

General Product Guide

Vol. 1

2017 ▶ 2018

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Catalog and website

For detailed product information and applications, please refer to our website (<https://www.onosokki.co.jp/English>).

We provide catalog for individual products, please contact your nearest distributor or send us an e-mail.

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Digital Rotation Detector

■MP-9100/911 Electromagnetic Detector



■Features

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

■Specifications

Output voltage	2.0 Vp-p or more (1kHz, 10kΩ load) M=1, gap=0.5mm
Detected 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/ heat resistant MP-9120 Low impedance

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



■Features

- Detection from nearly 0 r/min is available.
- Non-contact detector
- Rigid and designed to be used in harsh environment.
- Operation state and attached position are able to check with the signal indicator.

■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	φ20×75mm
Weight	Approx. 80g (including mounting nut×2)

■AP-981 Magneto-electric Detector (Acid resistant, water resistant type) — ■LG-9200 Optical Detector



■Features

- Water and acid resistant type which conforms to class7 (IPX7) of JIS C 0920.
- Detection from nearly 0 r/min is available.
- Non-contact detector
- Acid resistant cable 2m is directly attached.
- Operation state and attached position are able to check with the signal indicator.

■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

- Unified structure of light source, receiver and amplifier (weight: approx. 150g)
- Non-contact by affixing the reflection mark on the rotating shaft.
- Easy to adjust a position by visible light

■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)

■LG-930 Photoelectric Detector



■Features

- Detection distance is maximum 200mm
- Easy to attach by using L-shaped fixture (accessory)
- Easy to adjust a position by visible light
- Pulse lighting type

■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 12mm square reflective mark is used in 48mm interval)
Output waveform	Rectangular wave Hi; +5V±0.5V Lo; +0.5V or less (load resistance 100kΩ or more)
Output impedance	Approx. 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

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



■Features

- Can be measured thin rotating shaft and in a limited space.
- High sensitivity allows the detection of fine light quantity and light-dark change without an affection of disturbance light.
- Analog, pulse output

■Specifications

Detection distance	Max. 69mm (When 12mm square reflective mark is used)
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

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 μ s or more)
Input frequency range	Square wave; 1Hz to 100kHz Rectangular wave; 0.1Hz to 100kHz
Measurement accuracy	Display value $\times (\pm 0.01\%) \pm 1$ count or less
Measurement method	Periodic calculation method
Display device	Fluorescent display tube
External power supply	12VDC $\pm 10\%$ Max. 100mA
Input terminal	M3, free terminal screw
Power supply	100 to 240VAC, 50/60Hz
Outer dimensions	96(W) \times 48(H) \times 148(D)mm
Weight	Approx. 340g

Features

- Able to add more functions by optional cards.
- TM-3100: Display only
- TM-3120: BCD output
- TM-3130: Analog output
- TM-3140: Comparator output
- TM-0301 to 0350: Option

TM-5100 Multifunctional 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 μ s or more)
2ch calculation function	Difference (B-A), Ratio (B/A \times 100), Fluctuation ratio (B-A/A \times 100)
Main display	7 segment green LED Display range; 0 to $\pm 999,999$
Sub display	LCD module
Comparator function	Output item; UPPER/GOOD/LOWER
Analog output	Voltage range; 0 to ± 10 V.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) \times 72(H) \times 180(D)mm (not including protruded section)
Weight	Approx. 1.5kg

Features

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

Digital Handheld Tachometer

FT-2500 Advanced Tachometer/ FFT calculation method



Specifications

Input signal voltage	± 12 V, ± 0.5 V (FT-0501, and others) ± 5 V, ± 0.5 V, ± 0.05 V (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) \times 72(H) \times 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 or reflective mark is not required.

FT-7200 Advanced Handheld Tachometer/ FFT calculation method



Specifications

Input signal voltage	± 5 V, ± 0.5 V, ± 0.05 V
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-0501/0801, MI series, current probe, etc.
Power supply	Size AAA alkaline battery \times 4pcs. or an exclusive AC adapter
Battery life	Approx. 6 hours (when backlight is OFF) Approx. 5 hours (when backlight is ON)
Operating temperature range	0 to +40°C
Outer dimensions	66.0(W) \times 189.5(H) \times 47.5(D)mm
Weight	Approx. 230g (not including batteries)

Features

- Able to use for rotation speed difference, acceleration and deceleration speed.
- Enables calculation of rotation speed by sound or vibration from a measurement object with inaccessible rotating shaft.
- 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 1000.0 m/min (when KS-200 is used) 0.5 to 10,000 mm/s (when KS-100 is used)
Display method	5-digit LCD 7 segment
Measurement time	1s (2s update in 0.5 to 10 r/min)
Accuracy	Lo; 0.5 to 1249.9 r/min; within ± 0.1 r/min 1250.0 to 2000.0 r/min; within ± 0.2 r/min Hi; 5 to 10,000 r/min; within ± 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 \times 3pcs.
Battery life	Approx. 20 hours (when alkaline batteries are used, at 20°C)
Outer dimensions	63(W) \times 172(H) \times 38.5(D)mm
Weight	Approx. 160g (not including batteries)

Features

- Built-in memory function
- A large-size display (10.5mm character height)
- Replacing the contact tip with the circumferential ring enables circumferential measurement
- Equipped with a storage pocket for the circumferential ring
- 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 one reflective mark is used) 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 LCD 7 segment
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 \times 3pcs.
Continuous operating time	Approx. 20 hours (when alkaline batteries are used, at 20°C)
Outer dimensions	62(W) \times 129(H) \times 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 r/min to 50,000 r/min, in 1r/min resolution (when one reflective mark is used)
- 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 (attach the contact adapter)
 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 × (±0.02 %) ± 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 × 4pcs.
 or an exclusive AC adapter
 Battery life Approx. 32 hours (when the backlight is OFF)
 Approx. 8 hours (when the backlight is ON)
 Outer dimensions 66(W) × 180.5(H) × 47.5(D) mm
 Weight Approx. 220g
 (not including battery cell)

■Features

- Built-in memory function, 20 data can be saved.
- Built-in peak hold function, Max/Min value can be display while measuring.
- Large LCD with backlight
- Can be mounted on a tripod



■Specifications

Measurement object Rotating object in dentistry, texturizing machine, high-speed machine tools
 (Target measurement objects must be magnetized)
 Measurement unit 10 r/min (Rotation speed)
 Measurement accuracy Displayed value × (0.02%) ± 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 sensor signal waveform has been shaped (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 × 4pcs.
 or an exclusive AC adapter
 Battery life Approx. 13 hours (When the backlight is OFF)
 Approx. 8 hours (When the backlight is ON)
 Outer dimensions 66.0(W) × 189.5(H) × 47.5(D) mm
 Weight Approx. 230g
 (Main unit only, not including the battery cell)

■Features

- High rotational speed measurement is possible with the MP-5350 Electromagnetic rotation detector and high sensitive amplifier.
- Low to high-speed rotation measurement from 100 to 999,990 r/min.
- Built-in memory function up to 20 data can be saved to a memory.

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 ±999 mm*
 Measurement accuracy ± 1 count
 Measurement time: 10 ms
 Resolution Speed: 0.1 m/min*,
 Rotation speed: 1 r/min*,
 Distance: 1 mm (option)
 Averaging times are 10 or more.
 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 μs
 Power supply Size AAA alkaline battery × 3pcs.
 Battery life 15 hours or more
 (using at room temperature)
 Outer dimensions 60(W) × 162(H) × 38(D) mm
 (not including protruded section)
 Weight Approx. 423 g
 (Including the batteries/
 not including the 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

*Distance measurement up to ± 5000 mm is available, more than ± 999 mm is not guaranteed

Passing Velocity Speedometer

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



■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

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 (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) × 72(H) × 180(D) mm
 (not including protruded section)
 Weight Approx. 1300 g

*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 μs 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 ±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) × 99(H) × 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 the 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: ±0.02%/F.S./°C
 Linearity: ±0.2%/F.S.(up to 180 kHz)
 Output update time: 1 cycle + 3.5 μs 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) × 44(H) × 200(D) mm
 (not including protruded section)
 Weight Approx. 1 kg

■Features

- High-speed conversion per signal period
- Using the fluorescent display tube
- Rotation direction can be discriminated with two-phase input
- Rapid deceleration follow-up function

*Rotation speed is limited by maximum frequency

DA-4130 D/A Converter

Specifications

Input signal	BCD 5-digit and polarity (TTL level, open collector or positive logic)
D/A conversion quantity	Upper, middle, or lower 3-digit of 5-digit measurement value
Conversion speed	40 μ s
Conversion accuracy	$\pm 0.1\%$
Output voltage	0 to ± 10 V (at 000 to ± 999), Load resistance 1 k Ω or more
Output current	0 to ± 16 mA (at 000 to ± 999), 4 to 20 mA (option), Load resistance 250 Ω or less
Operating temperature range	0 to $+40^{\circ}\text{C}$
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; $+10\text{V} \pm 2\text{V}$, Lo; $+0.5\text{V}$ or less Open collector Max. applied voltage; $+40\text{V}$, 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 for 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; $+10\text{V}$ or more, Lo; $+0.5\text{V}$ or less
Output format	Totem pole output (standard) emitter output, collector output, open collector output (option)
Applicable detector	RV-3100, TM series
Operating temperature range	0 to $+50^{\circ}\text{C}$
Vibration resistance	19.6 m/s^2 (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 adopted in the rotating 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 extend 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.
- TH-2000 series Torque Detector (For general use and high rotation speed)
 - Mounting diameter is same as the SS series.
- TH-3000(H) series Torque Detector (For micro torque)
 - (H: for high rotation speed)
 - Mounting diameter is same as the MD series.
- 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

Phase Difference Method Using Gears Torque Detector

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



Specifications

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

Features

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

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

SS series Small/ Medium Capacity Type



Specifications

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

Features

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

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

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



Specifications

Detection method Phase difference method using gears
 Applicable torque meter TS series
 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

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

High-Speed Rotation Type

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; SS/ TH series
 Revolution; MP-981
 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) × 142(D) × 262(D) mm
 (not including protruded section)
 Weight Approx. 2 kg

Features

- Can be connected all of the phase difference type torque detectors by Ono Sokki.
- Isolated analog voltage enables connection to data processing devices and control devices.
- Enables N-0 compensation

TS-3200A Digital Torque Meter



Specifications

Measurement item Torque, revolution, output
 Applicable detector Torque; MD, SS, DD, EZ type torque detector
 Revolution; MP-981

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

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

Analog output 2ch, can be added 1ch by adding 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

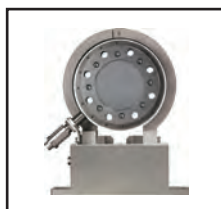
Power supply 100 to 240VAC, 75VA or less

Outer dimensions 360(W) × 99(H) × 301(D) mm
 (not including protruded section)

Weight Approx. 5 kg
 *There are restrictions on detectors that can be used.

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-5200
 Linearity $\pm 0.05\%$ / F.S.
 (includes hysteresis) (Single frequency output, display value when connecting with the TQ-5200.)

Rotation detector and gear Accessory
 Power supply Supplied from the TQ-5200

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

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 are optional specification

■TQ-5300 High-stiffness Torque Meter



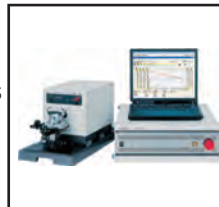
■Specifications

Measurement item	Torque, revolution
Applicable detector	Torque; TQ-1000 (G) series, 2000 (H) series Revolution; MP-981/9820
Revolution detection signal	60, 120, 180, 240, 360, 720 (P/R)
Display method	Fluorescent display tube
Display unit	Torque; N · m, kN · m Revolution; r/min
Analog output	0 to ±10V/ F.S.
Pulse output	Torque, revolution; Outputs after pulling up the open collector output to +5V with resistance 330Ω
Comparator Remote	Torque 3ch, non-voltage contact output Revolution direction CW/CCW switchable input, auto zero input, measurement ready output
Power supply	24 VDC, (18 to 30 VDC)
Outer dimensions	170(W)×49(H)×150(D) mm (not including protruded section)
Weight	Approx. 700g

■Features

- Four kinds of digital interface (option) Ether CAT, PROFIBUS, CAN, RS-232C
- Supports filter high resolution function
- Analog output the torque and revolution simultaneously

■MT series/ TS-7700B Torque Station Pro



■Feature

- High-accuracy measurement of motor characteristics
- Equipped with motor torque detector switching function
- Supports various torque capacities
- Software supports Windows®
- Graph creation with simple operation.
- Automatic saving of measurement results
- Output of selected value data
- Component Analysis of Torque Ripple and Cogging Torque

■Overview

- This system is designed to automatically measure motor torque characteristics, which are evaluated in development and product inspection of motor and motor driver.

■Configuration

- TS-7700B +PC*+ MT series detector*+ Motor support stand*+ BA amplifier* (required depending on the capacity)
*option

■Specifications

Measurement function	Auto sweep measurement, Selected value measurement, Step measurement
Measurement item	Torque, revolution, others 0 to 10 VDC (16ch)
Graph display	Time-axis display, X-axis and Y-axis display, Overlaid display, efficiency calculation display (Current voltage detector is required for some of the detectors.)
Saving function	Measurement condition, graph ,numerical value

Motor Torque Measurement Detector

■MT-6200B Series Torque Detector for Torque Ripple and Cogging Torque (Made to order) — ■MT-6400B Series Torque Detector Equipped with a Hysteresis Brake (Made to order)



■Specifications

Measurement item	Torque, revolution, current, voltage
Current measurement range	10A/ 2A; MT-6221B to 6253B
Voltage measurement range	50V/ 10VDC; MT-6221B to 6253B
Weight	Varies according to the model selected

*Current and voltage measurement is option with the MT-6214B or higher.

Model name	Torque capacity (mN · m)	Revolution range (r/min)
6221B	2	0.5 to 5
6251B	5	0.5 to 5
6212B	10	0.5 to 5
6222B	20	0.5 to 5
6252B	50	0.5 to 5
6213B	100	0.5 to 5
6223B	200	0.5 to 5
6253B	500	0.5 to 5
6214B	1,000	0.5 to 5
6224B	2,000	0.5 to 5
6254B	5,000	0.5 to 5
6215B	10,000	0.5 to 5
6225B	20,000	0.5 to 5

■Features

- When combined with the TS-7700B enables automatic measurement of motor revolutions and torque characteristics.
- Can measure torque ripple when the motor is excited, and cogging torque when the motor is in the non-excited state.



■Specifications

Measurement item	Torque, revolution, current, voltage
Current measurement range	10A/ 2A; MT-6422B to 6414B
Voltage measurement range	50V/ 10V; MT-6422B to 6414B
Weight	Varies according to the model selected

*Current and voltage measurement is option with the MT-6424B or higher.

Model name	Torque capacity (N · m)	Brake power (W)	Revolution range (r/min)
6422B	0.02	5	100 to 20,000
6452B	0.05	8	100 to 20,000
6413B	0.1	12	100 to 20,000
6423B	0.2	23	100 to 15,000
6453B	0.5	75	100 to 12,000
6414B	1	75	100 to 12,000
6424B	2	160	100 to 10,000
6454B	5	200	100 to 10,000
6415B	10	350	100 to 7,000
6425B	20	600	100 to 7,000

■Features

- When combined with the TS-7700B enables automatic measurement of motor revolutions and torque characteristics.
- Performs torque and revolution control, and is suitable for the measurement of both AC and DC motors.

*Idling torque may occur in the brake, and cannot be measured under no-load conditions.

■MT-6500B Series Torque Detector Equipped with a Powder Brake (Made to order)



■Specifications

Measurement item	Torque, revolution
Weight	Varies according to the model selected

*Current and voltage measurement is option

Model name	Torque capacity (N · m)	Brake power (W)	Revolution range (r/min)
6514B	1	20	5 to 1,800
6524B	2	50	5 to 1,800
6554B	5	130	5 to 1,800
6515B	10	320	5 to 1,800
6525B	20	450	5 to 1,800
	50	1,400	5 to 1,800
Made to order	100	2,200	5 to 1,800
	200	3,200	5 to 1,800

■Features

- Can be measured comparatively high-capacity low-revolution motors such as gear motors.
- When combined with the TS-7700B, enables automatic measurement of motor revolution and torque characteristics.

*XY table is equipped with the MT-6514B to 6525B

*Idling torque may occur in the brake, and cannot be measured under no-load conditions.

*Please contact us for made-to-order large capacity detector.

Rotary Encoder

RP-1700 Series Bottom-mount Type/ Flange-mount Type (Made to order)



Bottom-mount type
RP-1710/20 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

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

Max. rotation speed 5000 r/min
Allowable shaft load Radial 80N
Thrust 50N
Weight Approx. 3.7 kg
Protection class IP65
(Terminal board and oil seal are attached)
Output waveform 2-phase square waveform
Output voltage Hi; +10V or more, Lo; +0.5V or less
Response frequency 100 kHz (500 kHz for line driver output)
Output method Totem-pole: Load resistance 470Ω or more (Collector output [Load resistance 10kΩ or more], Line driver output, Open collector output [40VDC, 50mA or less] are options)
Power supply 100VAC (50 mA) to 240VAC (63 mA)/
12VDC (83 mA) to 24VDC (42 mA)
Operating temperature range -5 to +55°C



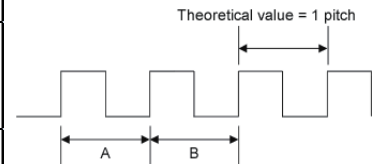
Flange-mount type
RP-1730/40 series

Adjacent error

Adjunct 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, 1024, 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.

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



SP-405ZA Series Ultra-compact Type (Some of the number of 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

Number of output pulses 60,100,200,300,360,500,600 P/R
(Option 40,50,250,400,800,900 P/R)
Max. rotation speed 6000 r/min
Allowable shaft load Radial 25N
Thrust 15N
Weight Approx. 0.1 kg
Protection class IP40
Output waveform Two-phase square wave + zero mark
Output voltage Hi; Power -20% or more,
Lo; +0.5 V or less
Response frequency 100 kHz
Output method Collector Load resistance
10 kΩ or more
Power supply 5 to 12 VDC ± 10% (50 mA)
Operating temperature range -10 to +70°C

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 output signal connector
- Two-phase square wave and zero mark square wave outputs
- 5 types of output pulses

Specifications

Number of output pulses 120,360,600,1000,1024
Max. rotation speed 5000 r/min
Allowable shaft load Radial 20N
Thrust 10N
Weight Approx. 0.25 kg
Output waveform Two-phase square wave and zero mark (timing is optionally selected)
Output voltage 5 V power is used: Hi; +4V or more,
Lo; +0.2 V or less
12 V power is used: Hi; +10 V or more,
Lo; +0.3 V or less
Response frequency 50 kHz
Output method Totem-pole/ Load resistance 1 kΩ or more
Power supply 5 VDC ± 5% (100 mA) or 12 VDC ± 5% (100 mA)
Operating temperature range 0 to +50°C

■PA-330ZA 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 to output
Output voltage	Hi; +10±2V (5kΩ load) Lo; +0.5V or less (5kΩ load)
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

■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.

■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)

■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

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 steps)
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 and splash proof)
- High durability (achieves 30 million times of sliding)

■Specifications

Model name	BS-1210	BS-1310
Measurement range (mm)	10	
Resolution (μm)	10	1
Accuracy (at +20°C)	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 ⁺⁰ _{-0.03}	
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
- 2 types provided: standard, nut-mounted type
- Lead-free
- Dust-proof and water resistant

■Specifications

Model name	GS-7710A	GS-7710NA
Measurement range (mm)	10	
Resolution (μm)	0.5*	
Accuracy (at +20°C)	2	
Max. spindle velocity* (m/s)	0.5	
Measurement force (downward) (N)	1.08 or less	
Protection class	IP67	
Stem diameter (mm)	Φ8 ⁺⁰ _{-0.022}	Φ9 ⁺⁰ _{-0.022}
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-2310/4340/4340. (AA-8910 conversion cable is required for connecting with the DG-5100.)

■GS-3813B/3830B High Resolution Type



■Features

- High resolution and high accuracy type

■Specifications

Model name	GS-3813B	GS-3830B
Measurement range (mm)	13	30
Resolution (μm)	0.1	
Accuracy (at +20°C)	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 ⁺⁰ _{-0.009}	
Vibration resistance (m/s ²)	196 (20 G)	
Shock resistance (m/s ²)	1960 (200 G)	
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 maximum spindle velocity with the DG-5100.

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



■Features

- Compact general purpose
- Dust-proof and splash-proof (protection class IP64)
- *Disconnected or modified signal cable is not applicable to CE marking.

■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)	3		2	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 ⁺⁰ _{-0.009}			
Vibration resistance (m/s ²)	98 (10 G)			
Shock resistance (m/s ²)	980 (100 G)			
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
- Dust-proof and splash-proof type (protection class IP64)
- Vibration resistant and shock resistant structure
- *Disconnected or modified signal cable is not applicable to CE marking.

■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)	3		2	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 ⁺⁰ _{-0.009}			
Vibration resistance (m/s ²)	147 (15 G)			
Shock resistance (m/s ²)	1470 (150 G)			
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 type
- Dust-proof, water-proof and oil-proof (protection class IP66G)
- Vibration resistance and shock resistance structure
- *Disconnected or modified signal cable 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)	3		2	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 ⁺⁰ _{-0.009}			
Vibration resistance (m/s ²)	196 (20 G)			
Shock resistance (m/s ²)	1960 (200 G)			
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
- High durability (achieves 15 million times of sliding)
- Torsional rigidity

Specifications

Model name	GS-5050A	GS-5100A	GS-5051A	GS-5101A
Measurement range (mm)	50	100	50	100
Resolution (μm)	10		1	
Accuracy (at +20°C)	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)	$\Phi 15^{+0}_{-0.009}$			
Vibration resistance (m/s^2)	147 (15 G)			
Shock resistance (m/s^2)	1470 (150 G)			
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 μm 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 ± 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-4320 Open Collector BCD Type



Specifications

Display method	Liquid crystal display 5.5 digits and polarity (-)
Display range	0.000 to ± 199.999 mm or 0.00 to ± 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 Detector 12V

DG-4340 Color Comparator Display Type



Specifications

Display method	Liquid crystal display 5.5 digits and polarity (-)
Display range	0.000 to ± 199.999 mm or 0.00 to ± 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 I/O	5 digits polarity 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 dimension	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 Detector 12V

DG-2310 2ch with Addition/Subtraction Function



Specifications

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	0 to ± 10 V/ F.S. (F.S. is optionally setting)
Analog output signal	Baud rate; 2400/4800/9600 bps
RS-232C communication	Comparator output item; LOWER/ GOOD/ UPPER
Comparator output signal	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 ± 999999
Resolution	0.5 μm , 1 μm , 10 μm
Switching function	
Operating temperature range	0 to +40°C
Power supply	100 to 240 VAC, 50/60 Hz
Outer dimension	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 μm resolution with the combination with the GS-7000

Specifications

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

■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 signals in square wave
Input level	Hi; +3 to +5.25 V, Lo; 0 to +1.4 V
Input impedance	Approx. 47 Ω
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) × 29 (H) × 90 (D) mm (not including protruded section)
Weight	Approx. 100 g

■DA-4130 D/A Converter



■Features

- 3 ranges changeover switch
- Conversion accuracy is ±0.1% when conversion speed is 40 μs
- Applicable models DG-4120/4240/4320/4340, TM-3120 etc.

■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 μs or less
Output voltage	0 to ±10 V (at 000 to ±999) Load resistance 1 kΩ or more
Output current	0 to ±16 mA (at 000 to ±999) (4 to 20 mA: option) Load resistance 250 Ω or less
Operating temperature range	0 to +40°C
Power supply	100 to 240 VAC, 50/60 Hz
Outer dimension	48(W) × 96(H) × 140(D) mm (not including protruded section)
Weight	Approx. 600 g

■RQ-2110 Digital Printer



■Features

- Number of samples (N), max. value (MAX), min. value (MIN), range (R), average value (X), standard deviation (σ_n, σ_{n-1}), process capability index (CP, CPK), number of faults (±NG), fraction defective (P)

- Creating D (Displacement) chart which shows the time-series change of measurement data
- Display and output of Pass/Fail judgment with LED and printing

■Specifications

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

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

<LV-7100 Laser Doppler Surface Velocity Meter Controller>

Detection velocity range	0 to ±1800 m/min	Max. display length	9999.999 m
Tracking acceleration	800 m/s ² : when [FAST] is selected at RESPONSE 400 m/s ² : when [SLOW] is selected at RESPONSE	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 range: (180 (m/min)/V to 1 (m/min)/V)	Operating temperature range	0 to 40°C
Low-pass filter	OFF (5 kHz)/ 1 kHz/ 300 Hz	Operating humidity range	20 to 80%
Phase difference output	90° ±60° Output format: Line driver output/ Totem-pole output Pulse width (A, B Phase): Dividing ratio; 1 to 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 detection, no-load measurement with the laser light
No defects such as scratch, wrinkle or transformation
- "Laser Safety Class 2", no need of safety requirement for detection such as laser protection glass, laser control regions/controller.
- Indicator on a compact sensor allows you to check the target and operating condition at the same time.
- High speed response of 800 m/s². Steep start and stop from zero speed are able to be detected.
- Selectable from speed output, phase difference output and RS-232C.

Roller Encoder

RP-7400 series for 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 (option)
Applicable detector	RV-3150, TM series
Operating temperature range	0 to +50°C
Vibration resistance	19.6 m/s ² (2ch each in X, Y and Z directions) (150 minutes)
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)

Contact Type Length Measuring Device

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)

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

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 steps)
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

Electrostatic Capacitance-type Non-contact Thickness/ Displacement Meter

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



CL-5610

Features

- Minimum display resolution: 0.02 μm (When using sensor VE-2011/5010/5011 and CL-0200 High-resolution calculation function option)
- Maximum measurement gap is 8 mm (When using sensor VE-8020/8021)
- Up to 11.5 m separation between the main unit of CL-5610S and a sensor is possible to measure.
- Easy to view with fluorescent display tube
- Measured data of gap and thickness can be output as analog voltage and judgment output is possible with the 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 is possible even the grounding impedance of the measurement target is high (CL-0210 High impedance grounding mode function (option) is used)

Specification (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.)	$\pm 0.15\%$ F.S., when attached high resolution calculation function option (CL-0200): $\pm 0.12\%$ 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 increased up to 10 m.)
Measureable 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] $\pm 5\text{ V}$ [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 (with a guaranteed accuracy range)	
Outer dimension	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)



VT-5210/5710

Features

- Measurement range: wide range of 20 μm to max. 8 mm
- $\pm 0.2\%$ 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 embedded application for device (VT-5710/5720)

Measurement target

Measurement is available when the material to be measured is a conductor.

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.)	$\pm 0.2\%$ F.S.	$\pm 0.25\%$ F.S.	$\pm 0.2\%$ F.S.	$\pm 0.25\%$ F.S.
Temperature characteristics	$\pm 0.05\%$ 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 \pm 2°C)			
Power requirement	100 to 240 VAC, 10 VA		$\pm 15\text{VDC}$ ($\pm 0.5\text{ V}$ or less), 100mA	
Outer dimensions	95(W) x 150 (H) x 195 (D) m (not including protruded section)		42.4 (W) x 56 (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 the displacement sensor with high accuracy which can measure the gap between the sensor and measurement target. It demonstrates its best performance when used for the measurement and control of the axial and surface vibration of rotational shafts such as main shaft of turbines, electric motors, compressors, and of the thickness and width of moving objects by using together with the VT series non-contact displacement meter or CL series non-contact thickness meter.

● Cable for VE series (1.5 m)

Exclusive cable for the connector connection type sensor

VL-1520: Both terminals are straight connector

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)	$\phi 3$ (hold part $\phi 10$)	$\phi 6$ (hold part $\phi 10$)	$\phi 8$ (hold part $\phi 10$)	$\phi 40$ (hold part $\phi 10$)
Cable connecting method	Connector connection (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)	$\phi 6$	$\phi 8$	$\phi 10$	$\phi 20$	$\phi 40$ (hold part $\phi 10$)
Cable connecting method	Signal cable provided (1.5 m)		Connector connection (using exclusive cable (1.5 m))		
Operating temperature range	0 to +80°C				

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



Overview

The CF-9200/9400 portable 2ch/4ch FFT Analyzer is all-in-one portable FFT Analyzer. Two on-board, large-capacity lithium ion secondary batteries enable continuous cordless operation of up to 5 hours. The intuitive and light operation is possible by a large hard key with excellent operability and a capacitance type touch panel. New developed 100 kHz analysis front end is provided 24-bit A/D converter, dynamic range 120 dB or more. Real-time FFT analysis of 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 is possible
- Simultaneous recording and analysis is possible
- Cord less driving with on-board secondary batteries
- Batteries can be changed while the power is ON
- Noise or vibration-free operation in a fan-less, spindle-less design
- Large hard key and touch panel allow high speed operation
- Three amplitude values can be read out in real-time tripartite graph

- Cord less screen printing with the connection of Bluetooth¹
- Waveform observation and main body operation are possible with a tablet terminal by wireless LAN connection¹
- Applicable to RTA/ tracking analysis/ Log sweep analysis, excitation control¹
- External control with LAN and automatic analysis are possible with auto sequence function¹

Specifications

A/D converter	24-bit $\Delta\Sigma$ Type
Frequency range	10 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) ^{*2}
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
 - Input the setting by directly touching the 8.4-inch color crystal liquid screen
 - 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 is possible
 - Input is available with the TEDS (Ver. 0.9, 1.0) applicable accelerometer and microphone*
- *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 dimension	220 (W) x 185 (H) x 220 (D) mm (not including protruded section)
Weight	Approx. 3.3 kg (when full option is equipped)

Data Recorder

DR-7100 Portable Data Recorder for Acoustics & Vibration



Overview

The DR-7100 is a portable data recorder for acoustic and vibration with easy operation and high accuracy. Equipped with dedicated input terminal for rotation speed signal, data recording is possible without sacrificing any input channel.

4 channels 40 kHz range, 24-bit high speed recording with compact body of A5-size. This is a data recorder with portability suitable for field use. Recorded data can be exported in general format of WAVE, UFF, CSV with the equipped viewer software.

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 8 channels)
- A5-size

Specifications

Number of channels	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 $5\mu\text{s}$ 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) (Operation check is required.)
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.

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 (Class 1)
- MI-1433 1/2-inch Back electret-type general-usage Microphone (Class 2)
- 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	-26±1.5 dB (1 kHz)	-29±3 dB (1 kHz)		-48±3 dB (250 Hz)
Max. sound pressure level	135 dB (when using MI-3170)	135 dB (when using MI-3111) 141 dB (when using MI-3170)	157 dB (when using MI-3140)	
Intrinsic noise level	14 dB (A)	19 dB (A)		30 dB (A)
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-3111/3140/3170 Microphone Preamplifier



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
Insertion 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)
Intrinsic noise (A-weighting, effective value)	3.3 μVrms or less	5.0 μVrms or less	2.5 μVrms or less
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	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

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

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 60942:2003 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 attached to the SC-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 (without 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 source	Size AA battery (R6P or LR6) × 3	Size AA battery (LR6 or HR6) × 3	9V flat battery (6F22 or 6LR61) × 1
Battery life	2.5 hours or more continuous operation (when using R6P)	4 hours or more continuous operation (when using LR6)	20 hours or more continuous operation (when using 6F22)
Outer dimension (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

SR-2210 2ch Sensor Amplifier



Specifications

Operating frequency range	1 Hz to 20 kHz (±0.5 dB)
Gain	(Output load impedance 100 kΩ or more) -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 kΩ or more) Approx. 0.4 Hz (load impedance 50 kΩ or more)
Input/output connector	BNC (C02)
Power supply	Size AA battery x4 or exclusive AC adapter
Battery life	20 hours or more (with alkaline battery (LR6) x4)
Outer dimensions	140 (W) x 40 (H) x 125 (D) mm (not including protruded section)
Weight	Approx. 500 g (with batteries)

Features

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

MI-8100 Directional Microphone



Specifications

Sensitivity	-30 dB ± 3 dB (re. 1 V/Pa)
Frequency band	50 Hz to 20 kHz
Directivity	Narrow angle directivity
Input equivalent noise	26 dB (A) or less
Max. sound pressure	137 dB (driven voltage 24 V)
Drive side format	CCLD (constant current line drive)
CCLD power	Constant current: 2 to 4 mA, voltage: 18 to 24 V

Features

- A sharp directivity that detects intended sound clearly
- Flat frequency characteristics up to 20 kHz and sensitivity of -30 dB (0 dB=1 V/Pa)
- Direct connection to CCLD measuring equipment (Not required an external amplifier)

Operating temperature range	-10 to +40 °C
Storage temperature range	-20 to +50 °C
Outer dimensions	φ 19 × 197 mm
Weight	Approx. 125 g
Accessory	Wind screen

BL-1100 Acoustic Vibration Monitor



Specifications

Frequency range	20 Hz to 20 kHz
Equalizer center frequency	100 Hz, 340 Hz, 1 kHz, 3.4 kHz, 10 kHz
Equalizer increase attenuate width	± 20 dB
Microphone input	6.3 mm pin-jack input, plug-in-power supported
BNC input	NP-3000 series accelerometer or MI-8100 direction microphone, MI-3111 microphone preamplifier can be used with.

Features

- Accurately identifying the target by frequency extraction filter
- Helpful for removal of background noise in abnormal sound detection
- Direct connection to CCLD sensor (not required an external amplifier)

Input GAIN adjustment	Adjustable in the range of 10 to 30 dB according to the sensor sensitivity (by semi-fixed adjustment knob)
Headphone output	6.3 mm pin-jack input (monaural output, stereo headphone supported)
Power supply	6F22 or 6LR61 (9V) x1 or exclusive AC adapter
Battery life	8 hours (alkaline batteries used at room temperature)
Outer dimensions	90 (W) x 35 (D) x 135 (H) mm (not including protruded section)
Weight	Approx. 200 g (not including batteries)

Accelerometer

NP-3000 series (single-axis) Accelerometer (with built-in preamplifier)



Features

- Built-in preamplifier reduces cable noise affection.
 - 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 are possible.
- *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 ²) ± 15%	1 mV/(m/s ²) ± 1 dB	1 mV/(m/s ²) ± 1 dB	1 mV/(m/s ²) ± 10%	0.5 mV/(m/s ²) ± 1 dB	1 mV/(m/s ²) ± 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 ± 3 dB	0.8 Hz to 16 kHz ± 3 dB	0.8 Hz to 16 kHz ± 3 dB	0.8 Hz to 16 kHz ± 3 dB	5 Hz to 15 kHz ± 3 dB	5 Hz to 12 kHz ± 3 dB

Model name	NP-3121	NP-3130	NP-3131	NP-3310	NP-331B
Features	General-purpose usage, floating	High sensitivity	High sensitivity, floating	Waterproof, directly attached cable	Waterproof, CE, floating
Sensitivity	1 mV/(m/s ²) ± 1 dB	10 mV/(m/s ²) ± 1 dB	10 mV/(m/s ²) ± 1 dB	1 mV/(m/s ²) ± 1 dB	5 mV/(m/s ²) ± 10%
Weight	34 g	46 g	69 g	59 g (not including cable)	50 g
Frequency range	5 Hz to 10 kHz ± 3 dB	5 Hz to 10 kHz ± 3 dB	5 Hz to 8 kHz ± 3 dB	5 Hz to 10 kHz ± 3 dB	2 Hz to 10 kHz ± 3 dB

NP-3000 series (tri-axial) Accelerometer (with built-in preamplifier)



Features

- CCLD built-in preamplifier reduces cable noise affection
 - 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 are possible.
- *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 ²) ± 10%	1 mV/(m/s ²) ± 10%	10 mV/(m/s ²) ± 10%
Weight	5.3 g	8.1 g	8.1 g
Frequency range	2 Hz to 5 kHz ± 5% (X-axis) 2 Hz to 10 kHz ± 5% (Y, Z-axis)	1 Hz to 5 kHz ± 1 dB (X, Y-axis) 1 Hz to 8 kHz ± 1 dB (Z-axis)	1 Hz to 5 kHz ± 1 dB (X, Y-axis) 1 Hz to 8 kHz ± 1 dB (Z-axis)

NP-3000 series Accepts TEDS Accelerometer with Built-in Pre-amplifier



Features

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

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 ²) ± 10%	10 mV/ (m/s ²) ± 10%	5 mV/ (m/s ²) ± 10%
Weight	11.1 g	11.1 g	50 g
Frequency range	1 Hz to 5 kHz ± 1 dB (X-axis) 1 Hz to 8 kHz ± 1 dB (Y, Z-axis)	1 Hz to 5 kHz ± 1 dB (X-axis) 1 Hz to 8 kHz ± 1 dB (Y, Z-axis)	2 Hz to 4 kHz ± 5% 2 Hz to 10 kHz ± 3 dB

NP-2000 series Charge Output Type Accelerometer



Features

- Due to charge output type, it can be used under high temperature (160°C, NP-2710 is 260°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 ²) ± 20%	0.16 pC/(m/s ²) ± 2 dB	0.3 pC/(m/s ²) ± 2 dB	1.2 pC/(m/s ²) ± 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 ± 3 dB	fc to 20 kHz ± 3 dB	fc to 20 kHz ± 3 dB	fc to 15 kHz ± 3 dB

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

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

NP-0081N20 TEDS Adapter



Configuration

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

Features

- Makes the accelerometer with built-in amplifier being applicable to TEDS.
- Adds the TEDS function to the features of the sensor, such as ultra compact or lightweight, without modification.

Specifications

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

VX-1100 Accelerometer Calibrator



Specifications

Exciter frequency	159.2 Hz ± 1%
Exciter acceleration	10 m/s ² (rms) ± 3%
Sensitivity measurement accuracy	± 3% ± 1 digit or less
Applicable accelerometer weight	110 g or less
Sensor power	Constant current: 0.5 mA/2mA (switchable) Voltage 15V
Power requirement	AA type battery x 4
Battery life	Approx. 20 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 the protruded section)
Weight	Approx. 1 kg

Features

- Standalone unit having three functions of an exciter
- The display function is integrated which can be read the exciter, amplifier and sensitivity values
- Required amplifier can be selected by switching
- Carrying case is provided as standard

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

Note: The VX-1100 cannot be used for NP-2106, 2506, 3211, 3331N20, 3572, 3574, 3576N10, 3578N10, 3560B and 7310.

Vibration Related Amplifier

CH-1200A Charge Amplifier



Specifications

Max. input charge	$\pm 100,000$ 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 $\pm 5\%$, 1 Vo-p $\pm 2\%$ sine wave (at 25°C ± 3 °C)
Sensitivity	0.01 to 999 pC/ EU*1
Input connector	Miniature connector
Output connector	C02 type (BNC)
Operating temperature (humidity) range	-10 to +50°C (90% RH or less)
Power requirement	10 to 15 VDC, 120 mA at 12 V (When using exclusive AC adapter; 100 VAC)
Outer dimension	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 is integrated

PS-1300 3-channel 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 $\pm 20\%$, voltage; +24 VDC
Number of channels	3ch
Rated output voltage	AC OUT ± 5 Vmax
Input connector	Miniature connector
Output connector	C02 type (BNC)
Filter	3rd Butterworth type, -18 dB/oct HPF; Through, 3 Hz, 10 Hz LPF; Through, 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 dimension	92 (W) x 121 (H) x 194 (D) mm (not including protruded section)
Weight	Approx. 1 kg

Features

- Using in combination with the 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)



*Sensor, cable and magnetic base are option.

Specifications

Input section	Number of input channels; 1ch
Analysis section	Band filter; (Number of setting bands; 2 bands) 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	Function; judgment is made independently for each band. Selection of either rms or peak value judgment for each value
General specification	
Power supply	24 VDC $\pm 10\%$
Operating temperature range	0 to +50°C
Operating humidity range	85% RH or less (with no condensation)
Outer dimension	DIN 96 x 96 x 112 mm
Weight	Approx. 500 g

Features

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

VC-3200 Vibration Comparator (3-band)



*Sensor, cable and magnetic base are option.

Specifications

Input section	Number of input channels; 1ch
Analysis section	Band filter; (Number of setting bands; 3 bands) 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 value factor (peak/rms) value, max hold, peak hold, peak/ max rms value factor (peak/rms) hold switching selection, calculation display of each measurement band
Comparator output	Function; Judgment is made independently for each band. Selection of rms / peak value / peak-maximum rms judgment factor for each band
General specification	
Power supply	24 VDC $\pm 10\%$
Operating temperature range	0 to +50°C
Operating humidity range	85% RH or less (with no condensation)
Outer dimension	DIN 96 x 96 x 112 mm
Weight	Approx. 500 g

Features

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

CH-6130/6140 Charge Converter



CH-6130

Specifications

Gain	1 mV/pC ¹ (CH-6130), 10mV/pC ¹ (CH-6140)
Frequency range	5 Hz to 15 kHz (± 0.5 dB) ² ; 2 Hz to 45 kHz (± 3 dB) ²
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 dimension	$\phi 15$ x 40 mm
Weight	Approx. 20 g

Features

- Separate placement charge amplifier is not required
- Direct connection of BNC connector which has CCLD* function

*CCLD: Constant Current Line Drive

*1: at 160 Hz

*2: The gain at 160 Hz is made 0 dB.

Note: The output polarity is reversed.

Impulse Hammer

■ GK-2110/3100/4110G20 Impulse Hammer



■ Features

- Checking of excitation, excitation force, and excitation band are available
- Select the best one from the three types of impulse hammers according to the measurement target
- Changing of the excitation force or excitation frequency band is possible by replacing the impact tip
- Built-in force sensor with built-in preamplifier enables direct connection to small power supply unit or CCLD compatible analyzer

Model name	GK-2110	GK-3100	GK-4110G20
Measurement range	220 N	2200 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 use)	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	6.4 mm	51 mm
Hammer length	107 mm	203 mm	370 mm
Output connector	Aluminum hammer handle: 5-44 coaxial connector Plastic hammer handle: 10-32 coaxial connector (miniature connector), directly attached cable	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-sensitive, and high resolution non-contact vibration sensor with built-in interacting system to the sensor head.
- Checking of the laser radiation part with the PC screen is possible with the LV-0181 built-in positioning camera on the sensor head.
- Excellent for amplitude of piezoelectric element, micro-amplitude of MEMS and thin film, non-contact vibration detection of large structure, measurement of ultrasonic tool

■ Specifications

Frequency measurement range 0.3 Hz to 3 MHz *1
 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*2

LV-0160 20MHz unit

LV-3800 3D optical unit*3

LV-0383 3D microscope unit*3

LV-0381 Microscope unit

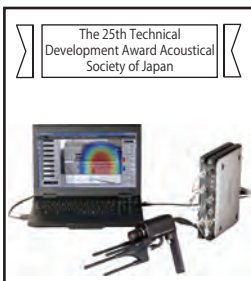
*1: More than 20 MHz or 0.01 Hz is available with an option.

*2: LV-0041 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



■ System Configuration

- Sound Source Visualization Probe Microphone: MI-5420
- 4ch Beam Forming software: BF-3100
- Time-series data analysis tool: OS-2720/0281
- Data Station: DS-3204/0371

■ Specifications

● Microphone probe
 Analysis frequency For low frequency 500 Hz to 4 kHz
 For high frequency 1 kHz to 8 kHz

● Software
 Real-time monitoring
 Number of color map display divisions 33 x 25
 Recording Frame rate 25 fps (record)
 Camera resolution 640 x 480
 Max. recording time 20 min
 Max. number of channel 8ch (4ch microphone exclusive for MI-5420 are fixed)

Offline analysis
 Frame rate 25 fps
 Analysis time resolution 40 ms or less
 Number of color map display divisions 33 x 25 to 161 x 121

■ Features

- Visualizing Sound Source using only 4 microphones
- Real-time monitoring of sound source
- Applicable to transient/impulsive sound

* There is a sound source visualization system with the MI-6420 3D SI probe. Please contact us for the details or refer to the product catalog.

■ Envelope Intensity Sound Source Visualization System



■ Features

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

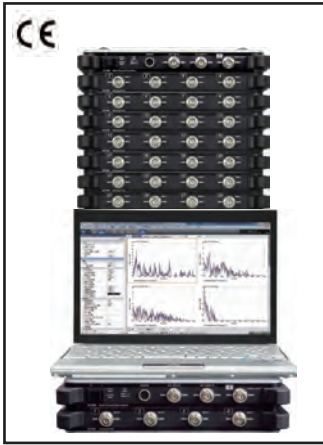
■ System Configuration

- 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°

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.
- 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
- The number of channels can be increased from min. 2ch to max. 64ch. (For 64ch, connect two 32ch units with the cable FRAME LINK.)
- B5 size, compact, approx. 2.2 kg lightweight unit (2ch/ 4ch)
- Integrate 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 LINK" : 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 are Windows® 7 (32/64-bit) and Windows® 10 (64-bit).

Hardware specifications

Max. number of units	9 units (1 main unit + 8 input/ output unit) for 40 kHz range and 100 kHz range units cannot be assembled in a same system.
Accessory	Instruction manual, AC adapter, Power cable for AC adapter
Hardware option	Power cable for DC input, Remote controller (DS-0395), Large-size AC adapter + power cable (option), connection interface between units (DS-0391) + Connection cable (option)
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 dimension	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 a standard with the system of 5 units or more.)
CE marking	Applicable

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 of the DS-3000 series exactly satisfy the needs.

Software specifications

Function	Item	Specification
Recording function (Throughput, recording function)	Recording time/ Channel	40 kHz range/ 16ch, 20 kHz range/ 32ch
	Analysis frequency range	40 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/ 10 OCT, 1/3 OCT (option: 1/6, 1/12, 1/24 OCT)

DS-3000 series Software

- DS-0321 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-0391 Unit connection interface
- DS-0392 Unit connecting interface
- DS-0395 Remote Controller

DS-3000 series Servo Analysis System



Overview

The DS-3000 Servo analysis system is a device that 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.

Features

- The mechanical control characteristics measurement (servo analysis mode) and noise vibration measurement (FFT analysis mode) are possible only by switching the mode on the DS-3000 series.
- Frequency response function (FRF) can be displayed in the graph simultaneously such as bode diagram, Nyquist diagram.
- Measurement signal, time waveform and frequency waveform can be monitored simultaneously.
- Two types of measurement mode (FRA mode, FFT mode)
- Improvement of the amplitude and phase differences between input channels (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. The signal which adds the noise signal to the feedback signal can be outputted from the main unit (available only with 100 kHz unit).

Specification

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 constant amplitude, acceleration, speed and displacement level for an arbitrary channel

Configuration 100 kHz Servo Analysis System

100 kHz hardware (2ch inputs + 1ch output): DS-3200+DS-0366+DS-0373

Servo Analysis Function Software: DS-0342

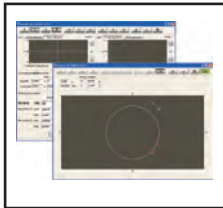
*Servo analysis function (software) can be used with an existing DS-3000 40 kHz hardware.

*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 which are required for balancing correction, and support the balance correction work in the field.

Features

- Procedure for balance correction, operation instruction, result display, etc. are graphically displayed on screen, so simple operation is possible.
- Reliable operation is available by adopting the large button applicable to touch panel.
- With the combination of the DS-2000/30000 series, it is possible to operate as a scalable measuring system.
- Field balancing of 1-plane 1-condition/ 1-plane 2-condition/ 2-plane 2-condition are possible

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)

Sound Level Meter

LA-7200/7500 High Performance Sound Level Meter



Overview

The LA-7200/7500 are the higher model of the LA-1411/1441/4441, high performance sound level meter which integrate the frequency analysis function and listening function. Easy to see and operated by the 4.3-inch color LCD display with touch panel function. Compact size and easy to carry.

Specifications

	LA-7500	LA-7200
Applicable standard	IEC 61672-1: 2013 Class 1	IEC 61672-1: 2013 Class 2
Sound pressure level range	24 dB, -138 dB	
Measurement range	10 Hz to 20 kHz	20 Hz to 8 kHz
Level range	20 dB -130 dB (wide range), 10 dB -80 dB... 60 dB -130 dB (normal range)	
Frequency weighting	A, C and Z	
Time weighting	F (fast), S (slow), I (impulse), 10 ms	
Display device	4.3-inch LCD (smart phone size) with color LCD touch panel	
Measurement items	L_p , L_{eq} , LE, L_{peak} , L_{max} , L_{min} , (LN)	
Analysis function	SPL (Single/ Dual/ Quad), 1/1 OCT, 1/3 OCT* option (FFT* option, Constant sound loudness* option will be released in 2018.)	
Memory function	Calculation value (CSV), Lp logging value (CSV), Sound recording (WAV)* option	
Interface	Analog output 2-terminal (Select from display AC output, DC/ AC-Z/ Through output), headphone output, external control terminal, USB terminal, Multi terminal (Equivalent to RS-232C)	
Other corrections	Wind screen correction	
Recommended calibrator	SC-2500, SC-3120	SC-2120A, SC-2500, SC-3120
Recommended extension cable	AG-3400 series	
Power supply	Size AA battery (LR6 and HR6) x 4, USB bus power	
Operating time	Approx. 12 hours (When LCD is not displayed, SPL driving)	
Outer dimensions	Approx. 90(W) x 280 (H) x 42 (D) mm	
Accessories	AC adapter, signal cable, windscreen (Φ70 mm), alkaline size AA battery x 4 pieces, instruction manual (CD)	

* This is a provisional specification.

LA-3570/3560/3260 High Function Sound Level Meter



■LA-1411/1441/4441 Integrating Sound Level Meter



■Overview

The LA-1411/1441/4441 sound level meter are applicable to IEC 61672-1: 2002, JIS C 1509-1:2005. Adopted curved surface body with less reflection of sound. All models can perform simultaneous measurement of seven sound parameters including equivalent continuous sound level without adjusting the level range corresponding to the sound fluctuation and display the selected parameters.

■LA-1411

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

■LA-1441

Integrating sound level meter for measuring the working environment and environment noise. Auto measurement function by timer and trigger. Level trend can be recorded at the interval from 1 ms (Lp memory function).

■LA-4441

Precision integrating 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.

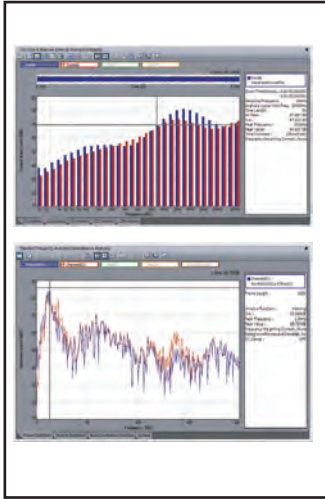
■Features

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

■Specifications

	LA-1411	LA-1441	LA-4441
Applicable standard	IEC 61672-1 : 2002 Class 2		IEC 61672-1 : 2002 Class 1
	JIS C 1509-1 : 2005 Class 2		JIS C 1509-1 : 2005 Class 1
	JIS C 1516-1 : 2014 Class 2		JIS C 1516-1 : 2002 Class 1
Linearity range	100 dB (wide range), 80 dB (normal range)		
Measurement range	A : 26 to 135 dB (IEC, JIS)		A : 27 to 135 dB (IEC, JIS)
	C : 31 to 135 dB (IEC, JIS)		C : 30 to 135 dB (IEC, JIS)
	Z : 36 to 135 dB (IEC, JIS)		Z : 35 to 135 dB (IEC, JIS)
Frequency weighting	A, C, Z		
Intrinsic noise	A : 15 dB or less		A : 16 dB or less
	C : 17 dB or less		C : 17 dB or less
	Z : 25 dB or less		Z : 24 dB or less
Time weighting	FAST, SLOW		FAST, SLOW, Impulse, 10 ms
Measurement items	$L_p, L_{eq}, L_E, L_{max}, L_{min}, L_{pk}, L_N (L_{High}, L_5, L_{10}, L_{50}, L_{90}, L_{95}, L_{Low}, L_{ave})$		
Measurement time	Manual, arbitrary setting (199h, 59m, 59 s max.)		
Display	LCD with LED backlight semitransparent (124 x 64-dot), Measurement value display by numeric and bar indicators, List display and trend graph display for various kinds of calculated values, Displays of date, time, measurement time, and conditions of various kinds of instruments		
Memory function	Manual memory	Manual memory, Auto memory, Lp record	
Analog output	Selectable from AC (frequency weighting), AC (frequency weighting-Z) and DC (Frequency weighting and time weighting)		
USB	-	Control of main unit and data output, Printer output (BL-112 IIUI) USB 2.0 FULL SPEED (connecting virtual COM port)	
Power supply	Size AA battery × 2 pcs. or PB-7090 AC adapter (option) Power consumption: Approx. 4VA at 100 VAC		
Outer dimensions	Approx. 78(W) × 263(H) × 47(D) mm		
Weight	Approx. 360 g (including batteries)		

OS-2740 Sound Quality Evaluation Pack



Overview

The OS-2740 is 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. Calculation of sound quality parameter such as loudness and sharpness, FFT analysis, octave analysis and sound reproducing and editing, and filter operation are possible.

Features

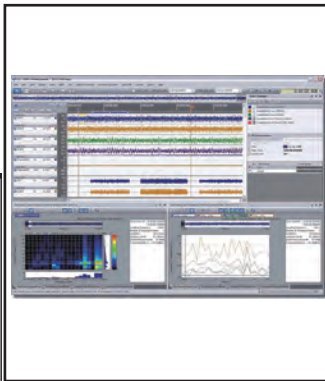
- Large capacity data of maximum 512 channels and 5 billion points can be handled
- The sound evaluation parameter calculation of loudness, sharpness, roughness, fluctuation strength and tonality are available.
- Signal processing, calculation, editing, detection functions can be used.
- IIR filter is equipped as a standard
Real-time recording of the sound which passing through the frequency filter/ order designed arbitrary.
- Applicable to 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 high code, file (.mem), TEAC, TAFFmat, file (.hdr), YOKOGAWA, binary data file (.wvf, .wdf)
- Addition of the function according to application is possible.
- Conforming to ISO 532B, DIN 45631/ A1

Operation environment

OS	Microsoft® Windows® 7, 10 (.NET Framework 3.5 Service Pack 1 or later must be installed.)
CPU	CPU which has a performance of Intel® 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 such as [standalone type] by using protect key and [net type] by using the PC which connects to the network.

OS-2760 Fluctuation Sound Analysis Pack



Overview

The OS-2760 is adding the "fluctuating sound analysis" effective for evaluating the key sound with time variation and the "fluctuation sound simulator" that can emphasize and remove the fluctuating component without changing the frequency characteristics to the OS-2740 sound quality evaluation pack. The fluctuating sound analysis can capture fluctuating sounds often concerned even it is small in volume, with three axes of frequency (sound pitch), fluctuating frequency (fluctuation speed), and magnitude of fluctuation. The fluctuation sound simulator can increase or decrease only the fluctuating sound, so hearing impression can be simulated when the fluctuation component is changed.

Features

- Multiple speed fluctuating sound can be displayed in the color map and intuitive evaluation is possible
- Useful when extracting only fluctuation component from the loud background noise of the level
- Applicable to wide fluctuation frequency range (0.5 to 200 Hz) from the slow fluctuation such as beating sound to the fast fluctuation.

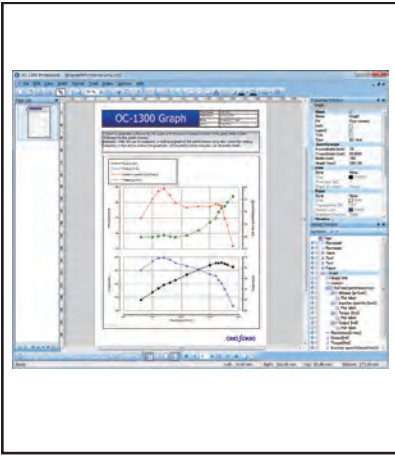
- It is possible to evaluate how the impression of the target sound changes by emphasizing and removing specific variation components.
- It is possible to generate a time waveform extracted from only specific fluctuation components.

Operation environment

OS	Microsoft® Windows® 7, 10 (.NET Framework 3.5 Service Pack 1 or later must be installed.)
CPU	CPU which has a performance of Intel® 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 such as [standalone type] by using protect key and [net type] by using the PC which connects to the network.

OC-1300 Multi-functioned Graph Creating Tool



Features

- Easy creation of multiple-axis graph and 3D graph which Excel® cannot be created
- Flexible graph creation by moving graph axis anywhere with a mouse.
- 3D and 4D graphs can be moved easily with a mouse.
- Improved operability with the Excel® add-in function

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
 - XLS¹, XLSX², XLSM², CSV, text, DS/CF (with restriction), FAMS/KY, combustion analysis³, Meidensha MEIDACS⁴
 - *1: Installation of Excel®2002 or later is required.
 - *2: Installation of Excel®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® other than OC-1300.
OC-0320	Digital map	Interpolate and output between the 3D data to arbitrary pitch width of mesh data.
OC-0330	Cube controller	Visualize the multiple maps in a multidirectional manner in a 4D graph
OC-0340	DAT browser	Display the data file which is performed FFT or octave analysis by the CF/DS series.
OC-0341	TRC browser	Display the 3D data file which is performed tracking analysis by the CF/DS series.

Applicable OS

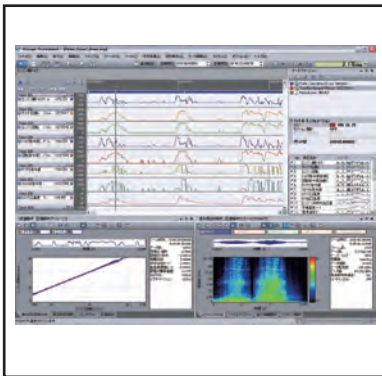
Microsoft® Windows® 7, 10

*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	This is the basic version which mainly supports the functions of scatter plot and line plot.
OC-1320	Standard	This is the standard version which enhances the basic functions.
OC-1330	Professional	This is the professional version which is implemented all functions including digital map and control API.
OC-1340	Package for DAT/TRC browser	This is package including DAT browser and TRC browser.

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



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 evaluation
- Playback of video while sound and vibration analysis is possible by loading the video file.
- The horizontal axis of the graph can be displayed as axes other than time, such as distance and angle.
- OS-2000 series are software for editing or analyzing the long time-series data, it can be displayed without being restricted by data format and sampling frequency.

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® (*.xls, *.xlsx), WAVE (*.wav), sound file (*.s01, *.s02), TEAC TAFFmat file, AQ-VU file, HIOKI memory hicoder file, YOKOGAWA WVF/WDF 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 creating tool, file merge, Hilbert conversion, 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 Tracing map

Applicable OS

Microsoft® Windows® 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
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.

Engine Rotation Detector

■IP-292/296 Ignition Pulse Detector



■Specifications

Applicable engine 2/4-cycle gasoline engines
 Detection section Primary cord of an ignition coil (IP-292)
 Secondary cord of an ignition coil (IP-296)
 Applicable cord diameter Max. \varnothing 10 mm
 Output cord length 4.9 m (direct output/ with BNC)
 Applicable display unit 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 -40 to +120°C
 Outer dimension 102 (W) x 48(H) x 30(D) mm
 Weight Approx. 280g

■Features

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

■IP-3000A Ignition Pulse Detector



■Specifications

Applicable engine 2/4-cycle gasoline engine
 Detection section Primary cord of an ignition coil
 Current cord of electronic distributor
 Applicable cord diameter Max. \varnothing 5 mm
 Output cord length 4.9 m (direct output/ with BNC)
 Applicable display unit 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 -40 to +120°C
 Outer dimension 8(W)x 14.3(H)x 30(D) mm
 Weight Approx. 80 g (including cable)

■Features

- Rotation detector exclusive for gasoline engine
- Convenient one-touch mounting
- Compact and lightweight detector enables installation on engines that are difficult to install with conventional models

■IP-3100 Ignition Pulse Detector



■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 electronic distributor
 Applicable cord diameter Max. \varnothing 10 mm
 Output cord length 4.9 m (direct output/ with BNC)
 Applicable display unit 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 -40 to +120°C
 Outer dimension 13(W)x 33(H)x 60(D) mm
 Weight Approx. 130 g (including cable)

■Features

- Rotation detector exclusive for gasoline engine
- Convenient one-touch mounting
- Compact and lightweight detector enables installation on engines that are difficult to install with conventional models

■OM-1200 Motor/Engine RPM Detector



■Specifications

Applicable engine 2/4-cycle gasoline engine, EV/HEV, motor
 Detection method Electromagnetic induction
 Applicable display unit 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
 MX-005/010/015/020 (option)
 Operating temperature range 0 to +80°C
 Outer dimension \varnothing 16 x 54 mm (only sensor)
 \varnothing 16 x 80 mm (when connecting cable)
 Weight Approx. 65 g

■Features

- Excellent in durability, environmental resistance and rigidity
- Gasoline engine rotation measurement and motor rotation measurement are possible

■OM-1500 Motor/Engine RPM Detector



■Specifications

Applicable engine 2/4-cycle gasoline engine, EV/HEV, motor
 Detection method Electromagnetic induction
 Output cord length 4.9 m (direct output)
 Applicable display unit 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 -10 to +100°C
 Outer dimension \varnothing 16 x 30mm
 Weight Approx. 130 g (including cable)

■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

■CP-044 RPM Detector for Diesel Engine



■Specifications

Applicable engine Diesel engine
 Detection method A piezoelectric element is used to detect pulsation at the time of fuel injection
 Applicable pipe diameter \varnothing 4 to 8 mm
 Output cord length 4.9 m direct output (with 6-core connector)
 Piezoelectric element withstand compressive pressure 1960 bar
 Applicable display unit GE-1400
 Operating temperature range 0 to +80°C
 Outer dimension \varnothing 32x79 mm
 Weight Approx. 120 g

■Features

- One touch mounting to fuel injection pipe
- Attachment to the injection pipe of \varnothing 4 to 8 mm are available
- Detection is available regardless of the number of cylinders

VP-201/1210 Engine Vibration Detector



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 direct output (with mini plug)
Applicable display unit	SE-2500
Operating temperature range	0 to +100°C
Outer dimensions	φ25 x 50 mm
Weight	VP-201; Approx. 110 g VP-1210; Approx. 130 g

Features

- Easy mounting to a cylinder head bolt by a magnet built-in detector
- Lightweight and heat resistance structure
- VP-1210 is high sensitive type

* Depending on the specifications, some engine cannot be measured with our engine tachometer. The engine which has not for used requires operation check with demo machine. Please contact your nearest distributor or send us an email (overseas@onosokki.co.jp).

VP-202/1220 Engine Vibration Detector



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 direct output (with BNC)
Applicable display unit	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	φ25 x 50 mm
Weight	VP-202; Approx. 110 g VP-1220; Approx. 130 g

Features

- Easy mounting to a cylinder head bolt by a magnet built-in detector
- Lightweight and heat resistance structure
- VP-1220 are high sensitive type

Engine Tachometer

GE-1400 Diesel Engine Tachometer



Specifications

Applicable engines	4-cycle diesel engines
Detection method	Detection of the pulsation generated by the injection pipe at the time of fuel injection
Display update time	1 ± 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 alkaline battery x4 or exclusive AC adapter
Battery life	Approx. 16 hours (when the backlight is OFF) Approx. 8 hours (when the backlight is ON)
Outer dimensions	66(W)x 186.5(H)x 47.5(D) mm
Weight	Approx. 230 g (not including batteries)

Features

- Built-in memory function
- Trigger adjustment function provided

HT-6200 External Sensor Input Type Handheld Digital Tachometer



Specifications

Applicable engine	Diesel engine, gasoline engine, motor, general rotating object
Display update time	1 ± 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 (±0.02%) ± 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)

Features

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

SE-2500 Gasoline Engine Tachometer



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 ± 0.2s
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 alkaline 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)

Features

- Built-in sensor type
- Built-in memory function
- Capable of performing measurement at a distance of 1 m when the external sensor (IP-2800) is used.
- Measurement can be performed in 1 r/min or 0.01 r/s units

SE-1200 Digital Engine Tachometer



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 ± 1 r/min 12,500 to 20,000 ± 2 r/min
Display section	7-segment LCD 5-digit
Measurement display time	1 s, automatic update
Power source	Size AAA-type battery x3
Battery life	Approx. 100 hours (when alkaline batteries are being used at a temperature of 20°C)
Outer dimensions	62(W)x 129(H)x 26.4(D) mm
Weight	Approx. 90 g (excluding batteries)

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 and accurate measurement is possible

■SE-1620 Gasoline Engine Tachometer On-vehicle and built-in at bench 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 (LG-9200 confirm, power
 supply; 12V 100 mA)

Display unit 100-mm wide angle meter, Class 1.5
 Double scale of 0 to 10,000 r/min
 (100 r/min/scale) or 0 to 20,000 r/min
 (200 r/min/scale)

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: $\pm 0.2\%$ /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

■Features

- On-vehicle and built-in at bench type
- Analog output, pulse output are provided as a standard
- Convenient on vehicle or field measurement by 12 to 24 VDC

■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 1.5
 Low speed; 0 to 2000 r/min,
 High speed; 0 to 10,000 r/min

Range switching function Automatic or manual switching of high
 speed and low speed range

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 $\pm 10\%$ (option), 11 to 15 VDC
 Outer dimensions 210(W)x 149(H)x 300(D) mm
 (not including protruded section)
 Weight Approx. 4 kg

■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)

■CT-6700 Digital Engine Tachometer



■Specifications

Applicable engine Gasoline engine, diesel engine, EV, HEV,
 general rotation body
 Measurement range 0 to 99999 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

■Features

- 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

[SIG] output 0 to F.S./ 0 to 10 V (value of F.S. can be
 specified)

Pulse output Outputs the sensor signal connected to
 MAIN (can be used by switching from analog output)
 Pulse outputs 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;
 100Ω 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

■Features

- 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.

■ LC-8120 GPS Speedometer



■ Features

- Using GPS enables stable measurement which is not affected by weather or road surface conditions.
- Highly accurate and fast response measurement by original algorithm using GPS + IMU.
- Various vehicle measurements can be conducted by adding optional software.
- Data import of CAN/OBD II is optionally available.
- With excellent performance of a delay time within 5 ms, useful for acceleration tests or brake tests.

■ Specifications

Horizontal speed	Measurement range: 0.1 to 500.0 km/h Accuracy: ± 0.1 km/h
Horizontal distance	Accuracy: $\pm 0.05\%$
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) Power consumption: Max. 30 VA Operating temperature range: 0 to +50°C Storage temperature range: -10 to +60°C
Accessory	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 dimension (weight)	Approx. 269(W)x 180(D) x 43(H) mm (not including protruded section) (Approx. 1.4 kg)

■ Option

LC-0080	: Small display unit
LC-0084	: Large display unit
LC-0730A	: 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
LC-0832	: Fuel consumption test software
LC-0833	: Track display software
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-4007J	: AC adapter 100VAC
TP-0411	: Thermal paper for printer

■ LC-8220 GPS Vector Speedometer



■ Features

- High end model of GPS speedometer of Ono Sokki.
- Various vehicle measurements can be conducted by adding optional software.
- Data import of CAN/OBD II is optionally available.
- 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, such as forward/backward acceleration, gradient angle.
- 8ch of analog input, 5ch of pulse input.

■ Specifications

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/s ²
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 \pm 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) Power consumption: Max. 30 VA Operating temperature range: 0 to +50°C Storage temperature range: -10 to +60°C
Accessory	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 dimension (Weight)	Approx. 269(W) x 180(D) x 71(H) mm (not including protruded section), (Approx. 2.2 kg)

■ Option

LC-0730A	: 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-4007J	: AC adapter 100VAC
TP-0411	: Thermal paper for printer

■ Specifications

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

■ LC-8300 Compact & High-sensitive GPS Speedometer



■ Features

- Using GPS enables stable measurement which is not affected by weather or road surface conditions.
- Highly accurate and fast response measurement by original algorithm using GPS, GLONASS and IMU.
- Various vehicle measurements can be conducted by adding optional software.
- Data import of CAN/OBD II is optionally available.
- Compact size (70% reduction in volume compared to the LC-8120), easily installed even in a limited space such as two-wheel vehicles.
- Data logging without a PC: Data can be stored in an attached USB memory or internal storage memory.
- Easy to operate with a touch panel: The touch panel display improves visibility and ease of operation.

- Analog 4ch, pulse 1ch, CAN 64ch input as a standard.
- Up to 30 items can be measured and recorded with only one unit.

■ Specifications

Horizontal speed	Measurement range: 0.1 to 500.0 km/h Accuracy: ± 0.2 km/h
Horizontal distance	Accuracy: $\pm 0.20\%$
XYZ acceleration	Measurement range: -98.0 to 98.0 m/s ²
XYZ angular speed	Measurement range: -150.0 to 150.0° /s
Output: Analog	Voltage range: 0 to 10V/ 0 to 500 km/h Output delay: 10 ms or less
Output: Pulse	Resolution: 1, 5, 10 mm/ P selectable Output delay: 10 ms or less Level: TTL
Input: Analog	4ch: ± 20 V/16-bit
Input: Pulse	1ch: TTL pulse, 1ch: SIN input
Power supply output	12 \pm 2VDC (Approx. 4 VA or less)x 1ch
External trigger input	Start, stop signal
External trigger output	Gate state output/ speed judgment output
Main unit test function	Normal measurement, interval measurement, starting acceleration, passing acceleration MFDD, ABS, fade recovery, coasting test
Others	Speed interpolation function (Pulse, CAN), CAN communication function, Printing function by optional printer
General specification	Power supply: 9 to 28 VDC/ 100 to 240 VAC (when using optional AC adapter) Power consumption: Max. 12 VA Operating temperature range: 0 to +50°C Storage temperature range: -10 to +60°C

Accessory	Touch panel display unit and each cable, Remote box, antenna, Power cable for cigarette light socket, USB memory, Installation CD, mounting jig for display unit, Carrying case
Outer dimension	170(W) x 120(D) x 40(H) mm (not including protruded section)
Weight	Approx. 0.75 kg

■ Option

LC-0824	: km/mile switching function
LC-0825	: IMU data output function
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 software
LC-0832	: Fuel consumption test software
LC-0833	: Track display software
LC-0854	: CAN output function
LC-0860	: Cable for CAN (2m)
LC-0863	: CAN/OBD II cable
LC-0864	: Tape switch
LC-0866	: Input/output cable
DPU-414	: Digital printer
PW-4007J	: AC adapter 100 VAC
TP-0411	: Thermal paper for printer

■ Software for GPS Speedometer



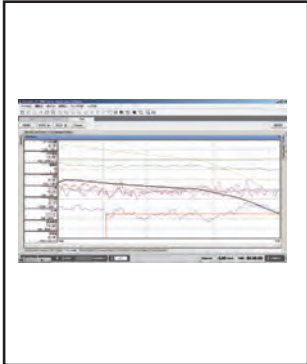
■ Operation environment

OS	Microsoft® Windows® 7 [32bit/64bit]/ 10 [32bit/64bit]
CPU	Intel® Core™ 2 Duo/ 2GHz or more
Memory	512 GB 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 when purchasing 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 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.

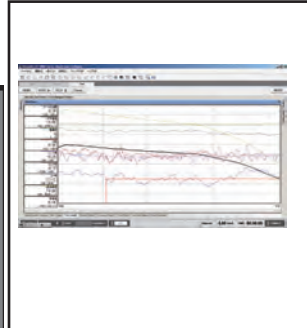
■ Features

- 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 in 100 Hz)
- 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 graph display.
- Start trigger: external input signal or speed difference. 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.
- 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
- Deleting list data while observing is possible
- Distinguishes data between forward and backward is possible
- 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 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.

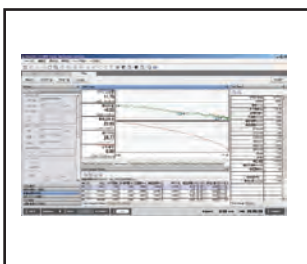
■ Features

- Mode selection is available from level ground fuel consumption test and pattern fuel consumption test
- Create a report based on a distance in the level ground fuel consumption test mode. Distance step: 5, 10, 20, 25, 50, 100 m
- Create a report based on a time in the level ground fuel consumption test mode. Time step: 1, 10, 60 s
- Simultaneous recording is possible at 100 Hz as an original data
- 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 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.
- Multiple tests can be observed and managed in the level ground fuel consumption test mode.
- Selected data can be list display when recording multiple data
- Deleting list data while observing is possible
- Distinguish data between forward and backward is possible
- 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-0833 Track display software



■ Overview

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

■ Features

- Minimum rotation radius can be measured.
- Brake test and sliding of the vehicle measurement while testing brake can be measured simultaneously when the LC-0831 Acceleration/deceleration test software is installed.
- Drawing of measurement vehicle 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 possible with the OS-0292 Tracking map option.
- Checking of speed and distance on the cursor position is possible
- 10 points can be selected on the line of the driving path
- Checking of north direction distance difference between starting point and an each marker point is available
- Checking of east direction distance difference between starting point and an 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 an 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 an 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 acknowledgment 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-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 acknowledgment function. ●Small and light weight, ideal for on-board measurement

FP-2140S Pressure loss compensation function type

- Measurement range: 0.05 to 200 L/h, resolution of 0.01 mL/P, measurement is available with one unit from micro fuel flow of HEV engine to high load range of alcohol fuel engine ●Drives the flow rate detector by a motor to move the free piston which has been inserted from a bypass pipe of the detector to 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)

- Measurement range: 1 to 1440 L/h
- Compensate the error by pulse flow and reverse flow with rotating direction acknowledgment 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 precision: within $\pm 0.2\%$ of reading ●Flow ratio; 1: 2000 ultra wide range
- Compensate the error by pulse flow and reverse flow with rotating direction acknowledgment function.
- Compact body and wide temperature range enables to install inside of the vehicle

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	- ^{*1}	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 ^{*2} (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 ± 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) ^{*3} (excluding filter pressure loss)	0.01 kPa or less (excluding filter pressure loss)	Within 2 kPa (at 60 L/h, for gasoline) ^{*3} (excluding filter pressure loss)	
Maximum flow rate pressure		980 kPa ^{*4}	980 kPa	980 kPa ^{*4}	
Operating temperature range		0 to +65 °C ^{*4}	0 to +60 °C	0 to +65 °C ^{*4}	
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	Yes
	Light oil	Yes	Yes	Yes	Yes
	Kerosene	Yes	Yes	Yes	Yes
	Standard petroleum oil	Yes	Yes	Yes	Yes
	Alcohol fuels	Option	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	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 ± 0.018 L/h or less (when 1 to 3.6 L/h), Within ± 0.5 of reading (when 3.6 to 1440 L/h)	$\pm 0.2\%$	$\pm 0.2\%$
	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 ^{*3} (at 500 L/h, for light oil) (excluding pressure loss at filter section)	4 kPa or less (excluding pressure loss at filter section)	
Maximum flow rate pressure		980 kPa	3.4 MPa ^{*4}	980 kPa ^{*4}	8 MPa
Operating temperature range		0 to +50 °C	0 to +65 °C ^{*4}		-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



FM-2500A



FM-1500

Features

- Three different flow detectors (FP/FX/FZ series) can be used in combination with selection of suitable measurement module. (Only the FM-2500A can be used in combination 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 in combination with the FX series.)
- Enables calculation of measured data and displaying them as volumetric flow rate or mass flow rate.
- Density correction function is provided to display of 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 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	LDC with CFL backlight, 320 x 240 dots	Fluorescent display tube (20 characters x 2 lines), text shape: 5 x 8 dots	
Interface ^{*1}	Remote ^{**}	Command Input level	START, STOP, HOLD, DISP, RESET H = +2.4 to 15 V, L = +0.8 V or less	
	RS-232C ^{**3}	Communication method	Asynchronous full-duplex mode	
		Data length	8 bits	
	Transfer speed	9600, 19200, 38400, 57600, 115200 bps	9600 bps	
GPIB		Option (model name: FM-0263)		
Digital I/O		Option (model name: FM-0361)	-	
Memory function	Memory function	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)	
		Data backup period	Approx. 1.5 month (at 25 ° C) battery: coin-type vanadium lithium secondary battery	
Storage 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 stored)	Approx. 4.2 kg	
Power supply		100 to 240 VAC, 50/60 Hz		
General specification	Maximum current consumption	40 VA or less, External fuse: 2 A	30 VA or less, External fuse: 2 A	
	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 ² , shock application period: 18ms)		
	Compatible vibration-resistance standard	JIS C 0040: 1999 (vibration acceleration: 10m/s ² , vibration frequency range: 10 to 150 Hz)		
	Maximum current consumption		40 VA or less, External fuse: 2 A	30 VA or less, External fuse: 2 A
	Insulation resistance		10 MΩ or more (500 VDC rated power supply)	

*1: Only on 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 is the FM-0200.

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

Fuel Flow Meter

MF-3200 On-Board Flow Detector



MF-3200

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 (MF-3200)
Measurement range	Flow rate: 0.3 to 120 L/h Pressure: 0 to 980 kPa Temperature: 0 to +99.9 °C Pressure: ±0.5% F.S. Flow rate: ±0.2% reading value or less Pressure: ±0.5% F.S. Temperature: Pt 100Ω Class B 0 to +65 °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	0 to +65 °C
Weight	Approx. 15 kg
Applicable display unit	FM series (DF-0400A; module for FP series detector), DF series
*In-tank fuel pump vehicle with MF-3200 cannot be used.	

Features

- Compact and light weight
- A fuel cooling function is provided as a standard
- Temperature, pressure sensor is provided as a standard
- Capable of compensating for errors caused by pulsating or backflow by means of a function for judging the direction of rotation.

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



FX-1110/1120/1130

Specifications

Detection method	Differential pressure conversion type
Measureable liquid	Gasoline, light oil, kerosene (alcohol is 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/s (FX-1110/1120) 0.1 g/s (FX-1130)
Operating max. pressure	196 kPa
Applicable display unit	FM-2500A (FX-0400A; module for FX series detector)
Weight	Approx. 13 kg

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

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



FZ-2100

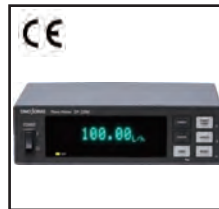
Specifications

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-2200)
Flow measurement accuracy	FZ-2100 ±0.1% of reading value at 2 to 82 kg/h ±(0.002 kg/h/ flow rate) x 100% Reading value or less at 0.2 to 2 kg/h FZ-2200 ±0.1% of reading value at 27 to 1090 kg/h ±(0.027 kg/h/ flow rate) x 100% Reading value or less at 1 to 27 kg/h ±0.1% of reading value or less/at 0.76g/cm ³
Density measurement accuracy	±0.1% of reading value or less/at 0.76g/cm ³
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-2200)

Features

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

DF-2200 On-Board Digital Flow Meter



DF-2200

Specifications

Measurement item	Instantaneous flow rate, 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) *The position of decimal place depends on the connecting flow detector.
Data memory function	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 dimension	170 (W) x 49 (H) x 120 (D) mm (without protruded section)
Weight	Approx. 800 g
Interface	CAN
Accessory	DC power cable with clamp

Features

- Easy installation on the dashboard of a vehicle (applicable to wide power range: 12 VDC/24V)
- Wide variety of options AC adapter, RS-2232C, remote control

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 Ultimate/Professional Pro 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)



*FAMS: Flexible Automatic Measuring System

Overview

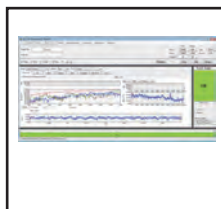
The basic system consists of dynamometer which is necessary for giving load condition to the engine, throttle controller and minimum required measuring instrument. By adding a variety of related equipment such as automatic operation setting device, various component controllers, measurement system and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

Features

- From dynamometer to data processing, our project team gives consistent support.
- Various selection of actuator developed by Ono Sokki. You can choose according to the purpose of the test.
- Each function is unitized for easy system configuration from simple system to advanced auto driving system.
- Extensive related equipments and options such as high performance detector or computer system is available

Sound and Vibration Measurement for Automotive

GN-1100 series Noise Testing Software



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
Frequency analysis 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

Automotive related product

Injection Amount/ Injection Ratio Meter

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



Overview

This system enables multi-stage fuel injection by offering high injection pressure in various driving situation.

Features

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

Applications

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

Measurement items

Fuel injection quantity (each stage and total injections), 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 rotation range	0 to 15,000 r/min
Vibration resistance	Radial direction; 500 m/s ² Thrust direction: 500 m/s ²
Operating temperature range	0 to +120 °C
Cable	Optical fiber cable 5 m (direct attached)
Rotation stop	CP-0610/ 0600A
Outer dimensions	Outside diameter: 57 mm Thickness: 38 mm
Weight	Approx. 750 g (including fiber cable)

■ Features

- High accuracy crank angle measurement is possible 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 voltage	Hi; +4.5 V or more
Power supply	Lo; +0.2 V or less
Operating temperature range	12 to 24 VDC (8VA) 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 TTL level angle signal (A-phase) and 1 P/R signal (Z-phase)
- Detection sensitivity control is possible 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 is possible with the CA-6000 crank angle amplifier
- No bearings, therefore low rotation load
- Small protrusion at shaft end, space saving is possible
- 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 ²
Operating temperature range	0 to +100 °C
Cable	Optical fiber cable 5 m direct output (with stainless flexible tube)
Outer dimension/ 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 each engine performance test 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
- Only attaching to the engine crank shaft end
- Exclusive for PP-932/933 Amplifier (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 ϕ 200 mm
 Resistant acceleration Approx. 200 m/s²
 Outer dimension/Weight 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 (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 each engine performance test 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
- Only attaching to the engine crank shaft end
- Exclusive for PP-932/933 Amplifier (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 ϕ 200 mm
 Resistant acceleration Approx. 200 m/s²
 Outer dimension/Weight 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 (not including protruded section)/ Approx. 1.2 kg

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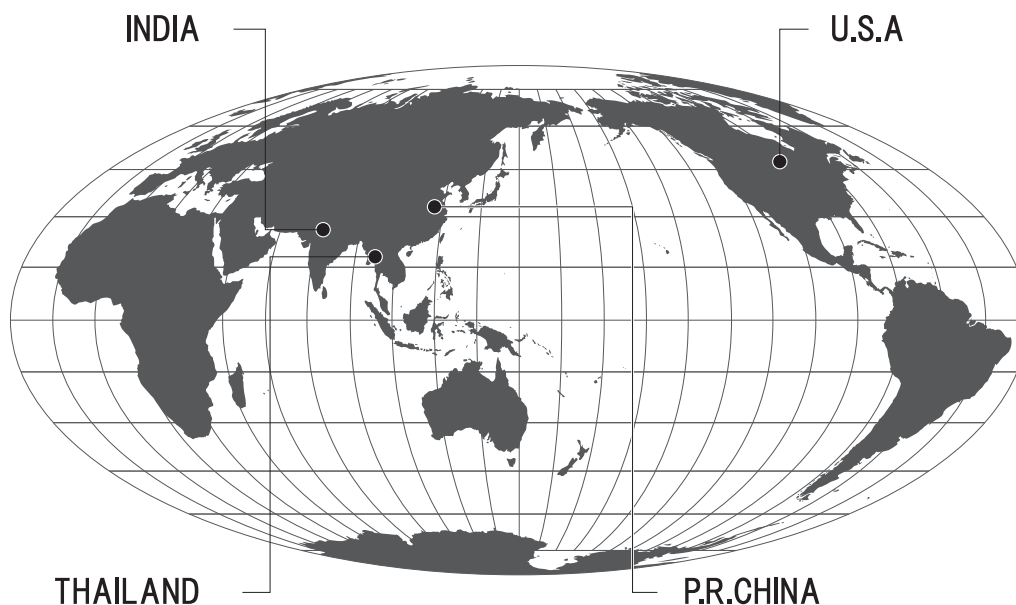
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