
Comparator function (Option: LA-0141)	-	Set comparison value :40.0 to 130.0 dB(in increment of 0.1 dB) Comparison item :Lmax or Lpeak Delay time :0 ms, 100 ms, 1 s, 5 s HOLD time :100 ms, 1 s, 5 s, manual Output logic :negative or positive logic Output format :open collector (withstand voltage :+3 to +24 VDC, current: 50 mA or less)	
Clock function	Current calendar (year/month/day/hour/minute) with leap year adjustment		
RS-232C	-	Control of main unit and data output Baud rate : 9,600/ 115,200 bps	
USB	-	Control of main unit and data output Baud rate : 460800 bps USB 2.0 FULL SPEED (connecting virtual COM port)	
Microphone cable extension *	305 m max.		105 m max.
Printer function	-	Content : Measurement value, measurement start/stop time, actual measurement time, frequency weighting, time weighting Mode : Normal (alphanumeric) or screen image, Applicable printer: DPU-414	
Power requirement	Type AA battery x 2 pcs. or PB-7090 AC adapter (sold separately)		
Battery life	Approx. 8 hours (LR6 alkaline battery in use)		
Operating temperature/ humidity range	-10 to 50 $^{\circ}$ C/ 25 to 90 % RH (with no condensations)		
Storage temperature/ humidity range	-20 to 60 $^{\circ}$ C/ 10 to 90 % RH (with no condensations)		
Outer dimensions	Approx. 78(W) x 263(H) x 47(D) mm		
Weight	Approx. 360 g (including batteries)		

\* The described value is extendable length when the exclusive cable is used.

OC-1300 Multi-functioned Graph Creating Tool



Specifications

- Type of graph (OC-1330)
  - Scatter plot, line plot, curve chart (cubic spline, B spline, Hermitian, regression curve and moving average), bar chart, grouping graph, counter map (clipping map), color scatter plot, lattice graph, 3D scatter plot, 3D bar chart, 3D contour map, waterfall, 4D scatter plot, 4D bar chart, 4D contour map, vector diagram (plane, solid)
- Import capacity
  - Max. 30 files, max. 1024 columns, max. 1 million rows, max. 100 million points (number of files x number of data columns x number of data rows)
- Import format
  - XLS<sup>1</sup>, XLSX<sup>2</sup>, XLSM<sup>3</sup>, CSV, text, DS/CF (with restriction), FAMS/KY, combustion analysis<sup>3</sup>, Meidensha MEIDACS<sup>4</sup>
  - \*1: Installation of Excel<sup>®</sup> 2002 or later is required.
  - \*2: Installation of Excel<sup>®</sup> 2007 or later is required.
  - \*3: Installation of DS-0228A ver. 7.03 or later is required.
  - \*4: Please contact us for the applicable models (data).

Option

Model name	Product name	Overview
OC-0310	Control API	Control the function of the OC-1300 such as file operation, graph operation from the application software on the Windows <sup>®</sup> other than OC-1300.
OC-0320	Digital map	Interpolation and output of the mesh data of which width is specified from 3D data.
OC-0330	Cube controller	Visualizes the multiple maps in a multidirectional manner in a 4D graph
OC-0340	DAT browser	Displays the data file which is performed FFT or octave analysis by the CF/DS series.
OC-0341	TRC browser	Displays the 3D data file which is performed tracking analysis by the CF/DS series.

Applicable OS

Microsoft<sup>®</sup> Windows<sup>®</sup> 7, 10  
 \*Installation of NET Framework 3.5 Service pack 1 is necessary to use Digital map/ cube controller.

Product lineup

Model name	Product name	Overview
OC-1310	Basic	Basic version which mainly supports scatter plot, line plot etc.
OC-1320	Standard	Standard version which enhances the basic functions.
OC-1330	Professional	Professional version which implements all functions including digital map and control API.
OC-1340	Package for DAT/TRC browser	Package including DAT browser and TRC browser.

OS-2500/2600/2700 Time-series Data Analysis Tool



Specifications

- Common specifications
  - Number of data: Max. 500 million points (Number of files x Number of channels x Number of records)
  - Number of display tracks: 1,000
  - Number of waveforms in 1 track: 64
  - Sampling frequency: 0.01 Hz to 20 MHz
  - Data import format: ASCII (\*.txt, \*.csv), EXCEL<sup>®</sup> (\*.xls, \*.xlsx), WAVE (\*.wav), sound file (\*.s01, \*.s02), TEAC TAFFmat file, AQ-VU file, HIOKI memory HiCorder file, YOKOGAWA WVF/WDF file, IPG Automotive ERG file, GRAPHTEC GBD file, Ono Sokki original file (ORF, DS/CF, FAMS, KY, VARTS), video file (\*.avi, \*.wmv)
  - Data export format: CSV (\*.csv), WAVE (\*.wav), ORF (\*.orf), AVI (\*.avi), OC-1300 output
- Function
  - Common function: Waveform editing function, marker function, sound playback function, search function, merging/ combining sections, simple calculation, moving average, event counter, statistical processing (interval), OC-1300 controller, signal calibration
  - OS-2000 Standard/ professional: Search value extraction, time-axis calculus, F/V converter, inter-channel calculation, resampling
  - OS-2000 Professional: Waveform generation tool, file merge, Hilbert transform, taper processing, recording
- Option
  - OS-0251 Statistics analysis, OS-0252 FFT analysis, OS-0253 FIR filter, OS-0254 Continuous automatic analysis, OS-0255 Combustion analysis monitor, OS-0261 IIR filter, OS-0263 Time frequency analysis, OS-0264 1/N octave analysis, OS-0265 Tracking analysis, OS-0271 Sound quality evaluation, OS-0272 Sound fluctuation analysis, OS-0273 Fluctuation sound simulator, OS-0281 Video playback, OS-0291 Non-time series graph, OS-0292 Tracking map

Applicable OS

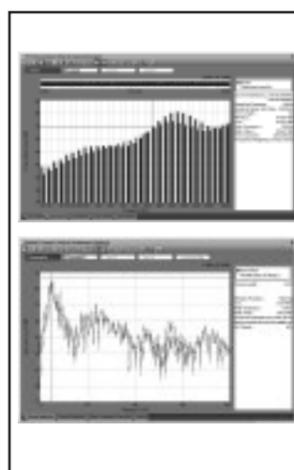
Microsoft<sup>®</sup> Windows<sup>®</sup> 7, 10  
 \*Installation of NET Framework 3.5 Service pack 1 is required.

Product lineup

Model name	Product name	Overview
OS-2500	Basic	This is the basic version equipped with the Event counter, search function and other essential capabilities.
OS-2600	Standard	This is the standard version includes enhanced features such as Inter-channel calculation, search value extraction, and F/V functions in addition to the basic version.
OS-2700	Professional	This is the professional version includes numerous advanced functions in addition to the functions in the standard version such as file merge, waveform generation tool, Hilbert transform, and recording functions.

- Features
  - Division, move, overlapping of waveform available with the mouse operation
  - Data of various devices can be displayed simultaneously
  - Realize the AND/OR search function in the combination of time-series data items (max. 10 conditions)
  - Various analysis functions of statistical processing, scatter plot/ regression analysis, FFT analysis, sound quality evaluation
  - Playback of video while sound and vibration analysis by loading the video file.
  - The horizontal axis of the graph can be displayed as axes other than time, such as distance and angle.
  - Software for editing or analyzing the long time-series data, can display data without being restricted by data format and sampling frequency.

OS-2740 Sound Quality Evaluation Pack



Overview

The OS-2740 is the package software consists of the sound quality parameter calculation function, recording function, frequency calculation function based on the time-series data analysis software OS-2000 series. It allows calculation of sound quality parameter such as loudness and sharpness, FFT analysis, octave analysis, sound reproducing and editing, and filter operation.

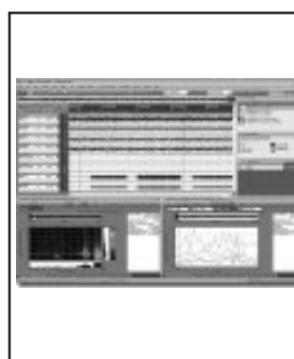
Features

- Large capacity data of maximum 512 channels and 500 million points can be handled
- The sound evaluation parameter calculation of loudness, sharpness, roughness, fluctuation strength and tonality are available.
- Signal processing, calculation, editing, detection functions can be used.
- IIR filter is equipped as a standard
  - Real-time listening of the sound which has passed through the frequency filter/ order designed arbitrary.
- Supported various data
  - WAVE, CSV, TXT, CF/DS (DAT, RCD, ORF), AU-4100A (INF), VARTS-II (DAT), FAMS (THD/LHD), KY-1000 (TRN, FRZ, AVE, LOG/TXT), HIOKI memory HiCorder file (.mem), TEAC TAFFmat file (.hdr), YOKOGAWA binary data file (.wvf, .wdf)
- The function can be added according to the application.
- Conforming to ISO 532B, DIN 45631/A1

Operating environment

- OS: Microsoft<sup>®</sup> Windows<sup>®</sup> 7, 10 (.NET Framework 3.5 Service Pack 1 or later must be installed.)
  - CPU: CPU which has a performance of Intel<sup>®</sup> Pentium 4, 2 GHz or more
  - Memory: 2 GB or more
  - Hard disk: 1 GB or more available capacity
  - Display: Can be displayed 1024 x 768 or more
- \*Two methods are available to manage the license: [standalone type] by using protect key [net type] by using the PC which connects to the network

OS-2760 Fluctuation Sound Analysis Pack



Overview

The OS-2760 is the package software that fluctuation sound analysis and fluctuation sound simulator are added to the OS-2740 Sound Quality Evaluation package.

Fluctuation sound analysis: Effective for sound evaluation which the time fluctuation is a key point. It can capture fluctuating sound often concerned even it is small in volume, with three factors of frequency (sound pitch), fluctuating frequency (fluctuation speed), and fluctuation magnitude.

Fluctuation sound simulator: Emphasizes or reduces only the fluctuating component without changing the frequency characteristics. It increases or decreases only the fluctuation sound, so hearing impression can be simulated when the fluctuation component is changed.

Features

- Color mapping of various speed fluctuating sound and intuitive evaluation
- Useful when extracting only fluctuation component from the background noise with the high noise level
- Applicable to wide fluctuation frequency range (0.5 to 200 Hz), from the slow fluctuation such as beating sound to the fast fluctuation.

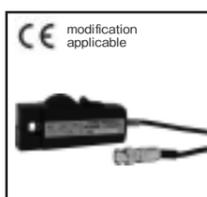
- The evaluation how the impression of the target sound changes by emphasizing and removing specific fluctuation components.
- Generation of time waveform extracted only the specific fluctuation components.

Operating environment

- OS: Microsoft<sup>®</sup> Windows<sup>®</sup> 7, 10 (.NET Framework 3.5 Service Pack 1 or later must be installed.)
  - CPU: CPU which has performance of Intel<sup>®</sup> Pentium 4, 2 GHz or more
  - Memory: 2 GB or more
  - Hard disk: 1 GB or more available capacity
  - Display: Can be displayed 1024 x 768 or more
- \*Two methods are available to manage the license: [standalone type] by using protect key [net type] by using the PC which connects to the network

## Engine Rotation Detector

### ■ IP-292/296 Ignition Pulse Detector

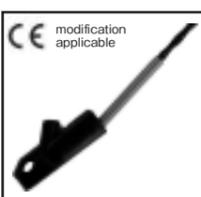


- Features**
- Rotation detector exclusive for gasoline engine
  - Convenient one-touch mounting
  - Max.  $\phi$  10 mm conductive wire can be installed
  - Heat resistance structure

#### ■ Specifications

Applicable engine 2/4-cycle gasoline engine  
 Detection section Primary cord of an ignition coil (IP-292)  
 Secondary cord of an ignition coil (IP-296)  
 Applicable cord diameter Max.  $\phi$  10 mm  
 Output cord length 4.9 m (directly attached/ with BNC)  
 Applicable display SE-1620: Gasoline engine tachometer unit  
 AR-7240B: Analog engine tachometer  
 CT-6700: Digital engine tachometer  
 FT-2500: Advanced tachometer  
 FT-7200: Advanced handheld tachometer  
 HT-6200: External sensor input type handheld tachometer  
 GE-2500: Diesel engine tachometer  
 Operating temperature range -40 to +120°C  
 Outer dimensions 102 (W) x 48(H) x 30(D) mm  
 Weight Approx. 280g

### ■ IP-3000A Ignition Pulse Detector

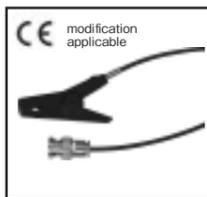


- Features**
- Rotation detector exclusive for gasoline engine
  - Convenient one-touch mounting
  - Compact and lightweight detector enables installation on engines in narrow space

#### ■ Specifications

Applicable engine 2/4-cycle gasoline engine  
 Detection section Primary cord of an ignition coil  
 Current cord of an electronic distributor  
 Applicable cord diameter Max.  $\phi$  5 mm  
 Output cord length 4.9 m (directly attached/ with BNC)  
 Applicable display SE-1620: Gasoline engine tachometer  
 AR-7240B: Analog engine tachometer  
 CT-6700: Digital engine tachometer  
 FT-2500: Advanced tachometer  
 FT-7200: Advanced handheld tachometer  
 HT-6200: External sensor input type handheld tachometer  
 GE-2500: Diesel engine tachometer  
 Operating temperature range -40 to +120°C  
 Outer dimensions 8(W) x 14.3(H) x 30(D) mm  
 Weight Approx. 80 g (including cable)

### ■ IP-3100 Ignition Pulse Detector



- Features**
- Rotation detector exclusive for gasoline engine
  - Convenient one-touch mounting
  - Compact and lightweight detector enables installation on engines in narrow space

#### ■ Specifications

Applicable engine 2/4-cycle gasoline engine  
 Detection section Primary cord of an ignition coil  
 Secondary cord of an ignition coil  
 Current cord of an electronic distributor  
 Applicable cord diameter Max.  $\phi$  10 mm  
 Output cord length 4.9 m (directly attached/ with BNC)  
 Applicable display SE-1620: Gasoline engine tachometer unit  
 AR-7240B: Analog engine tachometer  
 CT-6700: Digital engine tachometer  
 FT-2500: Advanced tachometer  
 FT-7200: Advanced handheld tachometer  
 HT-6200: External sensor input type handheld tachometer  
 GE-2500: Diesel engine tachometer  
 Operating temperature range -40 to +120°C  
 Outer dimensions 13(W) x 33(H) x 60(D) mm  
 Weight Approx. 130 g (including cable)

### ■ OM-1200 Motor/Engine RPM Detector



- Features**
- Excellent in durability, environmental resistance and rigidity
  - Gasoline engine rotation measurement and motor rotation measurement

#### ■ Specifications

Applicable engine 2/4-cycle gasoline engine, EV/HEV, motor  
 Detection method Electromagnetic induction  
 Applicable display SE-1620: Gasoline engine tachometer  
 AR-7240B: Analog engine tachometer  
 CT-6700: Digital engine tachometer  
 FT-2500: Advanced tachometer  
 FT-7200: Advanced handheld tachometer  
 HT-6200: External sensor input type handheld tachometer  
 GE-2500: Diesel engine tachometer  
 MX-005/010/015/020 (option)  
 Operating temperature range 0 to +80°C  
 Outer dimensions  $\phi$  16 x 54 mm (only sensor)  
 $\phi$  16 x 80 mm (when connecting cable)  
 Weight Approx. 65 g

### ■ OM-1500 Motor/Engine RPM Detector



- Features**
- One-touch attachment in parallel with the ignition coil (Attach OM-1500 perpendicular to the rotating shaft of the motor in measuring motor rotation)
  - Excellent in durability, environmental resistance, and rigidity
  - Easy to use

#### ■ Specifications

Applicable engine 2/4-cycle gasoline engine, EV/HEV, motor  
 Detection method Electromagnetic induction  
 Output cord length 4.9 m (directly attached/ with BNC)  
 Applicable display SE-1620: Gasoline engine tachometer unit  
 AR-7240B: Analog engine tachometer  
 CT-6700: Digital engine tachometer  
 FT-2500: Advanced tachometer  
 FT-7200: Advanced handheld tachometer  
 HT-6200: External sensor input type handheld tachometer  
 GE-2500: Diesel engine tachometer  
 Operating temperature range -10 to +100°C  
 Outer dimensions  $\phi$  16 x 30 mm  
 Weight Approx. 130 g (including cable)

### ■ CP-044 Diesel Engine Rotation Sensor



- Features**
- One touch attachment to fuel injection pipe
  - Attachment to the injection pipe of  $\phi$  4 to 8 mm are available
  - Detection is available regardless of the number of cylinders

#### ■ Specifications

Applicable engine Diesel engine  
 Detection method A piezoelectric element is used to detect pulsation at the time of fuel injection  
 Applicable pipe diameter  $\phi$  4 to 8 mm  
 Output cord length 4.9 m (directly attached/ with 6-core connector)  
 Piezoelectric element withstand compressive pressure 1960 bar  
 Applicable display unit GE-1400  
 Operating temperature range 0 to +80°C  
 Outer dimensions  $\phi$  32 x 79 mm  
 Weight Approx. 120 g

### ■ VP-201/1210 Engine Vibration Detector



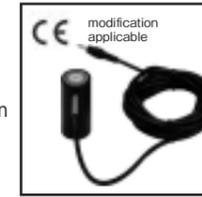
- Features**
- Easy mounting to a cylinder head by a magnet built-in detector
  - Lightweight and heat resistant structure
  - VP-1210: high sensitive type

#### ■ Specifications

Applicable engine 4-cylinder diesel/ gasoline engines  
 Detection part Engine, cylinder head part bolt or engine fixing bolt  
 Detection method Electro-dynamic vibration detection  
 Output cord length 2.9 m (directly attached/ with mini plug)  
 Applicable display SE-2500  
 Operating temperature range 0 to +100°C  
 Outer dimensions  $\phi$  25 x 50 mm  
 Weight VP-201; Approx. 110 g  
 VP-1210; Approx. 130 g

\* Depending on the specifications, some engine cannot be measured with our engine tachometer. Please contact your nearest distributor or send us an email (overseas@onosokki.co.jp).

### ■ VP-202/1220 Engine Vibration Detector



- Features**
- Easy mounting to a cylinder head by a magnet built-in detector
  - Lightweight and heat resistant structure
  - VP-1220: high sensitive type

#### ■ Specifications

Applicable engine 4-cylinder diesel/ gasoline engines  
 Detection part Engine, cylinder head part bolt or engine fixing bolt  
 Detection method Electro-dynamic vibration detection  
 Output cord length 2.9 m (directly attached/ with BNC)  
 Applicable display SE-1620: Analog meter, DC drive  
 AR-7240B: Auto range, analog meter  
 CT-6700: Multi-function, digital display  
 FT-2500: Advanced tachometer  
 FT-7200: Advanced handheld tachometer  
 HT-6200: External sensor input type handheld tachometer  
 GE-2500: Diesel engine tachometer  
 Operating temperature range 0 to +100°C  
 Outer dimensions  $\phi$  25 x 50 mm  
 Weight VP-202; Approx. 110 g  
 VP-1220; Approx. 130 g

## Engine Tachometer

### ■ GE-1400 Diesel Engine Tachometer



- Features**
- Built-in memory function
  - Built-in trigger adjustment function

#### ■ Specifications

Applicable engines 4-cycle diesel engines  
 Detection method Detection of the pulsation of the injection pipe generated at the time of fuel injection  
 Display update time  $1 \pm 0.2$  s  
 Applicable detector CP-044  
 Measurement range 400 to 8000 r/min  
 Analog output Output voltage; 0 to 1 V/ 0 to F.S. (F.S. is arbitrary setting)  
 Conversion method: 10 bit D/A  
 Monitor output Analog output for monitoring purposes after waveform reshaping of the sensor signal  
 Pulse output Output voltage Hi; +4.5 V or more, Lo; +0.5 V or less  
 Power source Size AAA battery x4 or exclusive AC adapter  
 Battery life Approx. 16 hours (when the backlight is OFF.)  
 Approx. 8 hours (when backlight is ON.)  
 Outer dimensions 66 (W) x 186.5 (H) x 47.5 (D) mm  
 Weight Approx. 230 g (not including batteries)

### ■ HT-6200 External Sensor Input Type Handheld Digital Tachometer



- Features**
- The maximum and minimum values can be displayed during measurement (peak-hold function)
  - Built-in memory function

#### ■ Specifications

Applicable engine Diesel engine, gasoline engine, motor, general rotating object  
 Display update time  $1 \pm 0.2$  s  
 Applicable detector IP-292/296/3000A/3100, OM-1200/1500, VP-202/1220  
 Measurement target Ignition coil, primary/secondary ignition cables, ECU rotation pulses (5 to 12 V)  
 Max. measurement value 20,000 r/min  
 Measurement accuracy Display value x ( $\pm 0.02\%$ )  $\pm 1$  count  
 Analog output Output voltage; 0 to 1 V/ 0 to F.S. (F.S. is arbitrary setting)  
 Conversion method; 10 bit D/A  
 Monitor output Sensor detection signal (using analog output by switching)  
 Pulse output Output voltage Hi; +4.5 V or more, Lo; +0.5 V or less  
 Power source Size AAA battery x4 or exclusive AC adapter  
 Battery life Approx. 16 hours (when backlight is OFF.)  
 Approx. 8 hours (when backlight is ON.)  
 Outer dimensions 66 (W) x 189.5 (H) x 47.5 (D) mm  
 Weight Approx. 230 g (not including batteries)

### ■ SE-2500A Gasoline Engine Tachometer



- Features**
- Built-in sensor type
  - Built-in memory function
  - Capable of measurement from a position 1 m apart by using the external sensor.
  - Measurement can be performed in 1 r/min or 0.01 r/s unit

#### ■ Specifications

Applicable engine Gasoline engines, 2-cycle (1 to 4 cylinders), 4-cycle (1 to 6, 8, 10, 12 cylinders)  
 Detection method Electromagnetic induction  
 Display update time  $1 \pm 0.2$  s  
 Measurement target Ignition coil  
 Applicable detector VP-201/1210  
 Measurement range 120 to 20,000 r/min  
 Analog output Output voltage; 0 to 1 V/ 0 to F.S. (F.S. is arbitrary setting)  
 Conversion method; 10 bit D/A  
 Monitor output Analog output for monitoring purposes after waveform reshaping of the sensor signal  
 Pulse output Output voltage Hi; +4.5 V or more, Lo; +0.5 V or less  
 Power source Size AAA battery x4 or exclusive AC adapter  
 Battery life Approx. 32 hours (when backlight is OFF.)  
 Approx. 8 hours (when backlight is ON.)  
 Outer dimensions 66 (W) x 198.5 (H) x 47.5 (D) mm  
 Weight Approx. 250 g (not including batteries)

### ■ SE-1200 Gasoline Engine Tachometer

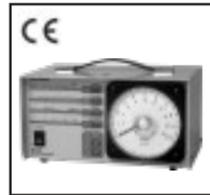


- Features**
- Built-in sensor type
  - Tachometer exclusive for gasoline engine
  - Non-contact detection only by approaching the secondary high-voltage cable of the gasoline engine
  - The indicator blinks when an ignition pulse of the engine is detected. The measurement status can be checked.

#### ■ Specifications

Applicable engine Gasoline engine  
 2-cycle (1 to 4 cylinders)  
 4-cycle (1 to 6, 8, 12 cylinders)  
 Measurement range 100 to 20,000 r/min  
 Detection method Detection of discharge noise of the ignition plug  
 Accuracy 100 to 12,499  $\pm 1$  r/min  
 12,500 to 20,000  $\pm 2$  r/min  
 Display section 7-segment LCD 5-digit  
 Measurement display time 1 s, automatic update  
 Power source Size AAA battery x3  
 Battery life Approx. 100 hours (when alkaline batteries are used at a temperature of 20°C.)  
 Outer dimensions 62 (W) x 129 (H) x 26.4 (D) mm  
 Weight Approx. 90 g (not including batteries)

### SE-1620 Gasoline Engine Tachometer On-vehicle and stationary type



#### Specifications

Applicable engine	Gasoline engine 2-cycle (1 to 4 cylinders) 4-cycle (1 to 6, 8, 10, 12 cylinders)
Measurement range	500 to 20,000 r/min
Applicable detector	IP-292/296/3000A/3100, OM-1200/1500, VP-202/1220 TTL input (for LG-9200, 12V 100 mA)
Display unit	100-mm square wide angle meter, JIS Class 1.5
Features	● On-vehicle, stationary type ● Analog output, pulse output are provided as a standard ● Convenient on vehicle or field measurement by 12 to 24 VDC
Pulse output	1 pulse/ 2-rotation Rectangular Hi; +4.5 V or more, Lo; +0.5 V or less Pulse width approx. 2 ms
Analog output	0 to 10 V/ 0 to 10,000 r/min or 0 to 20,000 r/min Linearity: ±0.2%/F.S. or less
Power supply	12 to 24 VDC
Outer dimensions	221(W)x 116(H)x 150(D) mm (not including protruded section)
Weight	Approx. 1.3 kg

### AR-7240B Analog Engine Tachometer (Auto range type)



#### Specifications

Measurement range	400 to 10,000 r/min
Applicable detector	IP-292/296/3000A/3100, VP-202/1220, MP-9100/911/981/9820, LG-9200, OM-1200/1500
Input pulse switching	0.5 to 199.5 P/R (0.5 P/R unit) arbitrary setting is available
Display unit	110-mm square wide angle meter, JIS Class 1.5
Features	● 2-range automatic switching method (high or low speed) ● Measurement range: lamp display ● Equipped with alarm, contact output for control (upper and lower limit)
Range switching function	Automatic or manual switching of high speed and low speed ranges
Analog output	Voltage; 0 to 5 V/ 0 to 10,000 r/min Current (option); 0 to 10 mA/ 0 to 10,000 r/min
Pulse output	1 P/R, 60 P/R and input signal waveform-shaped output TTL level
Contact output	Over run; 1 to 99 x 100 r/min Engine run; 1 to 99 x 100 r/min Output at the over run, engine run setting point
Power supply	100 to 240 VAC ±10% (option), 11 to 15 VDC
Outer dimensions	210(W)x 149(H)x 300(D) mm (not including protruded section)
Weight	Approx. 4 kg

### CT-6700 Digital Engine Tachometer



#### Specifications

Applicable engine	Gasoline engine, diesel engine, EV, HEV, general rotating object
Measurement range	0 to 99,999 r/min (depending on sensor and input pulse)
Applicable detector	IP-292/296/3000A/3100, LG-9200, MP-9100/911/981/9820, OM-1200/1500, VP-202/1220
Display method	Fluorescent display tube (52.5x11.5 mm)
Analog output	0 to 10 V/ 0 to 99,999 r/min
Pulse output	0.5 P/R, 1 P/R, 60 P/R and waveform shaping output (switchable)
Contact output	Over run: 1 to 99,999 r/min Engine run: 1 to 99,999 r/min Output with engine run, over run setting
Digital interface	RS-232C/ CAN (option)
Power supply	9 to 28 VDC, 12 VA or less (AC adapter, 100 to 240 VAC 36 VA or less)
Outer dimensions	170(W) x 49(H) x 120(D) mm
Weight	Approx. 700 g

- High response measurement
- Supports various sensors with different purposes
- Automatic setting of trigger level with the Trigger Assist Function
- Measurement by ECU crank signal of unequal interval pulses
- High speed digital data output by CAN interface (option)
- Space saving design

### GE-2500 Diesel Engine Tachometer



#### Specifications

Applicable engine	Diesel engine, gasoline engine (Engine without alternator cannot be measured.)
Calculation method	FFT calculation
Input frequency range	1 kHz, 2 kHz, 5 kHz (Measurement mode MAIN)/ 500 Hz (Calibration mode REF)
Measurement range	20,000 r/min
Applicable detector	OM-1200/1500, VP-202/1220, IP-292/296/3000A/3100, NP-3000 series, FT-0501/0801, MI series, Current probe, etc.
Constant drive power supply	2.2 to 3.2 mA (REF only)
[REVO] output	Outputs for rotation speed calculation values 0 to F.S./ 0 to 10 V (Value of F.S. can be specified.)
[SIG] output	Outputs signal of the sensor input to MAIN (can be used by switching from analog output)
Pulse output	Pulse output of the frequency of rotation speed calculation value Hi; +4.5 V or more/ Lo; +0.5 V or less (at no load) Update time; 200 ms or less, load resistance; 100kΩ or more
Power supply (power consumption)	12 to 24 VDC (8 VA or less)
Outer dimensions	Approx. 144 (W)x 72 (H)x 180(D) mm (not including protruded section)
Weight	2 kg or less

- By using rotation speed of an alternator, measurement is possible regardless of the engine type and number of cylinders
- Easy setting, sensor can be set any place of an alternator
- Enables small signal detection by FFT calculation. High noise tolerance and stable measurement.

## Automotive Test System

### LC-8120 GPS Speedometer



#### Specifications

Horizontal speed	Measurement range: 0.1 to 500.0 km/h Accuracy : ±0.1 km/h Accuracy : ±0.05%
Horizontal distance	Accuracy : ±0.05%
Analog (speed) output	Voltage range : 0 to 10 V/ 0 to 500 km/h Output delay : 5 ms or less
Pulse (distance) output	Resolution : 1, 5, 10 mm/P switchable Output delay : 5 ms or less
External trigger input	Non-voltage contact, voltage contact
External trigger output	Gate output : 1ch
General specification	Operating power : 10 to 28 VDC/ 100 to 240 VAC (using AC adapter: option)
Accessory	Power consumption: Max. 30 VA Operating temperature range: 0 to +50°C Storage temperature range: -10 to +60°C Antenna (LC-0721), Remote box (LC-0083), IMU (LC-0087) and each cable, DC power cable, USB cable, PC standard software, IMU mounting jig
Outer dimensions (weight)	Approx. 269 (W) x 180 (D) x 43 (H) mm (not including protruded section) (Approx. 1.4 kg)

#### 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+ IMU.
- Various vehicle measurements by adding optional software.
- With excellent performance of a delay time within 5 ms, useful for acceleration tests or brake tests.

#### Option

LC-0080	: Small display unit
LC-0084	: Large display unit
LC-0730B	: Power cable for cigarette light socket
LC-0811A	: CAN output function
LC-0813A	: Carrying case
LC-0815	: INPUT CONNECTOR BOX
LC-0819	: OUTPUT CONNECTOR BOX
LC-0820	: km/ mile switching function
LC-0821	: IMU data output function
LC-0822	: Vertical direction measurement function
LC-0823	: Vector measurement function
LC-0831	: Acceleration/ deceleration test software(ver.3)
LC-0832	: Fuel consumption test software(ver.3)
LC-0833	: Track display software(ver.3)
LC-0850	: External input output unit
LC-0851	: CAN input function
LC-0855	: High precision IMU
LC-0856	: White line detection sensor
LC-0871	: Jerk measurement function
DPU-414	: Digital printer
PW-C 0725	: AC adapter, AC 100 to 240 V
TP-0411	: Thermal paper for printer

### LC-8220 GPS Vector Speedometer



Lateral speed	Measurement range: -20.0 to 20.0 m/s
Sideslip angle	Measurement range: -25.0 to +25.0°
Yaw angle	Measurement range: -180.0 to 180.0°
XYZ acceleration	Measurement range: -98.0 to 98.0 m/s²
XYZ angular speed	Measurement range: -150.0 to 150.0°/s
Analog (speed) output	Voltage range : 0 to 10 V/ 0 to 500 km/h Output delay : 5 ms or less
Pulse (speed) output	Resolution : 1, 5, 10 mm/P selectable Output delay : 5 ms or less
Arbitrary analog output	16ch selectable
Analog input	8ch
Pulse input	4ch: TTL pulse 1ch: SIN input
Power supply output	12 ± 2VDC (Approx. 4VA or less) x 1ch
External trigger input	Non-voltage contact, voltage contact
External trigger output	Gate output 1ch
General specification	Power supply : 10 to 28 VDC/ 100 to 240 VAC (when AC adapter used: option)
Accessory	Power consumption : Max. 30 VA Operating temperature range: 0 to +50°C Storage temperature range: -10 to +60°C Antenna (LC-0721) x2, Display unit (LC-0084), Remote box (LC-0083), IMU (LC-0087) and each cable, DC power cable, USB cable, PC standard software, Mounting jig for antenna and IMU
Outer dimensions (Weight)	Approx. 269 (W) x 180 (D) x 71 (H) mm (not including protruded section), (Approx. 2.2 kg)

#### Features

- High end model of GPS speedometer of Ono Sokki.
- Various vehicle measurements by adding optional software.
- Measurement of over 30 items including forward speed, lateral speed and sideslip angle are allowed in a single unit.
- Analog output up to 16ch selected from acquired data.
- 8ch of analog input, 5ch of pulse input.

#### Specifications

Horizontal speed	Measurement range: 0.1 to 500.0 km/h Accuracy: ±0.1 km/h Accuracy: ±0.05%
Horizontal speed	Accuracy: ±0.1 km/h
Horizontal distance	Accuracy: ±0.05%
Forward speed	Measurement range: -500.0 to 500.0 km/h

#### Option

LC-0730B	: Power cable for cigarette light socket
LC-0811A	: CAN output function
LC-0813A	: Carrying case
LC-0815	: INPUT CONNECTOR BOX
LC-0819	: OUTPUT CONNECTOR BOX
LC-0820	: km/mile switching function
LC-0831	: Acceleration/ deceleration test software (ver.3)
LC-0832	: Fuel consumption test software (ver.3)
LC-0833	: Track display software (ver.3)
LC-0851	: CAN input function
LC-0855	: High precision IMU
LC-0856	: White line detection sensor
LC-0871	: Jerk measurement function
DPU-414	: Digital printer
PW-C 0725	: AC adapter, AC 100 to 240 V
TP-0411	: Thermal paper for printer

### LC-8310 High-Sensitive GPS Speedometer



depending on the model (vehicle model) or engine model.

#### Specifications

Horizontal speed	Measurement range: 0.1 to 500.0 km Accuracy: ±0.2 km/h Accuracy: ±0.20 %
Horizontal distance	Accuracy: ±0.20 %
XYZ acceleration	Measurement range: -98.0 to 98.0 m/s²
XYZ angular speed	Measurement range: -150.0 to 150.0°/s
Output	Selectable from analog or pulse output
Analog	Voltage range: 0 to 10 V/ 0 to 500 km/h Output delay: 10 ms or less
Pulse	Resolution: 1, 5 or 10 mm/P Selectable Output delay: 10 ms or less Level: TTL
Input	Analog 4 channels ± 20 V/16 bit Pulse 1 channel TTL pulse, SIN input
Power supply output	12 ± 2 VDC (approx. 200 mA or less) x 1 ch
External trigger input	Start, stop signals (non-voltage/voltage contacts)
External trigger output	Gate signal or speed judgment output signal
Main unit function	Normal measurement, interval measurement, starting acceleration, passing acceleration, MFDD, ABS, fade recovery, coasting test, Speed interpolation function (pulse, CAN), CAN communication function
Others	Printing function by optional printer
General specification	Power supply: 9 to 28 VDC/100 to 240 VAC (AC adapter use: option)
Accessory	Power consumption: up to 12 VA Operating temperature range: 0 to 50 °C Storage temperature range: -10 to 60 °C Antenna, Remote box, Touch panel display unit, Cable for cigarette lighter socket, USB memory, PC software, Mount adapter for display unit, Carrying case

#### Features

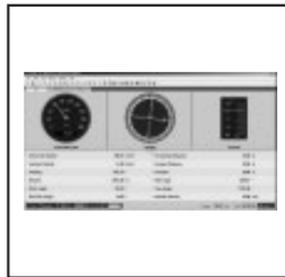
- Compact & supporting various kinds of vehicle tests without PC.
- Using GPS enables stable measurement which is not affected by road surface conditions.
- Measurement by original algorithm using GPS, GLONASS and IMU.
- Easily installed even in a limited space such as two-wheel vehicles.
- Data can be stored in an attached USB memory or internal storage memory without connecting with PC.
- Easy to operate with a touch panel.
- Analog 4ch, pulse 1ch, CAN 64ch input as standard.
- Various vehicle measurements can be conducted by adding optional software.
- CAN-OBDD II data acquisition function is available. (It conforms to SAEJ1979, but the data can't be acquired when the communication protocol is different,

Outer dimensions	Approx. 170 (W) x 120 (D) x 40 (H) mm (not including protruded section)
Weight	Approx. 0.75 kg

#### Option

LC-0864	: Tape switch
LC-0866	: General-purpose input output cable
LC-0082	: Power cable
LC-0824	: Unit selection function
LC-0825	: IMU data output
LC-0826	: Vertical direction measurement function
LC-0827	: Hardware acceleration test function
LC-0828	: Hardware brake test function
LC-0829	: Hardware coasting test function
LC-0831	: Acceleration / deceleration test
LC-0832	: Fuel consumption test
LC-0833	: Track display
LC-0854	: CAN output
LC-0860	: CAN cable (2m)
LC-0863	: CAN-OBDD2 cable
DPU-414	: Compact thermal printer
PW-C0725-W2-U	: AC adapter for printer *for Japan use
TP-0411	: Thermal paper for printer (28 m per roll, 10 rolls in a pack)

## Software for GPS Speedometer



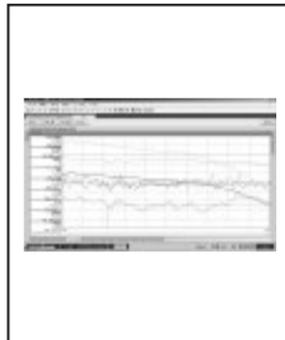
### Operating environment

OS	Microsoft® Windows® 7 [32bit/64bit]/10 [32bit/64bit]
CPU	Intel® Core™ 2 Duo/ 2GHz or more
Memory	512 MB or more
HDD	80 GB or more
Display	Able to display XGA (1024x768) or more
USB	USB 2.0 (High Speed) 1 port or more

### Features

- Accessory software of the LC-8000 series
- Logging of all data which can be measured with the speedometer such as speed, distance, latitude, longitude, altitude, number of satellites captured are available.
- Data can be transferred to the OS-2000 series Time-series data analysis software made by Ono Sokki by one button operation.
- Display language is selectable from Japanese and English.

## LC-0831 Acceleration/Deceleration Test Software



### Overview

This is the software for acceleration/ deceleration tests on a straight line such as starting-acceleration test, passing-acceleration test, brake test, coasting test. Creates a report on the basis of speed, time and distance.

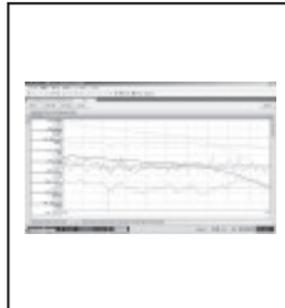
### Features

- Creates a report based on a speed. Speed step: 5, 10, 20 km/h
- Creates a report based on a distance. Distance step: 5, 10, 20, 25, 50, 100 m
- Creates a report based on a time. Time step: 1, 10, 60 s
- Simultaneous recording at 100 Hz as an original data available
- Display of distance, time, starting speed, maximum speed and minimum speed in the measurement result list
- All functions for the software for GPS speedometer are covered.
- Up to 8 data can be displayed as graphs.
- Start trigger: external input signal or speed change. Measurement is started when the condition is cleared in Ready state.
- Stop trigger: external input signal, speed change, or reaching distance. Measurement is stopped when the condition is cleared in the measurement state.
- Brake test can be selected from MFDD mode or ABS mode
- Stopping speed of the MFDD test can be selected arbitrary.
- Correction calculation of the correction speed in the ABS test can be selected from TRIAS and NCAP.
- Passing time of coasting test can be measured.
- Selected data can be displayed as a list when recording multiple data
- Displays the recorded multiple data as a list, and deletes the failure data in it.
- When recording multiple data, data of forward and backward can be distinguished.
- When recording is made with a distinction between forward and backward in case of performing coasting test by dividing the speed, divided data can be observed as a one coasting data.

### Operating environment

Same as the software for GPS speedometer

## LC-0832 Fuel Consumption Test Software



### Overview

This is the software for level ground fuel consumption test, and pattern fuel consumption test. Input the pulse of DF-210B/DF-2200 On-board Digital Flow Meter to the pulse input unit, and calculate, display, and record the fuel consumption from the obtained data and driving data.

### Features

- Mode selection is available from level ground fuel consumption test and pattern fuel consumption test
- Creates a report based on a distance in the level ground fuel consumption test mode. Distance step: 5, 10, 20, 25, 50, 100 m
- Creates a report based on a time in the level ground fuel consumption test mode. Time step: 1, 10, 60 s
- Simultaneous recording at 100 Hz as an original data available
- Display of distance, time, starting speed, average speed, fuel flow, fuel consumption in the level ground fuel consumption test mode.
- All functions for the software for GPS speedometer are covered.
- Up to 8 data can be displayed as graphs.
- Start trigger: external input signal or speed change. Measurement is started when the condition is cleared in Ready state.
- Stop trigger: external input signal, speed change, or reaching distance. Measurement is stopped when the condition is cleared in the measurement state.
- Multiple tests can be observed and managed in the level ground fuel consumption test mode.
- Selected data can be displayed as a list when recording multiple data
- Displays the recorded multiple data as a list, and deletes the failure data in it.
- When recording multiple data, data of forward and backward can be distinguished.

### Operating environment

Same as the software for GPS speedometer

## LC-0833 Track display software



### Overview

This is the software for measuring driving path of the vehicle such as minimum turning radius measurement, and drift amount measurement while testing brake. A symbol imitated the vehicle draws a driving path on a screen. You can check the speed and distance with the driving path line.

### Features

- Minimum turning radius can be measured.
- Brake test and the measurement of drift amount in brake testing can be performed simultaneously when the LC-0831 Acceleration/deceleration test software is installed.
- Drawing of vehicle to be measured is possible on the driving path.
- All functions for the software for GPS speedometer are covered.
- Up to 8 data can be displayed as graphs. (Driving path screen is displayed separately.)
- Start trigger: external input signal or speed change. Measurement is started when the condition is cleared and in Ready state.
- Stop trigger: external input signal, speed change, or reaching distance. Measurement is stopped when the condition is cleared in the measurement state.
- Drawing on a map is optionally available with the OS-0292 Tracking map.
- Checking of speed and distance on the cursor position
- 10 points can be selected on the line of the driving path
- Checking of north direction distance difference between starting point and each marker point is available
- Checking of east direction distance difference between starting point and each marker point is available
- Checking of north direction distance difference between starting point and cursor point is available.
- Checking of east direction distance difference between starting point and cursor point is available.
- Checking of north direction distance difference between each marker point and cursor point is available.
- Checking of east direction distance difference between each marker point and cursor point is available.
- Checking of direct distance between each marker point and cursor point is available.

### Operating environment

Same as the software for GPS speedometer

## Volumetric Type Flow Detector/ Flow Meter

### FP series Flow Detector



FP-213



FP-2240HA



FP-2140S



FP-2250A



FP-4135

### Features

- FP-213S/213** Small flow rate type
  - Wide range ability: 1:1000
  - Capable of compensating for errors caused by pulsating or backflow by means of the rotating direction judging function.
  - Small and light weight, ideal for on-board measurement
  - Low pressure loss (10 Pa or less), ideal for measuring the fuel consumption of motorcycles and heating equipment (FP-213S)
- FP-2140H/2240HA** Standard flow rate type
  - High accuracy within  $\pm 0.2\%$  of reading, high pressure resistant design
  - Wide range ability: 1 : 400
  - Capable of compensating for errors caused by pulsating or backflow by means of the rotating direction judging function.
- FP-2140S** Pressure loss compensation function type
  - Measurement range: 0.05 to 200 L/h, resolution of 0.01 mL/P, various measurements are available with one unit including micro fuel flow of HEV engine, high load range of alcohol fuel engine etc.
  - The flow rate detector is driven by a motor to move the free piston inserted from a bypass pipe of the detector to be the neutral position.
  - Reading accuracy  $\pm 0.2\%$  is achieved in all measurement range by optimizing the control with PID and feed forward
- FP-215/2250A** Large flow rate type (made to order)
  - Wide range ability: 1: 1440
  - Capable of compensating for errors caused by pulsating and backflow by means of the rotating direction judging function.
  - Ideal for measuring the flow rate of engines used in buses, trucks, and other large vehicles, as well as marine engines
- FP-4135**
  - High accuracy: within  $\pm 0.2\%$  of reading
  - Ultra wide range ability: 1: 2000
  - Capable of compensating for errors caused by pulsating and backflow by means of rotating direction judging function.
  - Compact body and wide temperature range is convenient for on-vehicle installation.

### Specifications

	Model name	FP-213	FP-213S	FP-2140H	FP-2240HA
Measurement parameters	Flow rate	Yes		Yes	
	Temperature	-		-	Yes
	Pressure	-		-	Yes
Applicable fluids	Gasoline	Yes		Yes	
	Light oil	Yes		Yes	
	Kerosene	Yes		Yes	
	Standard petroleum oil	Yes	- <sup>1)</sup>	Yes	
	Alcohol fuels	Option		Option	
Measurement range	Flow rate	0.06 to 60 L/h (1 to 1000 mL/min, 0.02 to 16.7 mL/s)		0.3 to 120 L/h <sup>2)</sup> (5 to 2000 mL/min, 0.08 to 33.3 mL/s)	
	Temperature	-		-	0 to +99.9 ° C
	Pressure	-		-	0 to 980 kPa
Accuracy	Flow rate	Within $\pm 0.0009$ L/h (from 0.06 to 0.18 L/h) Within $\pm 0.5\%$ of reading (from 0.18 to 60 L/h)	Within $\pm 0.5\%$ of reading (over the entire 0.06 to 60 L/h range)	Within $\pm 0.2\%$ of reading (over the entire 0.3 to 120 L/h range)	
	Temperature	-		-	Pt 100Ω class B
	Pressure	-		-	$\pm 0.5\%$ F.S.
Pressure loss	8 kPa or less (at 40 L/h, for gasoline) <sup>3)</sup> (excluding filter pressure loss)	0.01 kPa or less (excluding filter pressure loss)	Within 2 kPa (at 60 L/h, for gasoline) <sup>3)</sup> (excluding filter pressure loss)		
Maximum flow rate pressure	980 kPa <sup>4)</sup>	980 kPa	980 kPa <sup>4)</sup>		
Operating temperature range	0 to +65 ° C <sup>4)</sup>	0 to +60 ° C	0 to +65 ° C <sup>4)</sup>		

	Model name	FP-2140S	FP-215	FP-2250A	FP-4135
Measurement parameters	Flow rate	Yes	Yes	Yes	Yes
	Temperature	option	-	Yes	Yes
	Pressure	option	-	Yes	-
Applicable fluids	Gasoline	Yes	Yes		Yes
	Light oil	Yes	Yes		Yes
	Kerosene	Yes	Yes		Yes
	Standard petroleum oil	Yes	Yes		Yes
	Alcohol fuels	Option	Option		Yes
Measurement range	Flow rate	0.05 to 200 L/h	1 to 1440 L/h (17 to 24,000 mL/min, 0.3 to 400 mL/s)		0.1 to 200 L/h
	Temperature	0 to +99.9 ° C	-	0 to +99.9 ° C	-30.0 to +100.0°C
	Pressure	0 to 980 kPa	-	0 to 980 kPa	-
Accuracy	Flow rate	Within $\pm 0.2\%$ of reading	Within $\pm 0.018$ L/h or less (when 1 to 3.6 L/h), Within $\pm 0.5\%$ of reading (when 3.6 to 1440 L/h)		$\pm 0.2\%$
	Temperature	Pt 100Ω class B	-	Pt 100Ω class B	Pt 100Ω class A
	Pressure	$\pm 0.5\%$ F.S.	-	$\pm 0.5\%$ F.S.	-
Pressure loss	0.01 kPa or less (excluding pressure loss at filter section)	7.5 kPa or less <sup>3)</sup> (at 500 L/h, for light oil) (excluding pressure loss at filter section)	4 kPa or less (at 60 L/h: gasoline)		
Maximum flow rate pressure	980 kPa	3.4 MPa <sup>4)</sup>	980 kPa <sup>4)</sup>		8 MPa
Operating temperature range	0 to +50 ° C	0 to +65 ° C <sup>4)</sup>		-30 to +100°C *signal processing part: -30 to +70°C	

\*1: Please contact us for details. \*2: Flow rate measurement range from 0.3 to 300 L/h available. Please contact us for details. \*3: If the inlet pressure is lower than the pressure loss, the instantaneous flow rate may be varied when the outlet is open to the atmosphere. \*4: Please consult us if you require specifications other than given above.

## Flow Meter

### FM-2500A/1500 Digital Flow Meter



#### Features

- Selectable from two measurement modules according to the fuel flow detector (FP/FX/FZ). (Only the FM-2500A can be used with the FX series flow detectors.)
- Liquid temperature, pressure, and density can be measured and displayed as well as flow rate. (Density can be measured when used with the FZ series.)
- Enables calculation of measured data and displaying them as volumetric flow rate or mass flow rate.
- Density correction function is provided to display the mass flow after correction of density based on temperature.
- Measurement items can be displayed on a LCD in various formats. (FM-2500A)
- Difference of flow rate can be output by using an addition/subtraction module (FM-0210A) with two measurement modules. (FM-2500A only, FX series detectors cannot be used.)

#### Specifications

		FM-2500A	FM-1500
Applicable revolution detectors		MP-9100, MP-981, LG-9200	-
Display	Method	LCD with CFL backlight, 320 x 240 dots	Fluorescent display tube (20 characters x 2 lines), text shape: 5 x 8 dots
Interface*1	Remote*2	Command	START, STOP, HOLD, DISP, RESET
	Input level		H=+2.4 to 15 V, L=+0.8 V or less
	Communication method		Asynchronous full-duplex mode
	RS-232C*3	Data length	8 bits
Memory function	Memory capacity	Capacity	300 addresses
		Capture timing	Automatically saved when Hold or Stop, automatic increment of addresses from 001 to 300
	Memory backup	Memory capacity	1 MByte (SRAM)
General specification	Storage temperature/humidity range	Operating temperature/humidity range	-20 to +60 °C/10 to 90 % RH (with no condensation)
		Operating temperature/humidity range	0 to +40 °C/30 to 90 % RH (with no condensation)
	Weight	Approx. 7 kg (when 3 measurement module is installed)	Approx. 4.2 kg
	Power supply	100 to 240 VAC, 50/60 Hz	
	Maximum current consumption	40 VA or less, External fuse: 2 A	30 VA or less, External fuse: 2A
	Insulation resistance	10 MΩ or more (500 VDC rated power supply)	
	Withstand voltage	1500 VAC for one minute	
	Compatible shock-resistance standard	JIS C 0041: 1999 (Peak acceleration: 300m/s <sup>2</sup> , shock application period: 18ms)	
	Compatible vibration-resistance standard	JIS C 0040: 1999 (vibration acceleration: 10m/s <sup>2</sup> , vibration frequency range: 10 to 150 Hz)	
	GPIB	Option (model name: FM-0263)	

\*1: Only one interface unit can be installed. The RS-232C interface cannot be used if a GPIB interface is installed.

\*2: The model name of remote box: FM-0200.

\*3: When the FM-1500 is used, the DPU-414 digital printer (option) can be used to print out the measured values. (RS-232C interface)

## Fuel Flow Meter

### MF-3200 On-Board Flow Detector



#### Features

- Compact and light weight
- A fuel cooling function is provided as standard
- Temperature, pressure sensor is provided as standard
- Capable of compensation for errors due to pulsating flow or backflow by means of rotating direction judging function.

#### Specifications

Measurement item	Flow rate, temperature, pressure
Detection method	Flow rate : Volumetric (piston method) Pressure : Semiconductor strain gauge method Temperature: Sheath type resistance temperature detector (Pt 100Ω)
Measureable liquid	Light oil
Measurement range	Flow rate : 0.3 to 120 L/h Pressure : 0 to 980 kPa Temperature: 0 to +99.9 °C
Measurement accuracy	Flow rate : ±0.2% reading value or less Pressure : ±0.5% F.S. Temperature: Pt 100Ω Class B 0 to +65 °C
Operating temperature range	Approx. 15 kg
Weight	FM series (DF-0400A; module for FP series detector), DF series
Applicable display unit	

\*MF-3200A cannot be used with in-tank fuel pump vehicle.

### FX-1110/1120/1130 Mass-Burette Flow Detector



#### Features

- Capable of making direct measurement of flow rates by mass.
- Corrections of temperature and density are no longer necessary.
- Wide measurable range and high precision flow rate measurement.
- Measurement by zero-point is available

#### Specifications

Detection method	Differential pressure conversion type
Measureable liquid	Gasoline, light oil, kerosene (alcohol: option)
Measurement range	0 to 10 g/s (FX-1110) 0 to 25 g/s (FX-1120) 0 to 50 g/s (FX-1130)
Accuracy	±0.2% of reading value, ±0.01% of F.S. or less
Instantaneous resolution	0.001 g/s (FX-1110) 0.01 g/s (FX-1120/1130)
Integration resolution	0.01 g (FX-1110/1120) 0.1 g (FX-1130)
Operating max. pressure	196 kPa
Applicable display unit	FM-2500A (FX-0400A; module for FX series detector)
Weight	Approx. 13 kg

### FZ-2100/2200A Massflow Meter (Made to order)



#### Features

- Capable of continuous measurement without influence of temperature, pressure or density.
- High measurement accuracy, up to 40:1 at ±0.1 % of reading
- Available to measure density

#### Specifications

Measurement item	Flow rate, temperature, density
Measureable liquid	Gasoline, light oil, kerosene, water, general kerosene type hydraulic fluid (alcohol: option)
Measurement range	0.2 to 82 kg/h (FZ-2100), 1 to 1090 kg/h (FZ-2200A)
Flow measurement accuracy	FZ-2100 ±0.1% of reading value at 2 to 82 kg/h ±(0.002 kg/h/ flow rate) x 100% Within reading value at 0.2 to 2 kg/h FZ-2200A ±0.1% of reading value at 27 to 1090 kg/h ±(0.027 kg/h/ flow rate) x 100% Within reading value at 1 to 27 kg/h
Density measurement accuracy	Within ±0.1% of reading value/at 0.76g/cm <sup>3</sup>
Pressure loss	Approx. 100 kPa/F.S. flow rate (when using gasoline)
Withstand pressure	10 MPa
Operating temperature range	0 to +40 °C
Applicable display unit	FM series (FZ-0300A; module for FZ series detector)
Weight	Approx. 12 kg (FZ-2100) Approx. 9 kg (FZ-2200A)

### DF-2200 On-Board Digital Flow Meter



#### Features

- Easy installation on the dashboard of a vehicle (applicable to wide power range: 12 VDC/24VDC)
- Wide variety of options AC adapter, RS-232C, remote controller

#### Specifications

Measurement item	Instantaneous flow rate, temperature, pressure, integrating flow rate, time
Applicable detector	MF-2200/3200, FP-4135, FP-2135/213/2140S/2140H/2240HA
Measurement range	0.00 L/h (Max. 7 digits display) 0000 kPa (Max. 4 digits display) 0.0 mL (Max 8 digits display) 000.0 °C (Max. 4 digits display)
Data memory function	*The position of decimal place depends on the connecting flow detector. Integrating flow rate is backed up by battery when the power is turned OFF.
Analog output	0 to 10V/ 0 to range L/h 0 to 10 V/ 0 to range kPa Range: 60/100/120/200/300 L/h Range: 200/500/1000/980 kPa 0 to 10 V/-50 to 100 °C 0 to 10 V/ 0 to 100 °C
Pulse output	0.001 mL/ pulse, 0.01 mL/ pulse, 0.1 mL/ pulse, direct
Power supply	10 to 28 VDC, 28 VA or less
Outer dimensions	170 (W) x 49 (H) x 120 (D) mm (not including protruded section)
Weight	Approx. 800 g
Interface	CAN
Accessory	DC power cable with clamp

## Combustion Analysis System

### DS-3000 series Combustion Analysis Software



#### Features

- Supports multiple types of fuels (liquid fuel, gas fuel)
- Real-time measurement & calculation
- Trend display in real-time
- Supports start/ stop combustion testing
- Enable measurement without an encoder

#### Operating environment

CPU	Intel® Core™ i5 or more
Memory	4 GB or more
Interface	USB 3.0 interface (USB 2.0 can also be used, however the speed of USB 3.0 is faster than USB 2.0.)
OS	Microsoft® Windows® 7 Microsoft® Windows® 10 Pro Ultimate/Professional Microsoft® Windows® XP Professional (SP2 or later)

#### Specifications

Number of input pulses	180/360/720/1800/3600 P/R
Angle sampling resolution	0.05°/0.1°/0.25°/0.5°/1.0°
Number of rotations range	0.05° :10 to 8,000 r/min/ 0.1° :10 to 16,000 r/min/ 0.25°/0.5°/1.0° :10 to 25,000 r/min
Specification setting	Environmental specification, engine specification, fuel specification (composition weight ratio, element ratio)
All cylinder TDC auto correction function	
Test mode	Manual, auto storage, starting test

Angle resolution	Number of max. cycle	Recording time (1,800 r/min average)
0.05°	2,000	Approx. 2 min
0.1°	4,000	Approx. 5 min
0.25°	10,000	Approx. 10 min
0.5°	20,000	Approx. 20 min
1.0°	20,000	Approx. 20 min

\*The above is the value of 4ch measurement. The value will be changed depending on the content of calculation processing or the number of channels.

## Automotive Test System

### FAMS®-R5 Engine Testing System (made to order)



#### Overview

The basic system consists of dynamometer which is necessary for giving load condition to the engine, throttle controller and minimum required measuring instrument. By adding a variety of related equipment such as automatic drive setting device, various component controllers, measurement system and data processing system, it is possible to build a test system according to your purpose.

\*FAMS: Flexible Automatic Measuring System

#### Features

- From dynamometer to data processing, our project team gives consistent support.
- Selectable from various types of actuator developed by Ono Sokki, according to the purpose of the test.
- Since each function is unitized, wide range system from simple system to advanced automatic drive system is easily constructed.
- Wide variety of related equipment or options are available including high performance detector and computer system.

## Sound and Vibration Measurement for Automotive

### GN-1100 series Noise Testing Software



#### Overview

GN-1100 was developed for tracking analysis of sound & vibration of a rotating object. It can perform pass-fail judgment and tracking analysis of the each three input signal at the same time (Rev.1, Rev.2, and calculation revolution signal based on Rev.1 and Rev.2). This software is ideal to use in total inspections including vibration analysis of CVT, and turbines operated in parallel.

#### Features

- Tracking analysis and pass-fail judgment of the each three input at the same time (Rev.1, Rev.2, and calculation revolution).
- Capable of dent judgment during tracking measurement of acceleration/deceleration
- Up to 20 steps of measurement pattern setting
- External control by LAN, DIO, RS-232C

#### Specifications

Number of max. ch	32ch
Analysis frequency range	2 to 8ch: 40 kHz/ 10 to 16ch: 20 kHz/ 18 to 32ch: 10 kHz
Number of analysis tracks	16 tracks + OA
Frequency analysis	FFT 12,800 lines/ bundled of octave
Max. analysis order	1600th order
Rev. reference	Revolution1 / Revolution2 / calculation revolution of Rev.1 and Rev.2
Average	Exponential average/moving average
Composite calculation	Sound: max. 1ch Vibration: max. 10ch

#### System configuration

- DS-3200 series
- PC (Microsoft® Windows® 7 (64bit)/ 10 Pro (64 bit)
- MI series microphone/ NP series accelerometer

## Injection Amount/ Injection Ratio Meter

### FJ-8000 Series Multi-stage Injection Analyzer (made to order)



#### Overview

The multi-stage injection system is brought to attention as an effective method for exhaust gas regulation of diesel engines. FJ-8000 series measures injection amount and injection rate with high accuracy even if it is very small amount of injection.

#### Features

- Injection measurement in an environment near to an actual vehicle measurement
- 5 types of real-time data display
- Various methods to analyze the sampling data.
- Injection timing analysis by high accuracy and high speed sampling (200 kHz)
- Wide variety of options to meet the customer needs
- Applicable to mass injection measurement

#### Applications

- Measurement of fuel injection amount and injection rate of multi-stage fuel injection system for diesel engine.
- Measurement of fuel injection amount and injection rate of direct fuel injection system for gasoline engine.
- Measurement of multi-stage fuel injection (multiple times injection)

#### Measurement items

Fuel injection amount (amount of each stage, total injection amount), fuel injection rate, number of injections, pump rotation, temperature, and back pressure

## Crank Angle Measurement Equipment

### CP-5730 Crank Angle Detector



#### Specifications

Applicable amplifier CA-6000/ A/ B  
 Output signal Z, A  
 Number of output pulses 1 P/R (Z), 720 P/R (A)  
 Number of rotations range 0 to 15,000 r/min  
 Vibration resistance Radial direction; 500 m/s<sup>2</sup>  
 Thrust direction: 500 m/s<sup>2</sup>  
 Operating temperature range 0 to +120 °C  
 Cable Optical fiber cable 5 m (directly attached)  
 Rotation stop CP-0610/ 0600A  
 Outer dimensions Outside diameter: 57 mm  
 Thickness : 38 mm  
 Weight Approx. 750 g (including optical fiber cable)

#### Features

- High accuracy crank angle measurement by using with the CA-6000 crank angle amplifier. (Note: adjustment in our factory is required for CA-6000/A)
- Suitable for each engine performance test such as combustion analysis
- Optical fiber offering high resistance to noise

### CA-6000B Crank Angle Amplifier



#### Specifications

Applicable detector CP-5730/5720A/5110/5110A/5110B  
 Response frequency Max. 300 kHz  
 Output signal Hi; +4.5 V or more  
 voltage Lo; +0.2 V or less  
 Power supply 12 to 24 VDC (8VA)  
 Operating temperature range 0 to +40 °C  
 Outer dimensions 162 (W) x 56 (H) x 121 (D) mm  
 (not including protruded section)  
 Weight Approx. 1 kg  
 AC power adapter STD-1533PA (option)

#### Features

- Suitable for each engine performance test such as combustion analysis
- Input the signal from crank angle detector and output the angle signal (A-phase) and 1 P/R signal (Z-phase)
- Detection sensitivity can be adjusted with the external volume.

### CP-5110B Fiber Optic Crank Angle Detector



#### System configuration

Photo emitter and receptor CP-5110B  
 Slit disk CP-5120 (1 P/R, 360 P/R)  
 CP-5130 (1 P/R, 720 P/R)

#### Features

- High accuracy crank angle measurement by using with the CA-6000 crank angle amplifier
- No bearings, therefore low rotation load
- Small protrusion at shaft end, space saving installation
- Optical fiber offering high resistance to noise
- Optional fiber cable enables extension up to 5m (IX-041) or 10m (IX-042)

#### Specifications

Applicable amplifier CA-6000/A/B  
 Number of output pulses 1 P/R (Z), 360/ 180 P/R (A) (when using CP-5120)  
 1 P/R (Z), 720/ 360 P/R (A) (when using CP-5130)  
 Rotation speed range 0 to 20,000 r/min  
 Resistance acceleration 490 m/s<sup>2</sup>  
 Operating temperature range 0 to +100 °C  
 Cable Optical fiber cable 5 m directly attached  
 (with stainless flexible tube)  
 Outer dimensions/ Weight CP-5110B: 30(W)x 42.5(H)x 35(D) mm/ approx. 270g  
 CP-5120: φ52, t2.2 mm/ approx. 20g  
 CP-5130: φ94, t2.2 mm/ approx. 80g

### PP-932/PA-500A U-shaped Crank Angle Detection System (for 360 P/R)



#### System configuration

Photo emitter and receptor PP-932  
 Amplifier PA-500A  
 Slit disk PP-010A

#### Features

- Suitable for various engine performance tests such as combustion analysis
- Use as a timing signal for collecting combustion pressure data of cylinder at the combustion analysis, and an angle signal for ignition timing measurement or controlling.
- Photo emitter and photo receptor combined type
- Easy installation just to attach to the engine crank shaft end.
- Exclusive Amplifier for PP-932/933 (PA-500A)
- Worldwide power supply (PA-500A)
- Including monitor output of sensor signal

#### Specifications

Number of output pulses 360 P/R (A) & 1 P/R (Z)  
 Response frequency DC to 80 kHz  
 Rotation speed range 0 to 6,000 r/min  
 Output signal voltage Hi; +4.5 V or more, Lo; +0.2 V or less  
 Operating temperature range Sensor part; 0 to +65 °C  
 Amplifier part; 0 to +40 °C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 ● PP-010A specifications  
 Material Stainless  
 Diameter φ200 mm  
 Resistant acceleration Approx. 200 m/s<sup>2</sup>  
 Outer dimensions PP-932 ; 30(W) x 55(H) x 47(D) mm/ Approx. 250 g  
 PA-500A; 200 (W) x 100 (H) x 135 (D) mm  
 / Weight (not including protruded section)/  
 Approx. 1.2 kg

### PP-933/PA-500A U-shaped Crank Angle Detection System (for 720 P/R)



#### System configuration

Photo emitter and receptor PP-933  
 Amplifier PA-500A  
 Slit disk PP-011B

#### Features

- Suitable for various engine performance tests such as combustion analysis
- Use as a timing signal for collecting combustion pressure data of cylinder at the combustion analysis, and an angle signal for ignition timing measurement or controlling.
- Easy installation just to attach to the engine crank shaft end.
- Photo emitter and photo receptor combined type
- Exclusive Amplifier for PP-932/933 (PA-500A)
- Worldwide power supply (PA-500A)
- Including monitor output of sensor signal

#### Specifications

Number of output pulses 720 P/R (A), 1 P/R (Z)  
 Response frequency DC to 80 kHz  
 Rotation speed range 0 to 6,000 r/min  
 Output signal voltage Hi; +4.5 V or more, Lo; +0.2 V or less  
 Operating temperature range Sensor part ; 0 to +65 °C  
 Amplifier part; 0 to +40 °C  
 Power supply 100 to 240 VAC, 50/60 Hz  
 ● PP-011B specifications  
 Material Stainless  
 Diameter φ200 mm  
 Resistant acceleration Approx. 200 m/s<sup>2</sup>  
 Outer dimensions PP-933 ; 30(W) x 55(H) x 47(D) mm/ Approx. 250 g  
 PA-500A; 200 (W) x 100 (H) x 135 (D) mm  
 / Weight (not including protruded section)/  
 Approx. 1.2 kg

## JCSS (Japan Calibration Service System)

Ono Sokki provides reliable and high level calibration as a measuring instrument manufacturer based on the skills and know-how which has been acquired through many years of practice to meet ISO 9001 Quality System and the general requirements for the competence of calibration. ISO/IEC 17025. Ono Sokki is registered, accredited by NITE (National Institute of Technology and Evaluation) under 6 categories based on the JCSS of calibration laboratory accreditation system enforced by Measurement Law, article 143.

\*Please refer to our HP about the detail of JCSS system  
[https://www.onosokki.co.jp/HP-WK/c\\_support/calibration.htm](https://www.onosokki.co.jp/HP-WK/c_support/calibration.htm)  
 \*ilac: International Laboratory Accreditation Cooperation



### JCSS system applicable products

#### Acoustics/Ultrasonics (Dec 2005)

- LA series Sound level meter
- MI series Measurement microphone
- SC series Sound calibrator

#### Acceleration (Dec 2012)

- NP series Accelerometer detector

#### Torque (50 to 5,000 N·m: May 2013, 1 to 50 N·m: Oct 2018)

- Torque detector

#### Fluid flow (Nov 2014)

- Fuel flow meter (diesel, industrial gasoline)

#### Electricity (Direct current·Low frequency) (Jun 2015)

- CF/DS series FFT Analyzer

#### Speed (Mar 2019)

- LC-8000 series Speedometer

Ono Sokki can issue the calibration certificates with ilac, MRA marc.  
 \*Please note that some products are not applicable.



LC-8000 series

LA series

MI series

SC series

NP series

Torque detector

Fuel flow meter

CF/DS series

## Quality Assurance

### Establishment of Quality Assurance

In line with our policy on quality, which aims to "Continue to provide satisfaction and security from the customer's perspective", Ono Sokki has been establishing quality control activities on a corporate-wide scale. As a result of these activities, Technical Center/head office have been certified as conforming to the ISO 9001 Quality System.

Ono Sokki not only aims to maintain this certification, but will also strive to improve and enhance its quality assurance system, based on ISO 9001 Quality System in order to continually deliver better quality products to customers. As a result of our achievements, Ono Sokki has been named Japan's first official supplier of sound level meter as Accredited Calibration Laboratory since September 1997.

### Traceability

Ono Sokki has established a unique in-house traceability system with the verification instruments and calibration instruments/devices that have been approved and calibrated by the national metrology standards institutions such as NMIJ, NPL and NIST. To maintain the traceability system, we're regularly doing calibration in accordance with the regulations for the measurement instruments based on ISO 9001.

## Marking



CE marking is a safety mark that must be attached to designated products sold in the European Union. This mark can only be attached to products that comply with the safety regulations set forth by the EC Directive (Director of the Council of the European Communities), and if the product does not have CE marking, it cannot be exported to the EU.

#### CE modification

We're able to modify product to conform to CE marking.  
 Please contact us if you'd like to have a quotation and delivery date for modification.

Export cargo : List control relevant items Products regulated in the restriction list under the Foreign Exchange and Foreign Trade Act.

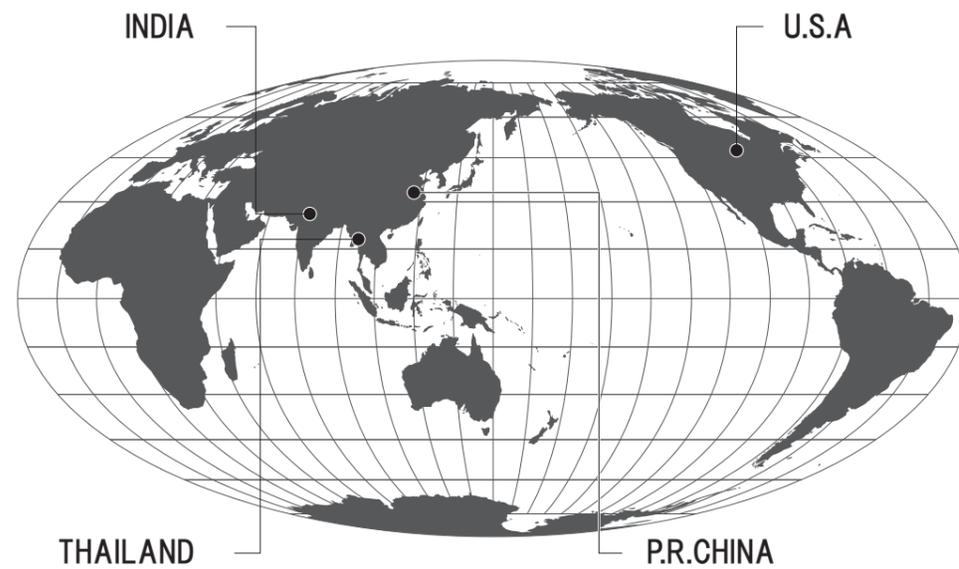
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