General Product Guide

Vol.6

General Product Guide

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Brochures and Website

For detailed product infomation, brochures and applications,
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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: directly attached cable type (5 m)
- Various types are available including oil proof, heat resistant and ultra compact.

■ Specifications

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

MP-9810/9830 Magneto-electric Rotation Detector (General, high speed type)

■ Features
- Detection from nearly 0 r/min is available.
- Non-contact detector
- Improved environmental resistance (IP67 compliant)
- Operation status and attaching position can be checked with signal indicator.

■ Specifications

Output waveform	Square wave Hi: +5±0.5 V Lo: +0.5 V or less
Measurement range	MP-9810: 0 Hz to 20 kHz MP-9830: 0 Hz to 100 kHz
Detection gear	Ferromagnetic, 3 mm or more gear width Module 0.5 to 3 mm
Detection distance	0.5 to 3.0 mm (depending on gear module)
Output impedance	Approx. 330 Ω
Operating temperature range	-10 to +70 ˚C
Power supply	DC12 to 24 V±10 % (10.8 to 26.4 V)
Weight	Approx. 80 g (including mounting nut×2)

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

■ Features
- Water and acid resistant type which conforms to IPX7 of JIS C 0920.
- Detection from nearly 0 r/min is available.
- Non-contact detector
- Acid resistant cable 1.9 m is directly attached.
- Operation status and attaching position can be checked with signal indicator.

■ Specifications

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

LG-9200 Optical Detector

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

■ Specifications

Detection method	Visible light reflection using an optical fiber sensor
Detection distance	20 to 40 mm (using 12 mm 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: +5 V±0.5 V Lo: +0.5 V or less
Output impedance	1 kΩ or less
Operating temperature range	-10 to +60 ˚C
Power source	12±2 VDC, 60 mA or less (at 12 V)
Outer dimensions	21 (W) × 24 (H) × 117 (D) mm
Weight	Approx. 150 g (including mounting nut × 2)

LG-930 Photoelectric Detector

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

■ Specifications

Detection method	Visible light reflection using an optical fiber sensor
Detection distance	70 to 200 mm (using 12 mm square reflective mark)
Light source	Light emitting diode (red visible light)
Max. response speed	25 m/s (when using 12 mm square reflective mark in 48 mm interval)
Output waveform	Rectangular wave Hi: +5 V±0.5 V Lo: +0.5 V or less (load resistance 100 kΩ or more)
Output impedance	1 kΩ or less
Operating temperature range	-10 to +60 ˚C
Cable length	4.9 m
Power source	12±2 VDC, 8 5 mA or less (at 12 V)
Outer dimensions	23 (W) × 29 (H) × 76.5 (D) mm
Weight	Approx. 200 g

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

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

■ Specifications

Detection distance	Max. 69 mm (using 12 mm square reflective mark)
Frequency response range	0 to 10 kHz (when duty is 1:1)
Pulse output	Rectangular wave Hi: +5 V, Lo: +0.5 V or less
Analog output	Voltage output according to the reflection light amount.
Output voltage range	0 to +10 V
Power supply	100 VAC±10 %, approx. 8 VA
Outer dimensions	144 (W) × 72 (H) × 180 (9D) mm (not including protruded section) (Fiber part: FS-540: 1m, FS-542/5500: 2 m)
Weight	Approx. 1 kg

Digital Tachometer

TM-4100 series Digital Tachometer

AC power supply models:
TM-4110 (Display only)
TM-4120 (BCD output)
TM-4130 (Analog output)
TM-4140 (Comparator output)

DC power supply models:
TM-4111 (Display only)
TM-4121 (BCD output)
TM-4131 (Analog output)
TM-4141 (Comparator output)

■ Features
- 1-channel input, maintaining compatibility with the existing models.
- Supporting Ethernet communication (option), and can be customized in combination of various functions.

■ Specifications

Input amplification format	Selectable from AC or DC
AC amplifier	Sine wave input: 0.2 to 30 Vrms Square wave input: 0.6 to 42 Vp-p Input frequency: 1 Hz to 100 kHz
DC amplifier	Input signal: Square waveform having a pulse width of 4 µs or more Input voltage range: Hi: 4 to 30 V / Lo: -1 to 1 V Input frequency: 0.05 Hz to 100 kHz Time measurement: 10 ms to 3600 s
Measurement accuracy	Within displayed value × (±0.01 %) ±1 count (count value excluding decimal point)
Measurement time	Within 1 ms + 1 cycle time
Display unit	OLED Display
Power supply for detector	Output voltage: 12 VDC ±10 % Maximum output current: 100 mA
Power supply	AC power supply models: 100 to 240 VAC ±10 %, 50/60 Hz, 30 VA max. DC power supply models: 12 to 24 VDC ±5 %, 1.25 A max., 15 W max.
Outer dimensions	96 (W) × 48 (H) × 140 (D) mm max.
Weight	Approx. 340 g (TM-4110)

TM-4200 series 2-channel Digital Tachometer

■ Features
- For measurement of rotation speed differences/ rotation speed ratio.
- Supporting Ethernet communication (option), and can be customized in combination of various functions.

■ Specifications

Input amplification format	Selectable from AC or DC
AC amplifier	Sine wave input: 0.2 to 30 Vrms Square wave input: 0.6 to 42 Vp-p Input frequency: 1 Hz to 100 kHz
DC amplifier	Input signal: Square waveform having a pulse width of 4 µs or more Input voltage range: Hi: 4 to 30 V / Lo: -1 to 1 V Input frequency: 0.05 Hz to 100 kHz
Measurement accuracy	Single CH (CH-A or CH-B) Within displayed value × (±0.01%) ±1 count (count value excluding decimal point) B/A or (B-A)/A 2 × (Single CH measurement accuracy) B-A ± (CH-B measurement accuracy) ± (CH-A measurement accuracy)
Measurement time	Within 1 ms + 1 cycle time
Display unit	OLED Display
Power supply for detector	Output voltage: 12 VDC ±10 % Maximum output current: 180 mA
Power supply	AC power supply models: 100 to 240 VAC ±10%, 50/60 Hz, 30 VA max. DC power supply models: 12 to 24 VDC ±5%, 1.25 A max., 15 W max.
Outer dimensions	96 (W) × 48 (H) × 140 (D) mm max.
Weight	Approx. 400 g (TM-4270)

FT-2500 Advanced Tachometer

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

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

Handheld Digital Tachometer

FT-7200 Advanced Handheld Tachometer

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

■ Specifications

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

HT-3200 Handheld Digital Tachometer (contact type)

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

■ Specifications

Detection method	Contact method
Rotation speed measurement range	0.5 to 10,000 r/min
Circumferential speed measurement range	0.05 to 1,000.0 m/min (when using KS-200) 0.5 to 10,000 mm/s (when using KS-100)
Display method	5-digit LCD 7 segment
Measurement time	1s (2 s 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 2,000.0 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 × 3 pcs.
Battery life	Approx. 20 hours (when alkaline batteries are used, at 20 ˚C)
Outer dimensions	63 (W) × 172 (H) × 38.5 (D) mm
Weight	Approx. 160 g (not including batteries)

HT-4200 Handheld Digital Tachometer (non-contact type)

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

■ Specifications

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

Rotation/ Line speed/ Rotational fluctuation measurement

HT-5500 Handheld Digital Tachometer (contact/non-contact type)

■ Features

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

■ Specifications

Detection method	Red visible ray photoelectric reflection method Contact method (contact adapter attached)
Measurement range (When the contact adapter is used)	r/min (Hi) : 6 to 99999 (20000) r/min (Lo) : 6.0 to 600.0 r/s : 0.1 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 FS (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 × 4 pcs. or an exclusive AC adapter
Battery life	Approx. 32 hours (when backlight is OFF.) Approx. 8 hours (when backlight is ON.)
Outer dimensions	66 (W) × 180.5 (H) × 47.5(D) mm
Weight	Approx. 220 g (not including battery cell)

HR-6800 Handheld Digital Tachometer (high-speed type)

MP-5350 attached

■ Features

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

■ Specifications

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

Elevator Speedometer

EC-2100 Elevator Speedometer

*with circumferential ring (option)

■ 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

■ 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*1
Measurement accuracy	±1 count Measurement time: 10 ms
Resolution	Speed: 0.1 m/min*2, Rotation speed: 1 r/min*2, Distance: 1 mm (option)
Analog output	Output signal: Instantaneous value Voltage range: 0 to 1V/ 0 to FS
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 AA alkaline battery × 3 pcs.
Battery life	15 hours or more (using at room temperature)
Outer dimensions	60 (W) × 162 (H) × 38 (D) mm
Weight	Approx. 423 g (Including batteries/not including a circumferential ring)

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

Passing Time/Passing Speedometer

TM-4400 series Passing Time/Passing Speedometer

■ Features

- Simultaneous measurement of passing time and passing speed between two points.
- Supporting Ethernet communication (option), and can be customized in combination of various functions.

■ Specifications

Input amplification format	DC
DC amplifier	Input signal: Square waveform having a pulse width of 4 µs or more (When the lowpass lter is OFF) Input voltage range: Hi: 4 to 30 V/ Lo: -1 to 1 V Input frequency: DC to 100 kHz
Measurable cycle	0.1 ms to 3600 s
Minimum resolution	1 µs
Measurement range	10 s/1000 s/3600 s
Measurement item	Selectable from passing time/passing speed
Measurement distance	0.1 to 99999.9 mm
Prescale function	0.00001 × 10E-3 to 9.99999 × 10E+3 EU/Pulse (only when measurement of passing speed)
Display unit	OLED Display
Power supply for detector	Output voltage: 12 VDC ±10 % Maximum output current: 180 mA
Power supply	AC power supply models: 100 to 240 VAC ±10 %, 50/60 Hz, 30 VA max. DC power supply models: 12 to 24 VDC ± 5%,1.25 A max., 15 W max.
Outer dimensions	96 (W) × 48 (H) × 140 (D) mm max.
Weight	Approx. 400 g (TM-4470)

Converter for Rotation Measurement

FV-1500 High-speed F/V Converter

■ Features

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

■ 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 type), terminal block
Input format	Single-phase, AC/DC/non-voltage (+12 V 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 +5 V Temperature coefficient: ±0.02 % FS/˚C Linearity: ±0.2 % FS (up to 180 kHz) Output update time:1 cycle + 3.5µs 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*
Power supply	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

*Rotation speed is limited by maximum frequency

PA-150 Isolated Signal Amplifier

■ 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, floating ground, filter or isolation.

■ 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 V ±2 V, Lo: +0.5 V or less Open collector output Max. applied voltage: +40 V, Max. input voltage: 50 mA
Power supply	12 VDC ±5 %, Max. 100 mA
Power voltage	100 VAC ±10 %, 50/60 Hz
Outer dimensions	146 (W) × 112 (H) × 332 (D) mm
Weight	Approx. 4 kg

Line Speed/ Length Measurement

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

■ Features

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

■ Specifications

Roller outer circumference	200 mm
Number of output pulses	Speed : 120 P/R, 1200 P/R Length: 200 P/R
Speed range	0 to 600 m/min
Measurement unit	1200 P/R: 0.01 m/min 120 P/R: 0.1 m/min 200 P/R: 1 mm
Output waveform	2-phase square wave
Output voltage	Hi: +10V or more, Lo: +0.5V or less
Output format	Totem pole output (standard) emitter output, collector output, open collector output (options)
Applicable detectors	TM series
Operating temperature range	0 to +50 ˚C
Vibration resistance	19.6 m/s² X/Y/Z direction (150 min each)
Power supply	12 VDC±5 %/ 100 mA or less at 12 VDC
Weight	Approx. 400 g

Rotation/ Line speed/ Rotational fluctuation measurement

Compact High Rigidity Torque Detector

RH series Compact High Rigidity Torque Detector

■ Features
- Highly accurate detection of torque fluctuation with high rigidity
- High speed torque measurement
  - ・Standard: 16,000 r/min
  - ・Option : 20,000 r/min
- Direct signal output
  - ・It can be connected with the TQ-5300 Toque Meter
- Highly accurate performance evaluation
  - ・Non-linearity (including hysteresis) : ±0.05 % FS
- Weight and volume are reduced
  - ・Shaft length：approx. 1/2 shorter
  - ・Weight, volume：approx. 1/3 reduced

■ Specifications

Detection method	Strain gauge
Applicable torque meter	TQ-5300 (can be used without torque meter)
Non-linearity (including hysteresis)	±0.05 % FS or less (screen display with TQ-5300 connected)
Applicable detectors	MP-9810/9830 (sold separately)
Rotational detection gear	4 P/R installed as standard, 60 P/R mounted as option

Model	Rated torque (N・m)	Rated rotational (r/min)
1105	10	16,000 (20,000)
1205	20	16,000 (20,000)

※( )option

Phase Difference Method Torque Detector Using Electromagnetic Induction Theory

TH series Micro/Small/Medium Capacity type Torque Detector

■ Features
- High accuracy
  - ・TH-1000/2000 series: ±0.1 % FS
  - ・TH-3000 series: ±0.2 % FS
- Long service life:
  Non-contact phase difference method is adopted in the rotating section and the signal detecting section
- Enables high rotation speed measurement (TH-2000 series/ TH-3000H series)
- Superior noise withstanding:
  Line driver output with strong noise immunity
- Switching of the rotation direction (CW/CCW) is no longer required
- High-speed analog output
- No need for matching:
  The matching is not required even when the cable length between the torque detector and TS-2800 Torque meter is changed. Cable can be extended up to 50 m. (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 dimensions are same as the SS series with same torque.
- TH-2000 series Torque Detector (For general use and high rotation speed)
  Mounting dimensions are same as the SS series with same torque.
- TH-3000 (H) series Torque Detector (For micro torque)
  (H: for high rotation speed)
  Mounting dimensions are same as the MD series with same torque.
- Applicable Torque Meter: TS-2800 Digital Torque Meter

TH-1000/2000 series

● TH-1000 series (For general use)

Model name	Rated torque (N・m)	Rated rotational speed (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	Rated torque (N・m)	Rated rotational speed (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, made to order)

Model name	Rated torque (N・m)	Rated rotational speed (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 Torque Detector Using Electromagnetic Gears

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

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

■ Specifications

Detection method	Phase difference method using electromagnetic gears
Applicable torque meter	TS-2800
Overall accuracy	±0.2 % FS
Applicable detector	MD-0110 series (option)
Power supply	100 VAC ±10 %, 50/60 Hz

Model name	Rated torque (mN・m)	Rated rotational speed (r/min)
201C	2	10,000
501C	5	10,000
102C	10	10,000
202C	20	10,000

SS series Small/ Medium Capacity Type

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

■ Specifications

Detection method	Phase difference method using electromagnetic gears
Applicable torque meter	TS-2800
Overall accuracy	±0.2 % FS
Applicable detector	MP-9810 (sold separately)
Power supply	100 VAC ±10 %, 50/60 Hz

Model name	Rated torque (N・m)	Rated rotational speed (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	1,000	5,000
202	2,000	5,000

Torque Meter

TQ-5300 High-stiffness Torque Meter

■ Features
- Three kinds of digital interface (option)
  Ether CAT®, CAN, RS-232C
- Supports factor high resolution function (TQ-0521 option)
- Analog output of torque and revolution simultaneously

■ Specifications

Measurement item	Torque, revolution
Applicable detectors	Torque:TQ-3507 Revolution: MP-9810/9830
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 ±10 V/ FS
Pulse output	Torque, revolution: Outputs after pulling up the open collector output to +5V with resistance 330 Ω
Comparator	Torque 3ch, non-voltage contact output
Remote	Revolution direction CW/CCW switchable input, auto zero input, measurement ready output
Power supply	24 VDC, (18 to 30 VDC)
Outer dimensions	170 (W) × 49 (H) × 150 (D) mm (not including protruded section)
Weight	Approx. 700 g

TS-2800 Torque Meter

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

■ Specifications

Measurement item	Torque, revolution
Applicable detectors	Torque: Phase difference type torque detectors by Ono Sokki Revolution: MP-981/9820
Display method	LCD
Display unit	Torque; N・m, Revolution; r/min
Analog output	Torque: ±10 V, Time constant SS type: 63/500 ms TH type: 1.6/16/63/500 ms Revolution: 10 V (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

Flange Type High-stiffness Torque Detector

TQ-3507 Flange type High-stiffness Torque Detector

■ Features
- High stiffness enables to capture even minute torque fluctuations.
  Ideal for torque measurement on benches in automotive development
- High durability
- Compact & space saving
- Multi-range option

■ Specifications

Detection method	Strain gauge
Applicable torque meter	TQ-5300
Non-linearity (including hysteresis)	±0.05 % FS (screen display with TQ-5300 connected)
Applicable detectors	MP-9810/9830 (sold separately)
Rotational detection gear	option

Model name	Rated torque (N・m)	Rated rotational speed (r/min)
3507	5,000	8,000

Motor Torque Measurement Detector

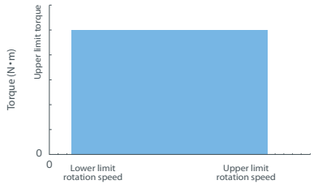
MT series Torque Detector for TS-8700

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

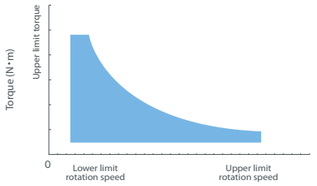
MT-82R15, MT-82T25 for medium capacity
(Stand with XYZ stage: option.)

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

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



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

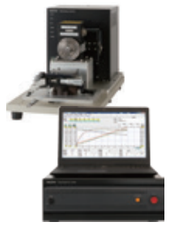


* MT-84/85 series can be used within the upper range and the brakin g capability
W.Braking capability W=Torque N·m × Rotation speed r/min × 0.10472

The detector with a new compact high-rigidity torque detector R H series (10 N・m/20 N・m) has been added, and the measurement up to a higher frequency range with high accuracy (± 0.05 % FS) is available.

Motor Torque Measurement

TS-8700 Torque Station Pro



■ Features

TS-8700 Torque Station Pro is torque measurement system for motor basic property. Using with the motor torque detector MT series with the high accuracy and high response, and has achieved up to 5.12 kHz sampling, ±0.1 % FS (TH type)/±0.05 % FS (RH type) of accuracy. It is ideal for measuring torque fluctuations in a wide range of motors such as EPS motors.

■ Specifications

Measurement target		DC motor, AC motor (excluding stepping motor)
Measurement item		Torque, rotation speed, voltage signal input data, temperature*, power meter digital input*
Torque input		Use signals from Ono Sokki's exclusive detector (MD/SS,TH/RH/TQ*) , external torque analog input*
Rotation input		Use signals from Ono Sokki's MP-9810 or RP series detectors
Analog input		0 to ±10 V DC, 16 channels, 16 bit A/D
Temperature input		Type T thermocouple*
Measurement accuracy	Torque**	±0.1 % FS (TH-1000/2000) ±0.2 % FS (MD/SS, TH-3000H) ±0.05 % FS (RH/TQ*)
	Revolution speed**	±0.02 % FS ±1 count
	Analog	Linearity: ±0.1 % FS or less (1 second average) Temperature drift: ±0.01 % FS/˚C
	Temperature	Conversion accuracy: within ±[0.5 % of span + 0.5 ˚C {thermosensitive element accuracy}] *Options **After N-0 compensation. 1-second averaged value. Excluding the influence of fluctuation component which comes from equipment component and resonance component including the measurement target.
Computing equation		4 operations (four arithmetic operations) Can be defined calculation items from input signal, existing computed data
Measurement condition setting		Setting of torque detector, revolution detector
Control method		Revolution/torque
Measurement mode		Automatic/Manual (can be saved with a file name)
Measurement function		Fixed value, Sweep, Step, Pattern
Monitor display		Numeric value display: Max. 100 items can be displayed simultaneously
Trend display		Time axis display

*: Options

■ MT series specifications

Type	Series	ID code	Torque (N・m)	Braking capability (W)	Rotation speed range (r/min)	Torque measurement accuracy (% FS)
Torque ripple/cogging torque measurement	Standard type with MD/SS (successor of MT-6200B series)	82M21	0.002	-	0.5 to 5	±0.2
		82M51	0.005	-	0.5 to 5	±0.2
		82M12	0.01	-	0.5 to 5	±0.2
		82M22	0.02	-	0.5 to 5	±0.2
		82M52	0.05	-	0.5 to 5	±0.2
		82M13	0.1	-	10.5 to 5	±0.2
		82M23	0.2	-	0.5 to 5	±0.2
		82M53	0.5	-	0.5 to 5	±0.2
		82M14	1	-	0.5 to 5	±0.2
		82M24	2	-	0.5 to 5	±0.2
		82M54	5	-	0.5 to 5	±0.2
		82M15	10	-	0.5 to 5	±0.2
		82M25	20	-	0.5 to 5	±0.2
	High performance type with TH (successor of MT-6200B series)	82T52	0.05	-	2 to 15	±0.2
		82T13	0.1	-	2 to 15	±0.2
		82T23	0.2	-	2 to 15	±0.2
		82T53	0.5	-	2 to 15	±0.2
		82T14	1	-	2 to 15	±0.2
		82T24	2	-	2 to 15	±0.1
		82T54	5	-	2 to 15	±0.1
		82T15	10	-	0.5 to 5	±0.1
		82T25	20	-	0.5 to 5	±0.1
	High accuracy type with RH	82R15	10	-	0.5 to 5	±0.05
		82R25	20	-	0.5 to 5	±0.05
TN/TI characteristics measurement with hysteresis brake	Standard type with MD/SS (successor of MT-6400B series)	84M22	0.02	5	100 to 20,000	±0.2
		84M52	0.05	8	100 to 20,000	±0.2
		84M13	0.1	12	100 to 20,000	±0.2
		84M23	0.2	23	100 to 15,000	±0.2
		84M53	0.5	75	100 to 12,000	±0.2
		84M14	1	75	100 to 12,000	±0.2
		84M24	2	160	100 to 10,000	±0.2
		84M54	5	200	100 to 10,000	±0.2
		84M15	10	350	100 to 7,000	±0.2
		84M25	20	600	100 to 7,000	±0.2
	High performance type with TH (successor of MT-6400B series)	84T22	0.02	5	100 to 9,000	±0.2
		84T52	0.05	8	100 to 11,000	±0.2
		84T13	0.1	12	100 to 20,000	±0.2
		84T23	0.2	23	100 to 15,000	±0.2
		84T53	0.5	75	100 to 12,000	±0.2
		84T14	1	75	100 to 12,000	±0.2
		84T24	2	160	100 to 10,000	±0.1
		84T54	5	200	100 to 10,000	±0.1
		84T15	10	350	100 to 7,000	±0.1
		84T25	20	600	100 to 7,000	±0.1
	High accuracy type with RH	84R15	10	350	100 to 7,000	±0.05
		84R25	20	600	100 to 7,000	±0.05
TN/TI characteristics measurement with powder brake	Standard type with MD/SS (successor of MT-6500B series)	85M14	1	20	5 to 1,800	±0.2
		85M24	2	50	5 to 1,800	±0.2
		85M54	5	130	5 to 1,800	±0.2
		85M15	10	320	5 to 1,800	±0.2
		85M25	20	450	5 to 1,800	±0.2
	High performance type with TH (successor of MT-6500B series)	85T14	1	20	5 to 1,800	±0.1
		85T24	2	50	5 to 1,800	±0.1
		85T54	5	130	5 to 1,800	±0.1
		85T15	10	320	5 to 1,800	±0.1
		85T25	20	450	5 to 1,800	±0.1
	High accuracy type with RH	85R15	10	320	5 to 1,800	±0.05
		85R25	20	450	5 to 1,800	±0.05

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

Bottom-mount type
RP-1710/20 series

Flange-mount type
RP-1730/40 series

Features

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

Specifications

Output waveform	2-phase square waveform Zero mark is available as an option.
Output voltage	Hi: +10V or more, Lo: +0.5V or less
Output method	Totem pole: Load resistance 470 Ω or more Collector : Load resistance 10k Ω or more Open collector: DC 40V, 50 mA or less Line driver
Power supply	AC100 to 240 V ±10 % / DC12 to 24 V ±5 %
Response frequency	100 kHz (500 kHz for line driver output)
Connection method	Terminal board or connector

Adjacent error

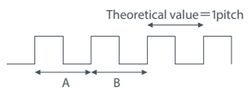
Adjacent error	Number of pulses (P/R)
1/200 P or less	60, 100, 180, 250, 256, 300, 750, 4500, 6000
1/8.3 P or less	120, 200, 240, 360, 400, 500, 512, 600, 720, 900, 1000, 1024, 1200, 1250, 1280, 1500, 3000, 3750, 9000, 12000, 18000, 22500, 24000, 30000
1/4.6 P or less	480, 800, 1440, 1800, 2000, 2048, 2400, 2500, 2560, 7500, 36000, 45000, 48000, 60000
1/3.3 P or less	960, 1600, 2880, 4000, 4096, 4800, 72000, 96000
1/2.5 P or less	3600, 5000, 5120, 15000, 90000, 120000

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

Max. rotation speed	5000 r/min
Allowable shaft load	Radial 80 N Thrust 50 N
Starting torque	15 mN•m * When the rotating shaft is affixed with an oil seal.
Moment of inertia	161 g•cm²
Weigh	3.7 kg
Operating temperature range	-5 to +55 ˚C
Storage temperature range	-20 to +70 ˚C
Humidity	95 %RH (40 ˚C / 8h, the rotating shaft is affixed an oil seal, with no condensation)
Protection class	IP65 (When selected terminal board and oil seal
Vibration resistance	98 m/s² (X, Y direction for 2h each, Z direction for 4h) 10 to 50 Hz sweep
Shock resistance	980 m/s² (Three times each in X, Y and Z directions)
Number of output pulses	60,100,120,180,200,240,250,256,300,360,400,480,500,512, 600,720,750,800,900,960,1000,1024,1200,1250,1280,1440, 1500,1600,1800,2000,2048,2400,2500,2560,2880,3000, 3600,3750,4000,4096,4500,4800,5000,5120,6000,7500, 9000,12000,15000,18000,22500,24000,30000,36000,45000, 48000,60000,72000,90000,96000,120000 P/R

Adjacent error is an absolute value of pitch variation between any two adjacent pulses.

Adjacent error= | A-B |



Here is a useful link for selecting specifications and model names.

URL https://www.onosokki.co.jp/English/rp17_katamei_e.htm

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

Features

- Ultra compact and light weight (φ38 mm, approx. 100 g)
- Two-phase square wave and zero mark signal output
- 7 types of output pulses

Specifications

Output waveform	2-phase square waveform + zero mark
Output voltage	Hi: More than power supply voltage -20 % Lo: +0.5V or less
Output method	Collector (load resistance 10 kΩ or more)
Adjacent error	±1/15 P
Power supply	5 to 12 VDC ±10 % (50 mA)
Response frequency	100 kHz
Connection method	Direct connected cable (1 m)

Max. rotation speed	6000 r/min
Allowable shaft load	Radial 25 N Thrust 15 N
Starting torque	2 mN•m
Moment of inertia	6 g•cm²
Weight	Approx. 0.1 kg
Operating temperature range	-10 to +70 ˚C
Storage temperature range	-20 to +80 ˚C
Protection class	IP40
Humidity	90 %RH (no condensation)
Vibration resistance	98 m/s² (X,Y,Z direction for 2h each)
Shock resistance	980 m/s² (Three times each in X, Y and Z directions)

[Number of output pulses]
Standard 60, 100, 200, 300, 360, 500, 600

RP-432Z Series Compact Multi-use Type

Features

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

Specifications

Output waveform	2-phase square waveform + zero mark
Output voltage	(5 V power is used) Hi: +4 V or more, Lo: +0.2 V or less (12 V power is used) Hi: +10 V or more, Lo: +0.3 V or less
Output method	Totem-pole: Load resistance 1 kΩ or more
Adjacent error	±1/20 P
Power supply	5 VDC ±5 % (100 mA) or 12 VDC ±5 % (100 mA)
Response frequency	50 kHz
Connection method	7-core connector (cable side: TRC116-12A10-7F)

Max. rotation speed	5000 r/min
Allowable shaft load	Radial 20 N Thrust 10 N
Starting torque	1.5 mN•m
Moment of inertia	24 g•cm²
Weight	Approx. 0.25 kg
Operating temperature range	0 to +50 ˚C
Storage temperature range	-20 to +80 ˚C
Humidity	85 %RH (40 ˚C / 8h, no condensation)
Vibration resistance	49 m/s² (X,Y,Z direction for 2h each)
Shock resistance	490 m/s² (Three times each in X, Y and Z directions)

[Number of output pulses]
120, 360, 600, 1000, 1024

TM-4300 series Reversible counter

Features

- Multiplication/addition/subtraction with 7 digits display.
- Supporting Ethernet communication (option), and can be customized in combination of various functions.

Specifications

Input amplification format	DC
DC amplifier	Input signal: Square waveform having a pulse width of 4 µs or more (When the lowpass filter is OFF) Input voltage range: Hi: 4 to 30 V/ Lo: -1 to 1 V Input frequency: DC to 100 kHz
Counting range	0 to ±2,000,000,000 (internal counter)
Multiplication	×1/×2/×4
Offset function	0 to ±9,999,999
Counting direction switching function	+/-
Pulse factor	0.00001×10E-3 to 9.99999×10E+3 EU /Pulse
Display unit	OLED Display
Power supply	AC power supply models: 100 to 240 VAC ±10 %, 50/60 Hz, 30 VA max. DC power supply models: 12 to 24 VDC ±5 %, 1.25 A max., 15 W max.
Outer dimensions	96 (W) × 48 (H) × 140 (D) mm max.
Weight	Approx. 400 g (TM-4370)

Digital Linear Gauge Sensor

BS-1210/1310 Baby Gauge Sensor

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

■ Specifications

Model name		BS-1210	BS-1310
Measurement range	(mm)	10	
Resolution	(μm)	10	1
Accuracy (at +20 ˚C)	(μm)	3	
Max. response speed*	(m/s)	1 (4)	0.3 (1.2)
Measurement force (downward)	(N)	1.47or less	
Protection class		IP66	
Stem diameter	(mm)	φ8 $^{+0}_{-0.03}$	
Operating temperature range	(˚C)	0 to +50	
Outer dimensions (Whole length)	(mm)	94.5	
Weight (including cable, connector)	(g)	Approx. 110	

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

GS-3813B/3830B High Resolution Type

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

■ Specifications

Model name		GS-3813B	GS-3830B
Measurement range	(mm)	13	30
Resolution	(μm)	0.1	
Accuracy (at +20 ˚C)	(μm)	1	
Max. response speed*	(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 $^{+0}_{-0.009}$	
Operating temperature range	(˚C)	0 to +40	
Outer dimensions (Whole length)	(mm)	146.5	218.5
Weight (including cable, connector)	(g)	Approx. 350	Approx. 420

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

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

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

■ Specifications

Model name		GS-1713A	GS-1730A	GS-1813A	GS-1830A
Measurement range	(mm)	13	30	13	30
Resolution	(μm)	10		1	
Accuracy (at +20 ˚C)	(μm)	3		2	3
Max. response speed*	(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 $^{+0}_{-0.009}$			
Operating temperature range	(˚C)	0 to +40			
Outer dimensions (Whole length)	(mm)	141.5	205.5	141.5	205.5
Weight (including cable, connector)	(g)	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
- Conforms to protection class IP64 (dust-proof and splash-proof)
- Vibration and shock resistant performances are 1.5 times in strength compared with the basic type.
  *Cut or modified signal cable connector is not applicable to CE marking.
- Suitable for mounting on automatic machine

■ Specifications

Model name		GS-6713A	GS-6730A	GS-6813A	GS-6830A
Measurement range	(mm)	13	30	13	30
Resolution	(μm)	10		1	
Accuracy (at +20 ˚C)	(μm)	3		2	3
Max. response speed*	(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 $^{+0}_{-0.009}$			
Operating temperature range	(˚C)	0 to +40			
Outer dimensions (Whole length)	(mm)	141.5	205.5	141.5	205.5
Weight (including cable, connector)	(g)	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 Long life Type

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

■ Specifications

Model name		GS-4713A	GS-4730A	GS-4813A	GS-4830A
Measurement range	(mm)	13	30	13	30
Resolution	(μm)	10		1	
Accuracy (at +20 ˚C)	(μm)	3		2	3
Max. response speed*	(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 $^{+0}_{-0.009}$			
Operating temperature range	(˚C)	0 to +40			
Outer dimensions (Whole length)	(mm)	145.5	209.5	145.5	209.5
Weight (including cable, connector)	(g)	Approx. 325	Approx. 385	Approx. 325	Approx. 385

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

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

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

■ Specifications

Model name		GS-5050A	GS-5100A	GS-5051A	GS-5101A
Measurement range	(mm)	50	100	50	100
Resolution	(μm)	10		1	
Accuracy (at +20 ˚C)	(μm)	10	12	4	5
Max. response speed*	(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)	φ15 $^{+0}_{-0.009}$			
Operating temperature range	(˚C)	0 to +40			
Outer dimensions (Whole length)	(mm)	258.5	355	258.5	355
Weight (including cable, connector)	(g)	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 0.1μm Resolution Type

■ 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

■ Specifications

Applicable gauges 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) × 48 (H) × 148 (D) mm
Weight	Approx. 370 g

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

DG-4340 with Comparator Function

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

■ 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 sensors	BS/GS series linear gauge sensors (GS-3800 series is not applicable.)
Input signal	90˚ phase difference rectangular 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 dimensions	72 (W) × 72 (H) × 114 (D) mm
Weight	Approx. 300 g

DG-4320 BCD output Type

■ Features
- Multiplication switching/ offset/ Multiplier setting function
- BCD output: Open collector output (positive/ negative logic switchable)
- MAX, MIN, RANGE (MAX to MIN) calculation function
- Compatible with 12 V power supply sensor (Sensor power supply DG-0430 is required)

■ 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 sensors	BS/GS series linear gauge sensors (with the exception of the GS-3800 series sensors)
Input signal	90˚ phase difference rectangular 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) × 72 (H) × 114 (D) mm
Weight	Approx. 300 g

DG-2310 2ch with Addition/Subtraction Function

■ Features
- With addition/ subtraction function: Ach, Bch, (A+B)ch, (A-B)ch
- Various calculation functions: MAX, MIN, RANGE (MAX-MIN)
- 0.5μm resolution with the combination with the GS-7000 series

■ Specifications

Applicable sensors	GS/BS series gauge sensors (GS-3800 series are not applicable)
Number of inputs	2ch
Display method	Main display: Polarity (-) & 6 digits of number in red LED Sub display: LCD 16 words×2 lines Comparator output display: UPPER (red), GOOD (green), LOWER (red)
Input signal	90˚ phase difference square 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
BCD input/ output signal	Output: (BCD, Polarity, judgment, error) open collector (max. 30 V) Input : Reset/Hold, Hi: +4 to +5.25 V, Lo: 0 to 1 V
Analog output signal	0 to ±10 V/ FS (FS is arbitrary setting)
RS-232C communication	Baud rate: 2400/4800/9600 bps
Comparator output signal	Output item : LOWER/ GOOD/ UPPER Output amount: Max. contact amount 30 VDC, 0.1 A
Peak hold function	Maximum value (MAX), Minimum value (MIN), Max. value – Min. value (RANGE)
Offset function	Setting range: 0 to ±999999
Resolution switching function	0.5 μm, 1 μm, 10 μm
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. 1.3 kg

Digital Linear Gauge Related Product

DG-0010/0020 Signal Conversion Box

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

■ Specifications

Amplifier format	2ch waveform shaped
Signal waveform	90˚ phase difference signal in square wave
Input level	Hi: +3 to +5.25 V, Lo: 0 to +1.4 V
Input impedance	Approx. 47 kΩ
Frequency range	DC to 300 kHz (When using sensor of Ono Sokki)
Open collector output	Withstand voltage: Max. 30 V (max) Sink current: 100 mA (max) Residual voltage: 1 V 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 supply	12 to 24 VDC 80 mA or less (at 12VDC) (DG-0010) 120 mA or less (at 12VDC) (DG-0020)
Outer dimensions	23 (W) × 29 (H) × 90 (D) mm (not including protruded section)
Weight	Approx. 100 g

Non-contact Length Meter/ Speedometer

LV-7000 Series Laser Doppler Surface Velocity Meter

LV-7220 LV-7002

Overview

LV-7000 series detects speed, uneven speed, moving distance, length, in plane vibration of moving object or rotating object by non-contact with high sensitivity and high response.

Features

- Conforming to "Laser Safety Class 2", no need of safety requirement for detection such as laser protection glasses, laser control regions/controller.
- Original optical system and demodulating circuit allow high sensitivity detection. Available to measure wide variety of targets.
- Easy, quick positioning and checking with red visible light.
- High speed response of 800 m/s², steep start and stop from zero speed are able to be detected.
- Connecting two sensors to one main unit enables to calculate difference in velocity/ length (LV-7220).
- Detecting minute speed changes with up to 20 kHz of the frequency response.
- By installing the option, the detection velocity range and the tracking acceleration can be doubled: ±3600 m/min, 1,600 m/s²

Specifications

<LV-7210/LV-7220 Main Unit/ LV-7002 Sensor>

Laser safety class	Class 2
Distance accuracy	Within ±0.2 % (Length evaluation by our standard plane at 25 °C)
Laser spot diameter	2 mm × 1 mm, ellipse
Detection distance (center)	200 mm *from the bottom surface of the sensor
Detection range (depth)	±4 mm distance accuracy: within ±0.2 % (of reading) ±10 mm distance accuracy: within ±5.0 % (of reading) (Length evaluation by our standard plane at 25 °C)
Detection velocity range	0 to ±1800 m/min (standard)
Maximum tracking acceleration	800 m/s² (standard)
Option	LV-0730 High-Velocity Module for Sensor

Roller Encoder

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

Features

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

Specifications

Roller outer circumference	200 mm
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 V or more, Lo: +0.5 V or less
Output format	Totem pole output (standard) emitter output, collector output, open collector output (options)
Applicable detectors	TM series
Operating temperature range	0 to +50 ˚C
Vibration resistance	19.6 m/s² X/Y/Z direction (150 min each)
Power supply	12 VDC±5 %/ 100 mA or less at 12 VDC
Weight	Approx. 400 g

Contact Type Length Measuring Device

TM-4300 series Reversible counter

Features

- Multiplication/addition/subtraction with 7 digits display.
- Supporting Ethernet communication (option), and can be customized in combination of various functions.

Specifications

Input amplification format	DC
DC amplifier	Square waveform having a pulse
Input signal	width of 4 µs or more (When the lowpass filter is OFF)
Input voltage range	Hi: 4 to 30 V, Lo: -1 to 1 V
Input frequency	DC to 100 kHz
Counting range	0 to ±2,000,000,000 (internal counter)
Multiplication	×1/×2/×4
Offset function	0 to ±9,999,999
Counting direction switching function	+/-
Pulse factor	0.00001×10E-3 to 9.99999×10E+3 EU /Pulse
Display unit	OLED Display
Power supply	AC power supply models: 100 to 240 VAC ±10 %, 50/60 Hz, 30 VA max. DC power supply models: 12 to 24 VDC ±5 %, 1.25 A max., 15 W max.
Outer dimensions	96 (W) × 48 (H) × 140 (D) mm max.
Weight	Approx. 400 g (TM-4370)

Electrostatic Capacitance-type Non-contact Thickness/ Displacement Meter

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

Export cargo:
List control relevant items

CL-5610

Features

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

Specifications (CL series Non-contact Thickness Meter)

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

VT series Non-contact Displacement Meter (made to order)

VT-5210/5710

Features

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

Measurement target

Objects made with a conductor material

Specifications

Model name	VT-5210	VT-5710	VT-5720
Detection method	Electrostatic capacitance-type		
Output	0 to 5 V/ 0 to 100 % FS		
Linearity (10 to 100 % at FS)	±0.2 % FS	±0.2 % FS	±0.25 % FS
Temperature characteristics	±0.05 % FS/˚C or less		
Response frequency	DC to 4 kHz		DC to 10 kHz
Indicated section	0 to 100 %/ LED (divided into 20)	0 to 100 %/ LED (divided into 10)	
Operating temperature range	0 to +40 ˚C (guaranteed accuracy range: 23±2 ˚C		
Power supply	AC100 to 240 V、10 VA	DC±15 V (±0.5 Vor less), 100 mA	
Outer dimensions	95 (W) × 150 (H) × 195 (D) mm (not including protruded section)	56 (W) × 42.4 (H) × 122 (D) mm (not including protruded section)	
Weight	Approx. 2 kg	Approx. 500 g	

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

Overview

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

- Cable for VE series (1.5 m)
  Exclusive cable for connector connection type sensor
  VL-1520: straight connector for both sides
  VL-1521: L-shape – straight connector

Specifications

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

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

FFT Analyzer

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

CF-9400A

Overview

The CF-9200A/CF-9400A is an all-in-one portable FFT analyzer. All FFT analysis operations can be performed with the integrated hard keys and capacitance type touch panel without requiring a PC.
Newly developed exclusive 100 kHz high-performance analysis front-end system incorporating 24-bit A/D converter analyzes sound and vibration of a piping/pump in a factory plant, motor, automobile, railway vehicle, mechanical instruments including home electrical appliances, and electrical /electronic parts.
The CF-9200A/9400A helps to find solutions for field workers in their FFT analysis including the resonance and frequency characteristics of mechanical structures by using an electromagnetic exciter or an impulse hammer.

Features

- 2ch/4ch 24-bit A/D isolation input
- High dynamic range of 120 dB or more
- Real-time 2ch/4ch 100 kHz FFT analysis
- Simultaneous recording and analysis
- Cordless driving with on-board secondary batteries
- Batteries can be changed while the power is ON
- Noise and vibration-free operation in a fan-less, spindle-less design
- Large hard key and touch panel allow quick operation
- Three amplitude values can be read out in real-time tripartite graph
- VC curve line can be displayed on 1/3 octave tripartite graph
- Cordless screen printing with the connection of Bluetooth® adapter made by TP-LINK TECHNOLOGIES CO., LTD.
- Waveform observation and main body operation with a tablet terminal by wireless LAN connection*1
- Applicable to RTA/ tracking analysis/ Log sweep analysis, excitation control*1
- External control with LAN and automatic analysis with auto sequence function*1

Specifications

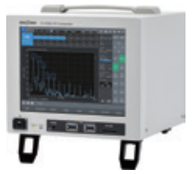
Number of input channels	CF-9200A: 2ch/ CF-9400A: 4ch
Input configuration	Single end
Input connector	BNC (C02) type
A/D converter	24 bits type ΔΣ
Frequency range	100 mHz to 100 kHz
Number of sampling points/analysis points	Max. 16384/6400
Input voltage range	1 Vrms, 31.62 Vrms (2 ranges)
Recording function	100 kHz (MAX)
Input voltage/Input frequency	AC100 to 240 V, 50/60 Hz
Outer dimensions	333 (W) × 248 (H) × 112 (D) mm or less (Not including handle, stand or protruded sections.)
Weight	Without batteries: Approx. 3.8 kg With two batteries: Approx. 4.8 kg

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)*3

*1 Option
*2 CF-0971 is required
*3 The additional fee is required when adding after delivery of the main unit.

CF-4700A FFT Comparator



Overview

The CF-4700A FFT comparator is the best pass/fail judgment machine for precise quality inspection of production line by analyzing sound and vibration. Enables pass/fail judgment by extracting the problematic frequency components.

Features

- Block Comparator function: Pass/fail judgment is performed from the signal level with characteristic frequency by setting a judgment block area.
- Tracking function (option): Pass/fail judgment by capturing level variation in specified orders while rotation speed is varied.
- Shape comparator function (option): Pass/fail judgment is performed by waveform shape. Amplitude Modulation
- Component Extraction Function (option): Pass/fail judgment is made by extracting fluctuation amount of vibration (chatter vibration etc.) and sounds caused by periodic fluctuations (roaring sound etc).
- Judgment Criterion Assist Function that sets the judgment block area based on the differences between frequency characteristics of good and defective products.
- Cable Disconnection Detecting Function that automatically detects cable disconnection and connector failure when using a constant current drive (CCLD) type sensor.
- Stores measurement conditions and measurement data on an USB memory.
- For sequencer, outputs judgment result of total and individual block with open collector. Controls the main unit with commands assigned to input I/O (up to 9).
- Power Source Backup Function prevents loss of measurement data in case of a main power down. (option)
- Accepts TEDS sensor that automatically perform unit calibration. (Accelerometer and microphone that conform to IEEE 1451.4 ver.0.9 and ver.1.0)

* TEDS information may not be read according to the type of TEDS chip. For details, please refer to our website.

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
Input voltage range	1 Vrms, 31.62 Vrms (2 ranges)
Dynamic range	110 dB or more
Number of sampling points/analysis points	Max. 16384/6400
Analog filter	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 (3 order Butterworth, ISO 2954)
AC adapter	100 to 240 VAC, 50/60 Hz
Outer dimensions	220 (W)× 185 (H) × 220 (D) mm (not including protruded section)
Weight	Approx. 2.8 kg without options Approx. 33 kg with options (including CF-0473A, 0478A, battery pack)

Option

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

* The additional fee is required when adding after delivery of the main unit.

Poratable Vibration Meter

VW-3100 Portable Vibration Meter

Overview

The VW-3100 Portable Vibration Meter is an all-in-one device that enables users to listen, measure, and evaluate vibrations on-site.
It is suitable for a wide range of applications, including equipment diagnostics and product inspection on manufacturing lines.

Features

- Simultaneous measurement and display of 3 physical quantities of vibration in the V3 Bands, which enables to improve work efficiency by accurately identifying abnormalities.
- Listening function with variable band-pass filters for anomaly detection and skill transfer
- Simultaneous data recording during inspections (ORF/WAV format), facilitating advanced diagnostics through post-analysis software like the O-Solution.
- Simultaneous data recording during inspections (ORF/WAV format), facilitating advanced diagnostics through post-analysis software like the O-Solution.

Specifications

Applicable sensors	NP-3000 series, NP-2000 serires, etc.
Number of channel	1ch
Input terminal	BNC (C02 type) Water-proof type (when connecting to a sensor)
Input voltage range	±5 V
Sampling frequnecy	64 kHz
Outer dimension	104 (W) × 223 (H) × 42 (D) mm
Weight	Approx. 625 g (Main unit including batteries)
Water /dust resistance	IP54

Option

Model name	Product name
VW-0310	Equalizing Function
VW-0320	Recording / Comparison Function
VW-0330	Filter Expansion Function
VW-0340	ISO Evaluation and Judgment Function
VW-0350	Assist Tool Communication Function
VW-0360	Vibration Diagnosis Assist Tool

Vibration Comparator

VC-2200 Vibration Comparator (2-band)

*Options: sensor, cable and magnetic base in the picture

Features

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

Specifications

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

General specifications

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

VC-3200 Vibration Comparator (3-band)

*Options: sensor, cable and magnetic base in the picture

Features

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

Specifications

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

General specifications

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

Laser Doppler Vibrometer

LV-1800 Laser Doppler Vibrometer

Features

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

Specifications

Frequency measurement range	0.3 Hz to 3 MHz (fc=-3 dB) *common to each velocity range 0.001 m/s/V (option): 0.3 to 200 kHz (fc=-3 dB)
Minimum velocity resolution	0.3 μm/s or less (when at 0.01 (m/s) /v)
Measurement distance	More than 100 mm
Minimum laser spot diameter	Approx. 20 μm or less (φ=1/e² when the focusing position is 100 mm.)
Light source	He-Ne Laser (632.8 nm 1 mW or less)
Laser safety standard	Class 2

Options

Model name	Product name
LV-0181	Built-in positioning camera
LV-0800	Small velocity range board
LV-0111/0112	Acceleration/displacement output board
LV-0121A	Digital displacement meter*1
LV-3800	3D optical unit*2
LV-0383	3D microscope unit*2
LV-0381	Microscope unit

*1: LV-0041 (connection set) is necessary for connecting with the LV-1800.
*2: Signal operation system (option) is required.

*1: LV-0041 (connection set) is necessary for connecting with the LV-1800.
*2: Signal operation system (option) is required.

Sound and Vibration measurement

Accelerometer

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

Features

- Built-in preamplifier reduces cable noise influence.
- Direct input to FFT Analyzer 9000, 9000A series, DS series, Vibration comparator VC-2200/3200, and Portable Vibration Meter VW-3100.
- The NP-3331 series is less affected by noise and enables more accurate measurements even when measuring vibrations of machines that generate electromagnetic noise.

Specifications

Model name	NP-3211	NP-3412	NP-3414	NP-3418	NP-3110
Features	Ultra compact, lightweight	Compact, lightweight	Compact, lightweight	Compact, lightweight	Compact, general-purpose usage
Sensitivity	1.02 mV/(m/s²) ±15 %	1 mV/(m/s²) ±1 dB	1 mV/(m/s²) ±1 dB	1 mV/(m/s²) ±10 %	0.5 mV/(m/s²) ±1 dB
Weight	0.5 g	5.5 g	3.5 g	1.9 g	5.4 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

Model name	NP-3120	NP-3121	NP-3130	NP-3131	NP-3310
Features	General-purpose usage	General-purpose usage, floating	High sensetivity	High sensitivity, floating	Waterproof, directly attachecd cable
Sensitivity	1 mV/(m/s²) ±1 dB	1 mV/(m/s²) ±1 dB	10 mV/(m/s²) ±1 dB	10 mV/(m/s²) ±1 dB	1 mV/(m/s²) ±1 dB
Weight	20 g	34 g	46 g	69 g	59 g (not including cable)
Frequency range	5 Hz to 12 kHz ±3 dB	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

Model name	NP-3331C	NP-3331N30	NP-3331WC
Features	Waterproof, CE, floating	Waterproof, CE, floating	Water/dust proof, CE, floating, directly attached cable
Sensitivity	5 mV/(m/s²) ±10 %	5 mV/(m/s²) ±10 %	5.0 mV/ (m/s²) ±10 %
Weight	50 g	50 g	50 g
Frequency range	2 Hz to 10 kHz ±3 dB	2 Hz to 4 kHz ±5 % / 2 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 influence
- Direct input to FFT Analyzer CF-9000, 9000A series, DS series.

Specifications

Model name	NP-3550	NP-3560B	NP-3572	NP-3574
Features	Ultra compact, tri-axial, 6.35 mm Cube	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/s²) ±20 %	1.02 mV/(m/s²) ±10 %	1 mV/(m/s²) ±10 %	10 mV/(m/s²) ±10 %
Weight	1.0 g	5.3 g	8.1 g	8.1 g
Frequency range	2 Hz to 5 kHz ±5 % (X-axis) 2 Hz to 8 kHz ±5 % (Y, Z-axis)	2 Hz to 5 kHz ±5 % (X-axis) 2 Hz to 10 kHz ±5 % (Y, Z-axis)	1 Hz to 5 kHz ±10 % (X, Y-axis) 1 Hz to 8 kHz ±10 % (Z-axis)	1 Hz to 5 kHz ±10 % (X, Y-axis) 1 Hz to 8 kHz ±10 % (Z-axis)

NP-3000 series TEDS* Compatible Accelerometer with Built-in Preamplifier

Features

- Accepts TEDS* (IEEE1451.4 Ver.1.0)
  When connecting TEDS* accepted unit, unique information (sensitivity, serial number, etc.) of the sensor can be read.
- Tri-axial cube type (NP-3564N10,NP-3576N20, 3578N20) , adhesive attachment on any surface except for connector surface

*TEDS: Transducer Electronic Data Sheet

Specifications

Model name	NP-3564N10	NP-3576N20	NP-3578N20
Features	TEDS compatible, compact, tri-axial	TEDS compatible, compact, tri-axial	TEDS compatible, compact, tri-axial
Sensitivity	10 mV/(m/s²) ±10 %	1 mV/(m/s²) ±10 %	10 mV/(m/s²) ±10 %
Weight	4.4 g	11.1 g	11.1 g
Frequency range	2 Hz to 7 kHz ±5 % (X, Y-axis) 2 Hz to 10 kHz ±5 % (Z-axis)	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)
	0.5 Hz to 10 kHz ±3 db (X, Y-axis) 0.5 Hz to 18 kHz ±3 db (Z-axis)	0.8 Hz to 8 kHz ±3 dB (X-axis) 0.8 Hz to 10 kHz ±3 dB (Y, Z-axis)	0.8 Hz to 8 kHz ±3 dB (X-axis) 0.8 Hz to 10 kHz ±3 dB (Y, Z-axis)

NP-2000 series Charge Output Type Accelerometer

Features

- Due to charge output type, it can be used under high temperature (160 ˚C, NP-2710 : 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-9000, 9000A series/DS series, VC-2200/3200 and Portable Vibration Meter VW-3100.

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/s²) ±20 %	0.16 pC/(m/s²) ±2 dB	0.3 pC/(m/s²) ±20 %	1.2 pC/(m/s²) ±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 usage	Ultra compact, tri-axial, directly attached cable	Compact, high-temperature
Sensitivity	5 pC/(m/s²) ±2 dB	0.04 pC/(m/s²) ±20 %	0.306 pC/(m/s²) ±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-7320N10 TEDS Tri-axial Accelerometer

Features

- High sensitivity, Low noise
- Tri-axial simultaneous measurement
- Waterproof type IP67
- TEDS compatible
- Conforming to CE marking

Specifications

Sensitivity	100 mV/ (m/s²) ±10 %
Weight	500 g
Frequency range	0.4 to 100 Hz ± 2.5 % 0.25 to 200 Hz ±1 dB 0.1 to 400 Hz +1 dB / -3 dB (Common to X, Y, Z-axis)

NP-0081N20 TEDS Adapter

Features

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

Configuration

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

Specifications

TEDS standard	IEEE1451.4-2004 Template Ver.1.0
Connector	Sensor side: 10-32 Coaxial (miniature) Measurement side: BNC (C02 type)
Applicable sensor	NP-3000 series
Operating temperature range	-40 to +85 ˚C
Outer dimensions	φ15 × 40 mm
Weight	Approx. 20 g

Vibration Related Amplifier

CH-1200A Charge Amplifier

Features

- Oscilator for calibration built-in

Specifications

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

*1 EU: Engineering unit

CH-6130/6140 Charge Converter

Features

- No amplifier is required.
- Direct connection to BNC connector which has CCLD* function

*CCLD: Constant Current Line Drive

Specifications

Gain	1 mV/pC*1 (CH-6130), 10 mV/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	BNC (C02 type)
Operating temperature range	0 to +50 ˚C
Operating humidity range	85 %RH or less
Outer dimensions	φ15 × 40 mm
Weigh	Approx. 20 g

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

PS-1300 3ch Sensor Amplifier

Features

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

Specifications

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

Calibrator for Accelerometer

VX-1100A Accelerometer Calibrator

Features

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

Specifications

Exciter frequency	159.2 Hz ±1 %
Exciter acceleration	10 m/s² (rms) ±3 %
Excitation speed	10 mm/s (rms) ±4 %
Excitation displacement	10 μm (rms) ± 5 %
Harmonic distortion rate	3 % or less
Sensitivity measurement accuracy	±3 %±1 digit or less
Applicable accelerometer weight	110 g or less
Sensor power	Constant current: 2.0 mA/4.0 mA (switchable) Voltage 24 V
Power requirement	Size AA battery × 4
Battery life	Approx. 8 hours (Detector weight: Approx. 25 g, with the use of alkaline dry cell battery)
Outer dimensions	120 (W) × 140 (H) × 50 (D) mm (not including protruded section)
Weight	Approx. 1 kg

* BNC/miniature conversion adapter (NP-0021) is required depending on the model of the sensor.
* The VX-1100A cannot be used for NP-2106, 2506.

Impulse Hammer

GK-2110/3100/4110G20 Impulse Hammer

Features

- Checking of excitation, excitation force, and excitation band easily
- Selectable from three types of impulse hammers according to the measurement target
- Excitation force and excitation frequency band changeable by replacing the impact tip
- Built-in force sensor with built-in preamplifier enables direct connection to power supply unit or CCLD compatible analyzer
- MI-1531: 1/4-inch high performance microphone

Specifications

Model name	GK-2110	GK-3100	GK-4110G20
Measurement range	220 N	2,200 N	22,000 N
Detection element	Crystal piezoelectric element		
Sensitivity	22.5 mV/N ±20 %	2.25 mV/N ±15 %	0.23 mV/N ±15 %
Resonance frequency	100 kHz or more	22 kHz or more	12 kHz or more
Excitation frequency range (when hard tip is used)	Up to 20 kHz	Up to 8 kHz	Up to 1 kHz
Hammer weight	Approx. 4.8 g (when attached with a plastic hammer handle)	Approx. 160 g	Approx. 1100 g
Head diameter	6.3 mm	15.7 mm	51 mm
Tip diameter	2.5 mm	6.3 mm	51 mm
Hammer length	107 mm	216 mm	370 mm
Output connector	Aluminum hammer handle: 5-44 coaxial connector Plastic hammer handle: directly attached cable, miniature connector (10-32)	BNC(C02 type)	BNC(C02 type)
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	less than 100 Ω	100 Ω or less
CCLD power supply	2 to 20 mA, DC 20 to 30 V		

Acoustic Related Product

MI-1271/1235/1433/1531 Measurement Microphone


MI-1271


MI-1235


MI-1433


MI-1531

■ Features

- Back electret type microphone
- MI-1271: 1/2-inch high performance microphone
- MI-1235: 1/2-inch general-usage microphone
- MI-1433: 1/2-inch general-usage microphone
- 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)
Bias voltage	0 V			
Sensitivity	-26±1.5 dB re. 1 V/Pa 50 mV/Pa (1 kHz)	-29±3 dB re. 1 V/Pa 36 mV/Pa (1 kHz)		-48±3 dB re. 1 V/Pa 4 mV/Pa (250 Hz)
Max. sound pressure level	135 dB (when using MI-3170)	135 dB (when using MI-3111)		157 dB (when using MI-3140)
Self noise level (A-weighting)	14 dB (typ) (when using MI-3170)	19 dB (typ) (when using MI-3111)		37 dB (typ) (when using MI-3140)
Operating temperature range	-30 to +80 ˚C	-10 to +50 ˚C		-30 to +60 ˚C (when using MI-3140)
Outer dimensions	φ13.2×16.9 mm	φ13.2×13.7 mm	φ13.2×13.5 mm	φ7.0×10.5 mm
Weight	Approx. 6 g			Approx. 1.5 g
Applicable preamplifiers	MI-3170	MI-3111		MI-3140

MI-3170/3111/3140 Microphone Preamplifier


MI-3170


MI-3111


MI-3140

■ Features

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

■ Specifications

	MI-3170	MI-3111	MI-3140
Applicable microphones	MI-1271/1235/1433	MI-1235/1433	MI-1531
Self loss	0.15 dB (Typ.)	1.0 dB (Typ.)	0.35 dB (Typ.)
Frequency range	10 Hz to 40 kHz (+0.1 dB,-0.2 dB, 1 kHz as reference) 1 Hz to 40 kHz (+0.1 dB,-1.5 dB,10 Hz as reference)	10 Hz to 20 kHz (±1.0 dB, 1 kHz as reference) 20 Hz to 20 kHz (±0.6 dB,1 kHz as reference)	10 Hz to 100 kHz (±0.5 dB, 1 kHz as reference)
Self-noise (effective value voltage, A-weighting)	3.3 μV or less	5.0 μV or less	2.5 μV or less (20 Hz to 20 kHz)
Max. Output voltage	±8 V (peak) Sound pressure conversion 135 dB (when using the MI-1271)	±5.6 V (peak) Sound pressure conversion 135 dB (when using the MI-1235 / 1433)	±8 V (at DC 24 V) Sound pressure conversion 157 dB (when using the MI-1531)
Operating temperature range	-30 to +80 ℃	-10 to +50 ℃	-30 to +60 ℃
Power supply	2 to 4.5 mA (rated 4 mA), DC 18 to 26 V (rated 24 V)	0.5 to 5 mA (rated 4 mA), DC 15 to 25 V (rated 24 V)	2 to 20 mA (rated 4 mA), DC 18 to 25 V (rated 24 V)
Outer dimensions	φ12.7 × 80.5 mm	φ12.7 × 63.5 mm	φ6.35 × 44 mm
Weight	Approx. 35 g	Approx. 25 g	Approx. 5.5 g
Recommended signal cable	MX-1000, 2000 series	MX-2000 series	NP-0120 series, NP-0180 series

MI-1282M10 Low-noise Microphone/MI-1271M12 TEDS Microphone


MI-1282M10


MI-1271M12

■ Features

● MI-1282M10
Self-noise level: 4.5 dB (Typ.)
Measurements can be made by directly connecting to CCLD compatible equipment with a BNC cable.
By using the DS-5000 as a battery-powered device, there is no need to secure a power source.
TEDS applicable

● MI-1271M12
Microphone MI-1271 built-in Preamplifier MI-3170
Measurements can be made by directly connecting to CCLD compatible equipment with a BNC cable.
TEDS applicable

■ Specifications

	MI-1271M12	MI-1282M10
Diameter, response type, polarization voltage	1/2-inch, free sound field, 0 V	
Sensitivity	-26.0 dB ±1.5 dB re.1 V/Pa (50 mV/Pa)	-6.0 dB ±2.0 dB re.1 V/Pa (500 mV/Pa)
Frequency range	1 Hz to 20 kHz (±2 dB)	10 Hz to 20 kH (±3 dB) 10 Hz to 16 kH (±2 dB)
Maximum sound pressure level	135 dB (250 Hz, 3 % distortion)	>100 dB (10 Hz～5 kHz) >80 dB (5 kHz ～20 kHz) (1 kHz, 3 % distortion)

	MI-1271M12	MI-1282M10
Self-noise level (A-weighting)	14.0 dB (typ.)	4.5 dB (typ.)
Operating temperature range	-30 to 80 ˚C	-10 to 60 ˚C
Power requirement	CCLD	
Drive current	2 to 4.5 mA (rated 4 mA)	2.8 to 20 mA (rated 4 mA)
Drive supply voltage	DC18 to 26 V (rated 24 V)	DC24 to 32 V (rated 24 V)
Output connector	BNC (C02 type)	
Outer dimension / Wekght	φ13.2 × 91.9 mm / Approx. 41 g	φ13.2 × 91.2 mm / Approx. 37 g

SC-2600/2500A/2120A Sound Calibrator


SC-2600


SC-2500A


SC-2120A

■ Features

● SC-2600
It has a nominal sound pressure level of 94 dB for calibration of Class 1 and Class 2 sound level meters. In addition to feedback control, it has built-in compensation functions for static pressure and temperature, allowing it to generate a stable sound pressure.

● SC-2500A
It has a nominal sound pressure level of 114 dB for calibration of Class 1 and Class 2 sound level meters. The calibration can be performed even if the measurement environment is loud such as in factories or outdoors, without being affected by the noise.

● SC-2120A
It can be used for simple operation checks.
It is a dynamic speaker type, cost-effective model.

■ Specifications

	SC-2600	SC-2500A	SC-2120A
Applicable standard	IEC 60942: 2017 Class 1 ANSI S1 40 2006 (R2011) Class 1 JIS C 1515: 2020 Class 1		IEC 60942: 2003 Class 2 JIS C 1515: 2004 Class 2
Method	Speaker		
Applicable microphone	1/2-inch microphone: MI-1235 / 1271 / 1433 / 1271M12 / 1282M10 1/4-inch microphone: MI-1531*2 Sound Level Meter: LA-7200 / 7500 / 7700 / 1411 / 1441A / 4441A Ultraminiature microphone: MB-2200M10*3	1/2-inch microphone: MI-1235 / 1271 / 1281*1 / 1433 / 1271M12 1/4-inch microphone: MI-1531*2 Sound Level Meter: LA-7200 / 7500 / 7700 / 1411 / 1441A / 4441A	1/2-inch microphone: MI-1235 / 1271 / 1433 / 1271M12 / 1282M10 Sound Level Meter: LA-7200 / 1411 / 1441A Ultraminiature microphone: MB-2200M10*3
Sound pressure level	Nominal sound pressure level : 94 dB Deviation of sound pressure level: ±0.20 dB or less*4	Nominal sound pressure level : 114 dB Deviation of sound pressure level: ±0.20 dB or less*4	Nominal sound pressure level : 94 dB Deviation of sound pressure level: ±0.5 dB or less*4
Total distortion	0.5% or less*4		0.5% or less
Frequency	Nominal frequency: 1000 Hz Frequency deviation ±0.1 % or less*4		Nominal frequency: 1000 Hz Frequency deviation ±1 % or less*4
Operating environment	Air temperature: -10 to 50 °C (with no condensation) Static pressure: 65 to 108 kPa Relative humidity: 25 to 90 % (Excluding a combination of air temperature and humidity that exceeds dew-point temperature of 39 °C or higher.)		
Power requirement	Size AA battery (LR6 or HR6) × 2		9 V flat battery (6F22 or 6LR61) × 1
Battery life	10 hours or more continuous operation (when using LR6)		20 hours or more continuous operation (when using 6F22)
Outer dimensions	84 (W) × 53 (H) × 76 (D) mm (not including protruded section)		52 (W) × 45 (H) × 130 (D) mm (not including protruded section)
Weight	Approx. 220 g (including battery cells)		Approx. 300 g (not including battery cells)

*1 : This product is discontinued. *2 : SC-0313 adapter attached to MI-3140 1/4-inch preamplifier is required. *3 : MB-0210 Ultraminiature Microphone Calibration Adapter (Option) is required.
*4 : Under reference environment (reference environment condition: air temperature 23 °C, static pressure 101.325 kPa, relative humidity 50 %)

Sound Level Meter

LA-7000 series High Performance Sound Level Meter

■ Overview

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

■ Features

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

■ Option

Model name	Product name
LA-0702	1/3 Real-time Octave Analysis function
LA-0703	FFT Analysis function
LA-0704	Sound Recording function
LA-0705	Level Judgment function
LA-0707	Level Simulator function
LA-0708A	Sound Quality Evaluation function
LA-0709	Ultra low frequency sound measurement function

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

■ Overview

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

■ Features

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

■ LA-1411
Class 2 sound level meter for product testing and measuring the sound level generated from machines etc.
High-performance and cost-effective model

■ LA-1441A
Class 2 sound level meter for measuring the working environment and environmental noise. Auto measurement function by timer and trigger.
Level trend can be recorded at the interval from 1 ms .

■ LA-4441A
Class 1 sound level meter for sound analysis and product testing. Time weighting (10 ms, Impulse) corresponding to the fast sound fluctuation.
Level trend can be recorded at the interval from 1 ms.

■Option
LA-0141 Comparator function

SR-2210 2ch Sensor Amplifier

■ Features

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

■ Specifications

Operating frequency range	1 Hz to 20 kHz (±0.5 dB) (Output load impedance 100 kΩ or more)
Gain	-10, 0, 10, 20, 30, 40, 50, 60 dB
Frequency weighting characteristics	A/C/FLAT (Z) (Applicable standard: IEC 61672-1, JIS C 1509-1)
Output cutoff frequency	Approx. 0.2 Hz (load impedance 100 kΩ or more) Approx. 0.4 Hz (load impedance 50 kΩ or more)
Input/ output connector	BNC (C02 type)
Power supply	Size AA battery × 4 or exclusive AC adapter
Battery life	20 hours or more (with alkaline battery cell (LR6) × 4)
Outer dimensions	140 (W) × 40 (H) × 125 (D) mm (not including protruded section)
Weight	Approx. 500 g (with batteries)

Ultraminiature Microphone

MB-2200M10 Ultraminiature Microphone

■ Features

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

■ Specifications

Sensitivity (1 kHz)	-37.0 ±3 dB re.1 V/Pa (14 mV/Pa)
Frequency (1 kHz reference)	200 Hz to 16 kHz (±2.5 dB)
Max. sound pressure level	114 dB or more (1 kHz, total harmonic distortion : 3 %)
Inherent noise level	36 dB or less (A-weighting)
Operating temperature range	-30 to +80 ˚C (within 2500 mm from tip of the sensor part) 0 to +50 ˚C (until the connector part of a preamplifier)
Operating humidity range	0 to 90 % RH (with no condensation)
Storage temperature range	-10 to +60 ˚C (sensor section, preamplifier section)
Storage humidity range	0 to 90 % RH (with no condensation)
Power requirement	CCLD (Constant current drive)/ 2.2 mA to 4.9 mA (Rated 4.0 mA)/ 18 V to 26 V DC (Rated 24 V)
Weight	Approx. 48 g (sensor section only: approx. 0.3 g)

Sound and Vibration Measurement System

O-Solution/DS-5000 Sound and Vibration Analysis System

O-Solution

DS-5000

■ Overview

The O-solution and the DS-5000 measure the sound and vibration phenomena at various site with high accuracy, and performs detailed analysis at once.
Quickly and smoothly, this new system helps to uncover the various problems for sound and vibration.

● O-Solution (Software)
"Measurement" and "Analysis" mode in one application with one click (for Windows®)

• Check the results instantly
You can perform all the process of setting, measurement, and analysis smoothly in one application. The result is quickly checked in the flow of process, and it can eliminate loss of time due to the rework.

• Perfect monitoring
Equipped with monitor functions that you can quickly respond to unexpected phenomena at site. Easy to notice errors such as overrange voltage and external noise

• Share the data
You can share the measured data and the analysis result with engineers far from the site, by using the free viewer (O-Solution Lite).

● DS-5000 (Hardware)
Multi-channel measurement from 3 up to 240 ch in the stack structure

- The input unit with 6ch is provided.
- The maximum input channels is 48ch, the maximum hardware to hardware connection is 5 units (up to 240 channels).
- There are two types of input units with a frequency range of 40 kHz and 100 kHz.
- The hardware to hardware connection builds a multi-channel measurement system according to your application.
- The DS-5000 is a battery-driven system and can be used outdoors, in factories and other places even where a power source is not easy to secure.
- Each channel has isolation structure so that electrical noise is less affected.
- Achieved the dynamic range that can measure from small to large amplitude.

■ Hardware specifications

Maximum number of input channels	48ch 240ch (when the hardware to hardware connection function used)
Input voltage range	-30 / 0 / 30 dBVrms
Max. input voltage)	30 Vrms (42.4 Vpk)
Recording performance	10 kHz range 240ch
Dynamic range	130 dB or more
Channel to channel phase accuracy	±0.6˚ (less than 20 kHz)
Channel to channel isolation	available
Operating temperature range	-10 to 50 ˚C (humidity 20 to 80 %RH, no dew condensation)
Power supply	AC adapter, external DC (battery unit required)

■ Hardware Features

Easy cable connection
The pitch is designed for easy cable connection.
Downsizing and easy operation are both achieved.

Less a ected by external noise
Each channel is isolated. You can measure safely even in the field or the object where is likely to have ground loop, electrical noise and potential di erences.

Extendable & expandable measurement system
The stack structure enables to build the system according to your application. Multi-channel measurement up to 240 channels is available.

Easy to notice the level range over
Arc-shaped LEDs on both sides of the connectors let you know the over-range channels.

Providing audio checking for reliable measurement
Main unit has an output connector for headphone monitor. The measured input signal can be checked with sound.

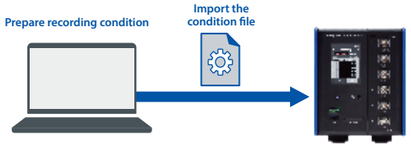
Battery-powered to use anywhere
Readily to use outdoors, in factories and other places even where a power sources not easy to secure. (approx. 4 h hours for a unit with 6-ch input)

* The battery unit is option.

■ Individual recording function

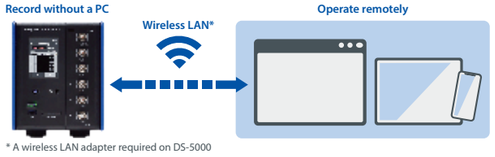
Highly accurate recording without a PC
Recording can be performed using only the DS-5000 at the measurement site. It is convenient for on-board measurement, data recording at sites where a PC cannot be brought in, or where measurement time is limited.

Condition can be set in advance with the O-Solution
By importing the condition file (calibration value, voltage range, etc.) prepared on the O-Solution in advance, you can use the DS-5000 as high-precision data logger.



Simple operation with touch panel
You can easily start and stop recording using the touch panel.

Operate from a smartphone/tablet
A remote control app for smartphones and tablets is available so that you can easily start/stop recording and check or change settings without a PC. The app does not need to be installed and can be used with a web browser.



* A wireless LAN adapter required on DS-5000

Further analyzing the recorded data with the O-Solution
Recorded data can be saved in a memory such as an SD card, and detailed analysis can be performed by importing the recorded data to the O-Solution.

Application Software

O-Solution Sound and Vibration Analysis System Software

Features
- Compare/ analyze the data with wide sampling frequency from 10 µHz to 100 GHz
- Flexibly layout to compare the data in different formats or sampling frequency
- Further analysis on specified area with the marker function
- Automation of analysis with the external control function

Specifications

Applicable sampling frequency	10 µHz to 100 GHz
Number of analysis data	Max 1,000 per one time
Number of output files	Max. 1,000 per one time
Data size	Large volume up to 1 TB
Multi-thread processing	Other processing can be performed while analyzing or importing data.

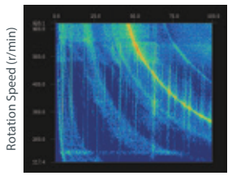
Option

Model name	Product name	Overview
O-Solution Lite	Viewer function (free)	It is a license free viewer function that anyone can use anywhere.
OS-5100	Platform	A variety of editing functions such as waveform cutting, correction, and search is available.
OS-0521	Digital filter	Applying an IIR or FIR filter to the recorded data
OS-0522	FFT analysis function	It enables to calculate the power spectrum, frequency response function, etc.
OS-0523	Tracking analysis function	Tracking analysis with constant ratio and constant width are available.
OS-0524	Octave analysis function	Analysis from 1/1 to 1/24 octave
OS-0531	Statistical Analysis Function	Histogram, autocorrelation function, scatter plot
OS-0510	External control function	It communicates with user's application via TCP / IP and controls O-Solution.

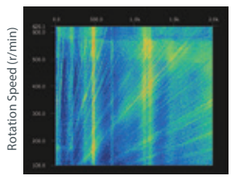
Operation environment

Interface	LAN terminal 1000base-T
OS	Microsoft®Windows®10 PRO, Microsoft®Windows®11 PRO *For other edition, please contact to us separately.
CPU	For the measurement/recording with 96 channels or less Intel® Core™ processor (Intel® Core™ i7 or higher grade, and 8th Generation or later generation), 4 cores and 8 threads or more, and 1.8 GHz or more base clock For the measurement/ recording with 96 channels or more Intel® Core™ processor (Intel® Core™ i7 or higher grade, and 8th Generation or later generation), 6 cores and 12 threads or more, and 2.5 GHz or more base clock frequency
Memory	Minimum 16 GB
Storage	Minimum free space 32 GB When storing data to the external HDD or SSD, the port for USB3. 2 (Gen1) / USB3. 1 (Gen1) / USB3. 0 is required.
Display	Minimum 1920 × 1080

Constant ratio tracking analysis



Constant width tracking analysis



OS-0525 O-Solution Sound Quality Evaluation Function

Overview
It is difficult to quantify subjective feelings such as pleasant sounds and unpleasant sounds. The Sound Quality Evaluation Function enables to quantify a human sense of sound using the sound quality evaluation parameters such as loudness, sharpness, roughness, tonality. When taking measures to reduce unpleasant sounds, these parameters enable quantitative determination that helps investigation of causes, fundamental countermeasures and sound improvement.

Applicable standards
- Loudness of stationary sounds (ISO532-1)
- Loudness of non-stationary sounds (ISO532-1)
- TNR/PR (ISO7779 Annex D)

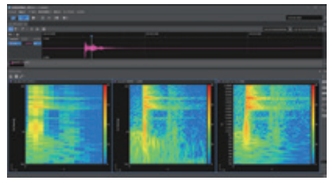
Parameters for sound quality evaluation
- Loudness (Loudness of sound)
- Sharpness (High-pitched sound)
- Tonality (Feeling of pure tones)
- Roughness (Roughness, rasping)
- Fluctuation strength (Fluctuating feeling)
- TNR/PR (Discrete tone)

OS-0526 O-Solution Fluctuation Sound Analysis Function

Overview
Although the loudness of sound is not so large, there are many "unpleasant sounds" in the world. Sounds with significant temporal fluctuations often feel unpleasant even if the magnitude (level) is not so large.
The Fluctuation Sound Analysis Function enables to extract only the components with large temporal fluctuations that are not affected by the level. As a result, it can quantify the characteristics of various temporal fluctuations that were difficult to detect with roughness or fluctuation strength. In addition, it is equipped with a function that can evaluate the audibility when only the variable components are emphasized or removed without changing the frequency characteristics. (Fluctuation sound simulator)

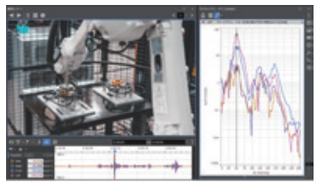
Features
- Various speed fluctuation sounds can be evaluated intuitively to display in the color-map at once.
- Effective when extracting only variable components from high-level background noise.
- It supports a wide range of fluctuation frequencies from slow to fast fluctuations (0.5 to 200 Hz).
- It enables to evaluate how the audible impression of the target sound changes by emphasizing or removing specific variable components.
- It can generate a time waveform that extracts only specific variable components.

OS-0527 O-Solution Time Frequency Analysis Function



Overview
This function can evaluate transient phenomena that were difficult to capture by FFT analysis and display clearly time change of the frequency components while maintaining the frequency resolution. It is equipped with STFT (Short Time Fourier Transform) and Wavelet transform.

OS-0532 O-Solution Video playback function

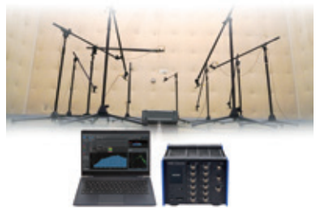


Overview
Video files recorded with a video camera or smartphone can be loaded into the O-Solution and played back along with analysis results of sound, vibration, etc. By displaying video, time series data, FFT analysis results, etc. side by side, you can determine which part of the target object's behavior is causing a problem.

Features
- Video data can be rotated vertically or horizontally.
- If the start positions of the data recorded with the DS-5000 and the video data are misaligned, you can align the positions of each data by using the time series position alignment function.

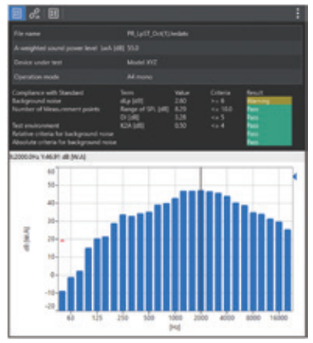
Supported video file formats
- AVI
- MP4
- MOV
- WMV
- M4A

OS-0541 O-Solution Sound Power Level Using Sound Pressure



Overview
The sound power level has been specified in the standards so that it can be measured in a variety of environments without limiting the target object.
The OS-0541 complies with the standard for measuring sound power level using sound pressure with a microphone. The OS-0524 Octave Analysis function is separately required.

Features
- Conforming to the latest ISO standard
- Calculating sound power level up to 20 kHz (1/3 octave band)
- Useful for cause analysis
  - Analysis and recording simultaneously (Synchronous recording with other sensors is also available.)
  - Calculate FFT, instantaneous sound power level.
  - Sound pressure level distribution can be displayed.

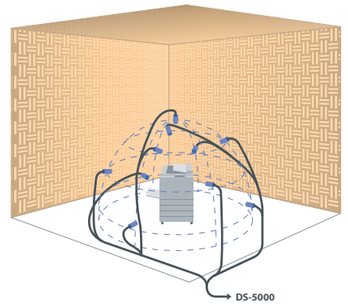


Conforming to standards

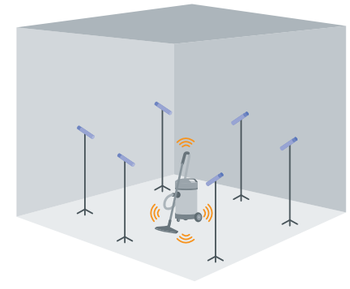
Test environment	Standards	Number of measurement points
Anechoic room, semi-anechoic room	Precision method ISO 3745: 2012, JIS Z 8732: 2021	20 or more
Semi-anechoic room, outdoor	Engineering method ISO 3744: 2010*, JIS Z 8733: 2000	9, 10 or more
	Survey method ISO 3746: 2010	4 or more
Reverberation room	Precision method ISO 3741: 2010,JIS Z 8734: 2021 (only comparison method)	6 or more
High frequency sound power level	ISO 9295: 2015 (only when not including discrete tones)	Refer to ISO 3741, 3744

* Revision of ISO 3744 is under development.
* When a revised version is published, our software will be updated to meet the new standard.

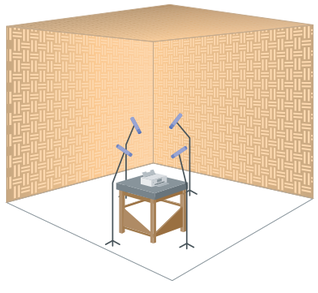
Sound power level measurement in semi-anechoic room
This is the most popular measurement method. Measurement is taken by arranging microphones on the surface of a hemisphere or rectangular parallelepiped surrounding the object.



Sound power level measurement in reverberation room
Compared to a semi-anechoic room , more accurate measurements can be made with fewer measurement points. There are direct method and comparison method, and the OS-0541 only supports comparison method.



OS-0542 O-Solution Information Technology Equipment Option



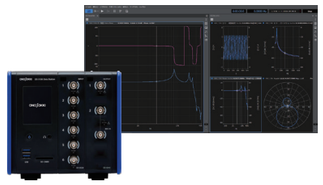
Overview
The measurement of noise emitted by computers, printers, multifunction devices, etc. is specified in the standard ISO 7779. This standard is also applied in obtaining environmental labels. It calculates emission sound pressure level at defined operator or bystander position as well as sound power level and the prominent discrete tones.

Conforming to standards

Measurement items	Standards
Sound power level for information technology and telecommunications equipment	ISO 7779: 2018, JIS X 7779: 2012
Emission sound pressure level	ISO 11201: 2010
Declared noise emission values	ISO 9296: 2017
Prominent discrete tones	ISO 7779: 2018, JIS X 7779: 2012 Tone-to-Noise Ratio, Prominence Ratio

Frequency Response Measurement Software

OS-4100 Frequency response measurement software



■ Overview

The OS-4000 is dedicated software that can measure the frequency characteristic of various objects with high precision and high speed, such as vibration characteristics of mechanical structures, acoustic characteristics of speakers, motor control characteristics, servo analysis, coupling response characteristics, and battery impedance characteristics.
This system can be used as a servo analyzer and frequency characteristic analyzer and obtain frequency characteristic easily, quickly, and with high resolution.

■ Features

1. Two types of calculation methods are equipped.

- **FRA method (Frequency Response Analyzer)**
  Obtains gain and phase for each signal frequency.
  This method is used for high accuracy and high dynamic range measurement.
- **FFT method (Fast Fourier Transform)**
  Obtains gain and phase over a wide frequency range at high speed.
  This method can quickly grasp the frequency characteristics.

2. Achieves the measurement of machine control characteristics and noise/vibration with one hardware

Control characteristics measurement (OS-4100) and noise/vibration measurement (O-Solution) can be measured with one hardware. By using different software according to the application, it can be used for various measurements at an affordable cost.
In the case of a camera, measure image stabilization control with the OS-4100 and its motor noise with the O-Solution.

■ Specifications

DS-5000 Hardware

Number of measurement channels	40 kHz unit- 3 to 42 ch 100 kHz unit- 2 to 4 ch
Dynamic range	40 kHz unit- FRA mode: 160 dB/ FTT mode: 130 dB 100 kHz unit-FRA mode: 160 dB/ FTT mode: 120 dB
Output voltage	Max. ±10 V (Peak) including offset voltage and amplitude
Type of output signal	Sine/ Sine sweep (log/ Linear)/ Swept sine/ Random/ Pseudo-random/ Impulse
Addition function	Installed in DS-0545 2ch Signal output unit (MIX IN)
Coupling	AC/DC automatic switching function

OS-4100 Software

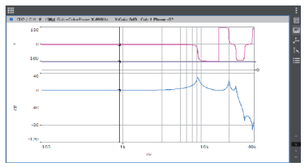
Measurement frequency range	40 kHz unit: 10 mHz to 40 kHz 100 kHz unit: 10 mHz to 100 kHz
Calculation method	FRA mode: Sine sweep (Log/Lin) FFT mode: Random, swept, pseudo-random, impulse
Frequency resolution	FRA mode: Log 2 to 2000 (Line/Decade) Lin 200 to 25000 (Line/Total) FFT mode: Max. Sampling points 65536
Measurement functions	FRA mode: Output amplitude control, Frequency range division setting (up to 30), Auto resolution control FFT mode: Pair range
Calculation functions	Gain margin/ phase margin, damping ratio, loss factor, cuto search, step response (delay time, overshoot
Graph display	Bode, time waveform, power spectrum, Nyquist, co-quad, Nicols, cole-cole plot

■ Functions

Two types of calculation methods

FRA method (Frequency Response Analyzer)

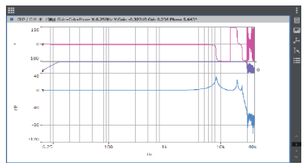
Obtains gain and phase for each signal frequency. This method is used for high accuracy and high dynamic range measurement.



- Signal output: Log sine sweep
- Frequency resolution: 200 Lines/Decade (100 Hz to 40 kHz)
- Measurement time: 78 seconds (Averaging count 2 times/Line)

FFT method (Fast Fourier Transform)

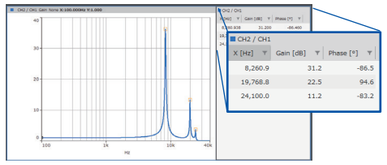
Obtains gain and phase over a wide frequency range at high speed. This method can quickly grasp the frequency characteristics.



- Signal output: Random
- Frequency resolution: 6.25 Hz (6400 Lines)
- Measurement time: 17 seconds (Averaging count 100 times)

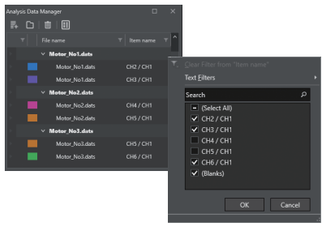
Useful list functions

Listing up peak points and damping factor, auto search of gain margin and phase margin



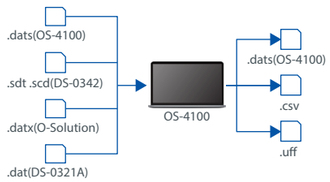
Data manager

The data manager enables to collectively manage acquired data, compare multiple data in the list, search/sort functions.



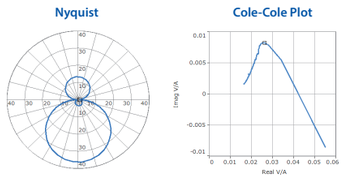
Supporting many types of files

You can export measurement data in the universal UFF and DATS (HDF5) formats which are compatible with the experimental modal analysis software, and import the files from the related products such as the O-Solution.



Various graph displays

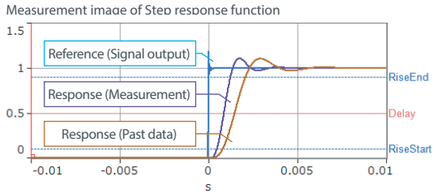
Nyquist, Co-quad, Nichols, Cole-Cole plot and power spectrum can be displayed.



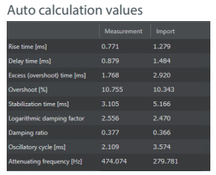
Step response function

The performance of the object can be obtained from the temporal response. By applying step signals to the object and measuring the step response signals, it automatically calculates the values related to response performance (rising time, etc.) and compares actual measurement data with past data.

Measurement image of Step response function



Auto calculation values



	Measurement	Import
Rise time [ms]	0.771	1.279
Delay time [ms]	0.879	1.484
Excess (overshoot) time [ms]	1.768	2.920
Overshoot [%]	10.755	10.343
Stabilization time [ms]	3.105	5.166
Logarithmic damping factor	2.556	2.470
Damping ratio	0.377	0.366
Oscillatory cycle [ms]	2.109	3.574
Attenuating frequency [Hz]	474.074	279.781

■ Option

OS-0410 External control

It has the External control function as an option which can communicate with the user's application via TCP/IP, measure under measurement conditions prepared in advance and save.

- **Automated inspection process for mass-production**
  Automate each operation such as setting, measuring and saving with one button
- **Control measurement instruments from other apps**
  Control the measurement start/end timing and specify the measurement conditions.

LAN port	For control side and communication (No required when operating within a PC)
Protocol	TCP/IP
Character code	ASCII
Line feed code	CRLF

Engine Revolution Detector

IP-292/296 Ignition Pulse Detector

■ Features
- CE modification applicable
- Rotation detector exclusive for gasoline engine
- Convenient one-touch mounting
- Max. φ10 mm conductive wire can be installed
- Heat resistance structure

■ Specifications

Applicable engines	2/4-cycle gasoline engine
Detection section	Primary cord of an ignition coil (IP-292) Secondary cord of an ignition coil (IP-296)
Applicable cord diameter	Max. φ10 mm
Output cord length	4.9 m (directly attached/ with BNC)
Applicable display units	CT-6710: Motor & Engine Tachometer FT-2500: Advanced tachometer FT-7200: Advanced handheld tachometer HT-6200: External sensor input type handheld tachometer GE-2500: Diesel engine tachometer
Operating temperature range	-40 to +120 ˚C
Outer dimensions	102 (W) × 48 (H) × 30 (D) mm
Weight	Approx. 280 g

IP-3000A Ignition Pulse Detector

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

■ Specifications

Applicable engines	2/4-cycle gasoline engine
Detection section	Primary cord of an ignition coil Current cord of an electronic distributor
Applicable cord diameter	Max. φ5 mm
Output cord length	4.9 m (directly attached/ with BNC)
Applicable display units	CT-6710: Motor & Engine Tachometer FT-2500: Advanced tachometer FT-7200: Advanced handheld tachometer HT-6200: External sensor input type handheld tachometer GE-2500: Diesel engine tachometer
Operating temperature range	-40 to +120 ˚C
Outer dimensions	8 (W) × 14.3 (H) × 30 (D) mm
Weight	Approx. 80 g (including cable)

IP-3100 Ignition Pulse Detector

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

■ Specifications

Applicable engines	2/4-cycle gasoline engine
Detection section	Primary cord of an ignition coil Secondary cord of an ignition coil Current cord of an electronic distributor
Applicable cord diameter	Max. φ10 mm
Output cord length	4.9 m (directly attached/ with BNC)
Applicable display units	CT-6710: Motor & Engine Tachometer FT-2500: Advanced tachometer FT-7200: Advanced handheld tachometer HT-6200: External sensor input type handheld tachometer GE-2500: Diesel engine tachometer
Operating temperature range	-40 to +120 ˚C
Outer dimensions	13 (W) × 33 (H) × 60 (D) mm
Weight	Approx. 130 g (including cable)

OM-1200 Motor/Engine RPM Detector

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

■ Specifications

Applicable engines	2/4-cycle gasoline engine, EV/HEV, motor
Detection method	Electromagnetic induction
Applicable display units	CT-6710: Motor & Engine Tachometer FT-2500: Advanced tachometer FT-7200: Advanced handheld tachometer HT-6200: External sensor input type handheld tachometer GE-2500: Diesel engine tachometer
Signal cable	MX-005/010/015/020 (option)
Operating temperature range	0 to +80 ˚C
Outer dimensions	φ16 × 54 mm (only sensor) φ16 × 80 mm (when connecting cable)
Weight	Approx. 65 g

OM-1500 Motor/Engine RPM Detector

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

■ Specifications

Applicable engines	2/4-cycle gasoline engine, EV/HEV, motor
Detection method	Electromagnetic induction
Output cord length	4.9 m (directly attached/ with BNC)
Applicable display units	CT-6710: Motor & Engine Tachometer FT-2500: Advanced tachometer FT-7200: Advanced handheld tachometer HT-6200: External sensor input type handheld tachometer GE-2500: Diesel engine tachometer
Operating temperature range	-10 to +100 ˚C
Outer dimensions	φ16 × 30mm
Weight	Approx. 130 g (including cable)

CP-044 Diesel Engine Rotation Sensor

■ Features
- CE modification applicable
- One touch attachment to fuel injection pipe
- Attachment to the injection pipe of φ4 to 8 mm are available

■ Specifications

Applicable engine	Diesel engine
Detection method	A piezoelectric element is used to detect pulsation at the time of fuel injection
Applicable pipe diameter	φ4 to 8 mm
Output cord length	4.9 m (directly attached/ with 6-core connector)
Piezoelectric element withstand compressive pressure	1960 bar
Applicable display unit	GE-1400: Diesel engine tachometer
Operating temperature range	0 to +80 ˚C
Outer dimensions	φ32 × 79 mm
Weight	Approx. 120 g

VP-201/1210 Engine Revolution Detector

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

■ Specifications

Applicable engines	4-cylinder diesel/ gasoline engines
Detection part	Engine, cylinder head part bolt or engine fixing bolt
Detection method	Electro-dynamic vibration detection
Output cord length	2.9 m (directly attached/ with mini plug)
Applicable display unit	SE-2500A: Digital engine tachometer
Operating temperature range	0 to +100 ˚C
Outer dimensions	φ25 × 50 mm
Weight	VP-201 : Approx. 110 g VP-1210: Approx. 130 g

VP-202/1220 Engine Revolution Detector

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

■ Specifications

Applicable engines	4-cylinder diesel/ gasoline engines
Detection part	Engine, cylinder head part bolt or engine fixing bolt
Detection method	Electro-dynamic vibration detection
Output cord length	2.9 m (directly attached/ with BNC)
Applicable display units	CT-6710: Motor & Engine Tachometer FT-2500: Advanced tachometer FT-7200: Advanced handheld tachometer HT-6200: External sensor input type handheld tachometer GE-2500: Diesel engine tachometer
Operating temperature range	0 to +100 ˚C
Outer dimensions	φ25 × 50 mm
Weight	VP-202 : Approx. 110 g VP-1220: Approx. 130 g

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

Engine Tachometer

GE-1400 Diesel Engine Tachometer

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

■ Specifications

Applicable engines	4-cycle diesel engines
Detection method	Detection of the pulsation of the injection pipe generated at the time of fuel injection
Display update time	1±0.2 s
Applicable detector	CP-044
Measurement range	400 to 8000 r/min
Analog output	Output voltage: 0 to 1 V/ 0 to FS (FS is arbitrary setting) Conversion method: 10 bit D/A
Monitor output	Analog output for monitoring purposes after waveform reshaping of the sensor signal
Pulse output	Output voltage Hi: +4.5 V or more, Lo: +0.5 V or less
Power source	Size AAA battery × 4 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) × 186.5 (H) × 47.5 (D) mm
Weight	Approx. 230 g (not including batteries)

HT-6200 Handheld Digital Tachometer

■ Features
- The maximum and minimum values can be displayed during measurement (peak-hold function)
- Built-in memory function
- External sensor input type

■ Specifications

Applicable engines	Diesel engine, gasoline engine, motor, general rotating object
Display update time	1±0.2 s
Applicable detectors	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 × (±0.02 %)±1 count
Analog output	Output voltage: 0 to 1 V/ 0 to FS (FS 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 × 4 or exclusive AC adapter
Battery life	Approx. 16 hours (when backlight is OFF.) Approx. 8 hours (when backlight is ON.)
Outer dimensions	66 (W) × 189.5 (H) × 47.5 (D) mm
Weight	Approx. 230 g (not including batteries)

SE-2500A Digital Engine Tachometer

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

■ Specifications

Applicable engines	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±0.2 s
Measurement target	Ignition coil
Applicable detectors	VP-201/1210
Measurement range	120 to 20,000 r/min
Analog output	Output voltage: 0 to 1 V/ 0 to FS (FS is arbitrary setting) Conversion method: 10 bit D/A
Monitor output	Analog output for monitoring purposes after waveform reshaping of the sensor signal
Pulse output	Output voltage Hi: +4.5 V or more, Lo: +0.5 V or less
Power source	Size AAA battery × 4 or exclusive AC adapter
Battery life	Approx. 32 hours (when backlight is OFF.) Approx. 8 hours (when backlight is ON.)
Outer dimensions	66 (W) × 198.5 (H) × 47.5 (D) mm
Weight	Approx. 250 g (not including batteries)

FT-7200 Advanced Handheld Tachometer

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

■ Specifications

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

CT-6710 Motor & Engine Tachometer

■ Features
- High response measurement
- Supports various sensors with different purposes
- Automatic setting of trigger level with the Trigger Assist Function
- Measurement by ECU crank angle signal of unequal interval pulses
- High speed digital data output by CAN interface (option)
- Optional external analog display unit available

■ Specifications

Applicable engines	Gasoline engine, diesel engine, EV, HEV, general rotating object
Measurement range	0 to 99,999 r/min (depending on sensor and input pulse)
Applicable detectors	IP-292/296/3000A/3100, LG-9200, MP-900/9000 series, MP-9810/9830, OM-1200/1500, VP-202/1220
Display method	Fluorescent display tube (52.5 × 11.5 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 V, 36 VA or less)
Outer dimensions	170 (W) × 49 (H) × 120 (D) mm
Weight	Approx. 700 g

GE-2500 Diesel Engine Tachometer

■ 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.

■ Specifications

Applicable engines	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 detectors	OM-1200/1500, VP-202/1220, IP-292/296/3000A/3100, NP-3000 series, FT-0501, MI series, Current probe, etc.
Constant drive power supply	2.2 to 3.2 mA (REF only)
[REVO] output	Outputs for rotation speed calculation values 0 to FS/ 0 to 10 V (Value of FS can be specified.)
[SIG] output	Outputs signal of the sensor input to MAIN (can be used by switching from analog output)
Pulse output	Pulse output of the frequency of rotation speed calculation value Hi: +4.5 V or more/ Lo: +0.5 V or less (at no load) Update time: 200 ms or less, load resistance: 100 kΩ or more
Power supply (power consumption)	12 to 24 VDC (8 VA or less)
Outer dimensions	Approx. 144 (W) × 72 (H) × 180 (D) mm (not including protruded section)
Weight	2 kg or less

FT-2500 Advanced Tachometer

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

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

FAMS*-R6 Automatic Measurement Control System (made to order)

*FAMS: Flexible Automatic Measuring System

■ Overview
The FAMS-R6 is an automatic measurement control system with the functions required for test bench testing such as control of various equipment, real time measurement, data collection, alarm monitoring, automatic operation, etc. It supports various work scenes by linking with applications.

■ Features
- Wide lineup of test bench systems
- Our unique, superior control method accurately reproduces any test.
- High-response, high-precision measurement
- GUI with excellent operability and visibility
- Excellent scalability to flexibly build the optimum system that the user requires.

* The existing model, FAMS-R5 is still available. For details, please contact your nearest distributor.

■ Various bench system lineup

Chassis dynamometer for 4-wheels

■ Overview
This system accurately evaluates various performance aspects of four-wheeled vehicles by replicating real-world driving conditions. It accommodates a wide range of vehicle types, including 2WD, 4WD, EVs, and HEVs, and supports a variety of tests such as emissions and fuel economy testing, environmental testing, and electric power efficiency evaluation for electrified vehicles. The system features an automatic vehicle restraint mechanism that ensures excellent test repeatability and stable results. It also offers applications compliant with a wide range of regulations, including CFR 1066, SAE J2951, and JASO E014 evaluations.

Chassis dynamometer for 2-wheels

■ Overview
This system replicates real-world driving conditions to accurately evaluate the performance of a wide range of vehicle types, including motorcycles, three-wheelers, ATVs, and electric scooters.
It supports various tests such as emissions testing, performance evaluation, and environmental testing. A lineup of electric inertia systems is available to accommodate small to large vehicles, offering benefits such as reduced initial investment, space-saving design, and excellent maintainability.

RC-S, Real-car simulation bench

■ Overview
This is a system that can evaluate various performances of next-generation vehicles without tire factors. It reproduces transient behavior that cannot be achieved with a chassis dynamometer, making it possible to evaluate vehicle control, including regenerative braking for electric vehicles, and to measure vehicle noise excluding road noise. In addition, by combining real time model calculations and a low-inertia motor, transient tests can be performed on actual vehicles. By linking with AD/ADAS verification simulation tools, automated driving functions such as lane keeping assist can be evaluated on the bench.

Power-train bench

■ Overview
This system is capable of evaluating HEV/EV powertrains, and is ideal for verifying the actual operation of HEV/EV systems and for energy flow analysis using a power meter.

Engine bench

■ Overview
This system can perform various tests such as engine running fuel efficiency test, gas emission test, output performance test, deterioration endurance test, combustion analysis, and sound source probing. The performance of the learning/predictive operation function and the control performance with the delay correction and rotational inertia correction functions have been improved, making it possible to perform transient tests that comply with gas emission regulations such as TRIAS, EPA, and ISO with sufficient reproducibility .

Motor bench

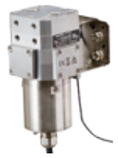
■ Overview
This is a system that can evaluate motor performance and endurance. By linking with various simulation tools and utilizing motor control technology that can reproduce simulation behavior, it enables to apply a load to an EV motor equivalent to that of an actual vehicle.

Volumetric Type Flow Detector

FP series Flow Detector (FP-5000 seires made to order)


Standard type


Low pressure loss type


Compact/Environment resistant type

■ Features

Standard type
- Achieves pulse resolution up to 20 times that of the existing models
- Various detector lineup supports wide flow range from motorcycles to large vehicles such as buses, trucks and ships
- A filter, a flow detector, and a temperature/pressure sensor unit, fuel density meter can be connected together, and achieved space saving.
- Applicable to alcohol mixed fuel as standard

Low pressure loss type
- It is driven by a motor so that the free piston inserted into the detector's bypass tube is located at the neutral position.
- High accuracy within±0.2% of reading over the entire flow measurement range optimized by PID and feedforward control

Compact/Environment resistant type
- Small and light weight, ideal for on-board measurement
- Super wide range ability: 1:2000

■ Specifications

Standard type

		Small flow rate type	Medium flow rate type	Large flow rate type
		FP-5130 series	FP-5140 series	FP-5150 series
Usable liquid		Gasoline, light oil, kerosene, alcohol biofuel and general petroleum-based hydraulic oi*1		
Measurement range	Flow rate	FP-5131/5132 : 0.05 to 60 L/h FP-5133/5134 : 0.05 to 108 L/h*2	FP-5141/5142 : 0.3 to 300 L/h FP-5143/5144 : 0.3 to 600 L/h	FP-5151/5152 : 1 to 1440 L/h
Accuracy	Flow rate	Within ±0.0009 L/h (0.05 to 0.18 L/h) Within ±0.5 % of reading (0.18 to 108 L/h)	Within ±0.2 % of reading	Within ±0. 5 % of reading
Pressure loss		8 kPa or less (at 40 L/h <gasoline>)	2 kPa or less (at 60 L/h <gasoline>)	7.5 kPa or less (at 500 L/h <light oil>)
Operating temperature	Liquid	0 to +65 ˚C		
	Ambient	0 to +65 ˚C		
Resolution		FP-5131/5133: 0.001 mL/Pulse FP-5132/5134: 0.0005 mL/Pulse	FP-5141/5143: 0.01 mL/Pulse FP-5142/5144: 0.005 mL/Pulse	FP-5151: 0.1 mL/Pulse FP-5152: 0.05 mL/Pulse
Port	Size	IN: Rc3/8*3 OUT: Rc3/8*3	IN: Rc3/8*3 OUT: Rc3/8*3	IN: Rc1/2 OUT: Rc1/2
Maximum operating pressure		1 MPa	1 MPa	3.4 MPa
Weight		Approx. 3.5 kg	Approx. 5.0 kg	Approx. 13.5 kg
● Temperature/ pressure sensor unit		EH-0830		EH-0850
Measurement range	Temperature	0 to +100 ˚C		
	Pressure	0 to 1 Mpa		
Accuracy	Temperature	PT100 Ω class A		
	Pressure	±0.25 %F.S		
● Filter/ Element				
Alcohol applicable	Filter	EH-1130		EH-1150
	Element	EH-0031A		EH-0051A

*1 Please contact to your nearest distributor.
*2 Made-to order for the measurement range from 0.02 L/h. Please contact to your nearest distributor.
*3 Option joint (SAE joint) is available. Please contact to your nearest distributor.

■Low pressure loss type

		FP-213S	FP-2140S
Usable liquid		Gasoline, light oil, kerosene and general petroleum-based hydraulic oi (option: alcohol biofuel)*1	
Measurement range		0.06 to 60 L/h	0.05 to 200 L/h
Accuracy		Within ±0.5 % of reading (over the entire 0.06 to 60 L/h range)	Within ±0.2 % of reading
Pressure loss		0.01 kPa or less (excluding filter pressure loss)	
Operating temperature	Liquid	0 to +60 ˚C	
	Ambient	0 to +60 ˚C	
Port	Size	IN: Rc1/4	IN: Rc3/8
		OUT: Rc1/8	OUT: Rc3/8

*1 Please contact to your nearest distributor.

■Compact/Environment resistant type

		FP-4135
Usable liquid		Gasoline, light oil, kerosene, alcohol biofuel and general petroleum-based hydraulic oi *1
Measurement range	Flow rate	0.1 to 200 L/h
	Temperature	-30 to +100 ˚C
Accuracy	Flow rate	Within ±0.2 % of reading
	Temperature	PT100 Ω class A
Pressure loss		4 kPa or less (at 60 L/h <gasoline>)
Operating temperature	Liquid	-30 to +100 ˚C
	Ambient	-30 to +100 ˚C*2
Resolution		0.01 mL/Pulse
Port	Size	IN: Rc1/4*3 OUT: Rc1/4*3
Operating maximum pressure		8 MPa

*1 Please contact to your nearest distributor.
*2 For FP-4135, signal processing part: 0 to 70 ˚C
*3 Option joint (SAE joint) is available. Please contact to your nearest distributor.

Digital Flow Meter

FM-3100/ DF-2200 Digital Flow Meter/ On-Board Digital Flow Meter


FM-3100


DF-2200

■ Features

Digital Flow Meter FM-3100
- High-speed response at 1 ms (analog/CAN)
- Applicable to FP series Volumetric Flow Detectors, FX series Mass-Burette Flow Detector and FZ series Coriolis type Mass flow Meter.
- Equipped with the density correction function, various calculation functions

On-Board Digital Flow Meter DF-2200
- Compact body optimum for on-board testing
- Wide power input range from 12 to 24 VDC corresponding to various test vehicles
- Various options such as AC adapter, RS-232C, remote box

■ Specifications

General specifications	FM-3100	DF-2200
Applicable detectors	FP series/ FD-5110/ FX series/ FZ series * Please select the compatible module (sold separetely) with each detectors.	FP-4135/MF-3200/FP-213S/2140S/FP-5131, 5133/ FP-5141, 5143
Power source	AC100 V to 240 V ±10 % 80 VA or less (when connected to the FP-2140S and the FM-3100)	DC10 to 28 V, 28 VA or less
Operating temperature range	0 to +50 ˚C	0 to +50 ˚C *Operating temperature range of AC adapter is 0 to +40 ˚C.
Operating humidity range	10 to 85 % (without condensation)	5 to 80 %
Storage temperature range	-10 to +60 ˚C	-10 to +60 ˚C
Storage humidity range	10 to 85 % (without condensation)	5 to 85 %
Outer dimension	240 (W) × 99 (H) × 297 (D) mm *The projection is not included.	170 (W) × 49 (H) × 120 (D) mm *The projection is not included.
Weight	Approx. 3 kg	Approx. 800 g
Conforming standard	CE marking (FM-0311) LVD Directive 2014/35/EU Standard EN61010-1 EMC Directive 2014/30/EU Standard EN61326-1 ClassA Group1 RoHS Directive 2011/65/EU Standard EN50581	LVD Directive 2014/35/EU Standard EN61010-1 (with AC adapter) EMC Directive 2014/30/EU Standard EN61326-1 RoHS Directive 2011/65/EU Standard EN50581
Measurement items	Time/ temperature/ pressure Module for FP/FD: instantaneous flow rate, instantaneous density Module for FZ: instantaneous flow rate, instantaneous density Module for FX: instantaneous flow rate	Instantaneous flow rate/time / temperature/ pressure/ integrating flow rate
Accessory	AC power cable, FM-0012 analog output conversion adapter (D-Sub to BNC 0.5 m), instruction manual	DC power cable with clamp

Coriolis type Flow Meter

FZ-2200A Massflow Meter (Made to order)

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

■ Specifications

Measurement item	Flow rate, temperature, density
Measureable liquid	Gasoline, light oil, kerosene, water, general kerosene type hydraulic fluid (alcohol: option)*
Measurement range	1 to 1090 kg/h
Flow measurement accuracy	±0.1 % of reading value at 27 to 1090 kg/h Within ±(0.027 kg/h / Flow rate) × 100 % of reading (at 1 to 27 kg/h)
Density measurement accuracy	± 0.0005 g/cm^3
Pressure loss	Approx. 100 kPa/FS flow rate (when using gasoline)
Withstand pressure	10 MPa
Operating temperature range	0 to +40 ˚C
Applicable display unit	FM-3100 (FM-0321 FZ module)
Weight	Approx. 9 kg

* Gaseous fuels such as CNG, LPG are also usable (option).
Please contact to your nearest distributor.

On-Board Flow Detector

MF-3200 On-Board Flow Detector (Made to order)

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

■ Specifications

Measurement item	Flow rate, temperature, pressure
Detection method	Flow rate : Volumetric (piston method) Pressure : Semiconductor strain gauge method Temperature : Sheath type resistance temperature detector (PT100)
Measureable liquid	Light oil
Measurement range	Flow rate : 0.3 to 120 L/h Pressure : 0 to 980 kPa Temperature : 0 to +99.9 ˚C
Measurement accuracy	Flow rate : ±0.2 % of reading Pressure : ±0.5 % FS Temperature : Pt 100 Ω Class B
Operating temperature range	0 to +65 ˚C
Weight	Approx. 15 kg
Applicable display units	FM-3100 (FM-0331 Module for FP/FD) DF-2200

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

Fuel Density Meter

FD-5110 Fuel Density Meter

■ Features
- Achieves low pressure loss and high accuracy in small flow rate
- Compact and space-saving design.
- Combining with the the FP series flow detectors, the FM-3100 enables the accurate mass flow measurement

■ Specifications

Measurement items	Density, temperature
Usable liquid	Gasoline/ kerosene/ A-type heave oil/ engine oil/ common petroleum hydraulic oil/ methanol/ ethanol/ mixture of alcohol and gasoline/ brake oil, etc.
Measurement range	0.5000 to 2.0000 g/cm^3
Minimum resolution	0.0001 g/cm^3
Accuracy Density	±0.0010 g/cm^3 (Light oil, Cleansol HS at 20 ˚C)
Temperature	±0.1 ˚C
Operating temperature range	+10 to +65 ˚C (liquid temperature) −10 to +50 ˚C (ambient temperature)
Dimension	60 × 60 × 176 mm
Weight	Approx. 1.5 kg
Conforming standard	EMC Directive 2014/30/EU Standard EN61326-1 ClassA Group1 RoHS Directive 2011/65/EU Standard EN50581
Inlet/outlet port	Rc 3/8
Applicable flow meter	FM-3100 (FM-0311 FP module)

Injection Amount/ Injection Ratio Meter

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

Overview

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

Features

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

Applications

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

Measurement items

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

Combustion Analysis System

ExAngle Angle Based Measurement & Analysis Software

Overview

This high-speed angular sampling device, utilizing advanced rotation angle-based measurement technology, supports a wide range of applications including combustion analysis.

Features

- NonStop architecture that continues monitoring even during post-recording processing and saving
- Supports various fuels (liquid and gas combustion)
- User-friendly UI with excellent visibility
- Canvas function that automatically outputs image data for reports
- Sub-recording function that ensures no abnormal combustion events are missed

Specifications

● Number of pulses per revolution	360/720/3600 P/R
● Angular resolution	0.05/0.1/0.25/0.5/1.0 °
● Measureable revolution speed	0.05 °: up to 8,000 r/min, 0.1 °: up to 16,000 r/min, 0.25/0.5/1.0 °: up to 30,000 r/min *when installing optional combustion
● Specification Settings	Environmental, engine, fuel (composition weight ratio, elemental ratio)
● Automatic correction function for TDC of all cylinders	
● Analysis functions	combustion calculation, knocking, combustion noise, torque fluctuation

Software lineup

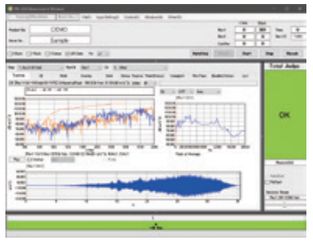
EX-2100	ExAngle Basic software
EX-0428	DS Combustion Analysis Function
EX-0436	DS Combustion Link Function
EX-0483	CAN Function
EX-0439	Knocking Expert Function

Operating environment

OS	Microsoft® Windows® 10 Pro 22H2 Microsoft® Windows® 11 Pro 22H2 or later
CPU	Intel® CoreTM i7 or higher grade, and 8th or later generation, 1.7 GHz or more base clock
Memory	Minimum 16 GB (for high speed 12ch or more, 32 GB recommended)
Interface	USB type A USB 3.0 × 3 ports or more (When using EX-0436, LAN terminal is required.)

Noise and Vibration Measurement for Automotive

GN-1200 series Noise Testing Software



Overview

This is a multifunctional and highly expandable comparator software that supports configurations from 1 channel to multiple channels. It analyzes signals such as sound, vibration, torque, rotation, and strain, detecting various abnormalities using a wide range of judgment methods. Ideal for full-unit shipment inspections of engines, motors, and other components on production lines, it contributes to automation and labor reduction.

Features

- Enables pass/fail judgment through simultaneous analysis using multiple analysis methods
- Integrates with a variety of inspection devices via LAN and DIO communication
- Monitoring via headphones is supported
- File viewer (option) for easy search and management of data files
- Auto sequence function for automating re-analysis
- Customization available, including communication protocols and generation of traceability-specific files

Specifications

Number of max. ch	Input: 42ch/Revolution: 2ch Input: 48ch/Revolution: Nil
Analysis frequency range	up to 20ch: 102.4 kHz up to 40ch: 64.0 kHz up to 48ch: 51.2 kHz
Number of analysis tracks	16 tracks + OA
Frequency analysis	FFT 6,400 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

Software & options

GN-1200	Noise Testing Software
GN-0100	ORF Input & Recalculation Function
GN-0110	Secondary Data Processing Function
GN-0120	GN Link Function (LAN)
GN-0130	File Viewer Function
GN-0140	Dual Rev Tracking Function
GN-0150	Calculation Rev Tracking Function
GN-0160	Dent Analysis Function
GN-0170	Real-time Octave Analysis Function
GN-0180	Auto Sequence Function
GN-0190	Offset Tracking Function
GN-0200	Grade Line Function
GN-0210	Stress Tracking Analysis Function
GN-0220	Torsion vibration operation function
GN-0230	Envelop Analysis Function
GN-0240	GN Link System (LAN+DIO or RS+DIO)

Operating environmenta

OS	Microsoft® Windows® 10 Pro 22H2 Microsoft® Windows® 11 Pro 22H2 or later
CPU	Intel® CoreTM i7 or higher grade, and 8th or later generation, 3.0 GHz or more base clock
Memory	Minimum 16 GB
Interface	USB type A USB 3.0 × 1 port or more (When connecting to DS-5000, LAN terminal is required.)

Crank Angle Measurement Equipment

CP-5730 Crank Angle Detector

Features

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

Specifications

Applicable amplifier	CA-6000/A/B
Output signal	Z, A
Number of output pulses	1 P/R (Z), 720 P/R (A)
Rotational speed range	0 to 15,000 r/min
Vibration resistance	Radial direction : 500 m/s² Thrust direction: 500 m/s²
Operating temperature range	0 to +120 ˚C
Cable	Optical fiber cable 5 m (directly attached)
Rotation stop	CP-0610/ 0600A
Outer dimensions	Outside diameter: 57 mm Thickness : 38 mm
Weight	Approx. 750 g (including optical fiber cable)

CA-6000B Crank Angle Amplifier

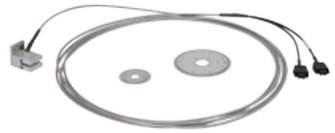
Features

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

Specifications

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

CP-5110B Fiber Optic Crank Angle Detector



System configuration

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

Features

- High accuracy crank angle measurement by using with the CA-6000 crank angle amplifier
- No bearings, therefore low rotation load
- Small protrusion at shaft end, space saving installation
- Optical fiber offering high resistance to noise
- Optional fiber cable enables extension up to 5 m (IX-041) or 10 m (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/s²
Operating temperature range	0 to +100 ˚C
Cable	Optical fiber cable 5 m directly attached (with stainless flexible tube)
Outer dimensions/ Weight	CP-5110B: 30 (W) × 42.5 (H) × 35 (D) mm/ Approx. 270 g CP-5120: φ52, t2.2 mm/ Approx. 20 g CP-5130: φ94, t2.2 mm/ Approx. 80 g

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

PA-500A

PP-932

System configuration

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

Features

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

Specifications

Number of output pulses	360 P/R (A) & 1 P/R (Z)
Response frequency	DC to 80 kHz
Rotation speed range	0 to 6,000 r/min
Output signal voltage	Hi: +4.5 V or more, Lo: +0.2 V or less
Operating temperature range	Sensor part : 0 to +65 ˚C, Amplifier part: 0 to +40 ˚C
Power supply	100 to 240 VAC, 50/60 Hz

● PP-010A specifications

Material	Stainless
Diameter	φ200 mm
Resistant acceleration	Approx. 200 m/s²
Outer dimensions / Weight	PP-932: 30 (W) × 55 (H) × 47 (D) mm/ Approx. 250 g PA-500A: 200 (W) × 100 (H) × 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)

PA-500A

PP-933

System configuration

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

Features

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

Specifications

Number of output pulses	720 P/R (A), 1 P/R (Z)
Response frequency	DC to 80 kHz
Rotation speed range	0 to 6,000 r/min
Output signal voltage	Hi: +4.5 V or more, Lo: +0.2 V or less
Operating temperature range	Sensor part : 0 to +65 ˚C, Amplifier part: 0 to +40 ˚C
Power supply	100 to 240 VAC, 50/60 Hz

● PP-011B specifications

Material	Stainless
Diameter	φ200 mm
Resistant acceleration	Approx. 200 m/s²
Outer dimensions / Weight	PP-933 : 30 (W) × 55 (H) × 47 (D) mm/ Approx. 250 g PA-500A: 200 (W) × 100 (H) × 135 (D) mm (not including protruded section)/ Approx. 1.2 kg

Driving performance measurement system

LC-8300A GPS Speedometer

■ Features
- Significantly improved satellite acquisition performance enables stable measurements not only on proving grounds, but also in urban areas and under overpasses.
- By correcting the velocity information from GPS by IMU, stable measurement is realized even in environments where radio wave reception is unstable.
- The GPS antenna can be installed inside the vehicle.
- Test results are recorded in the built-in storage or USB memory.
- Improved visibility and operability with a touch panel display.
- JCSS calibration conforming to IATF 16949.

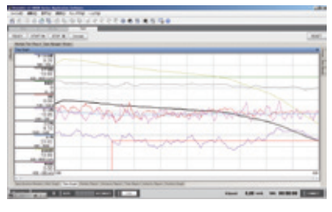
■ Specifications

Measurement range	0.1 to 500.0 km/h
Accuracy (Horizontal speed)	±0.1 km/h
Accuracy (Horizontal distance)	±0.10 % ±0.05 % (when using the High-Sensitive IMU)
Update frequency	100 Hz
Voltage input	4ch, ±20 V, 16 bit
Pulse input	1ch, sine wave or square wave
CAN input	2 input port, 32ch/1 port
External Trigger Input	Selectable from no-voltage contact/voltage contact
Digital output	Selectable from Gate output/Velocity determination output
Speed analog output	0 to 10 V/0 to 500 km/h
Distance pulse output	Selectable from 10, 5, 1 mm/pulse
Power requirement	DC 9 to 28 V, AC 100 to 240 V
Outer dimensions (main unit)	Approx. 170 × 120 × 40 mm (not including protruded section)
Weight (main unit)	Approx. 750 g

■ Option

LC-0092	Inertial Measurement Unit (IMU)
LC-0855	High-Sensitive IMU
LC-0856	White mark detection sensor
LC-0864	Tape switch
LC-0082	Power supply clip for battery
PS-P20023	AC adapter
LC-0860	CAN cable
LC-0861	CAN terminal register adapter
LC-0866	Auxiliary input/output cable
DPU-S445-00C-E	Mobile printer
LC-0824	Km/Mile Selection function
LC-0836	IMU data Output function
LC-0826	Vertical Direction Measurement function
LC-0854	CAN Output function
LC-0827	Hardware Acceleration Test function for Standalone Test Mode
LC-0828N	Hardware Brake Test function for Standalone Test Mode
LC-0829N	Hardware Coastdown Test function for Standalone Test Mode
LC-0831	Acceleration/Deceleration Test function for PC Test Mode
LC-0832	Fuel Consumption Test function for PC Test Mode
LC-0833	Orbit Display function for PC Test Mode

LC-0831 Acceleration/Deceleration Test Software

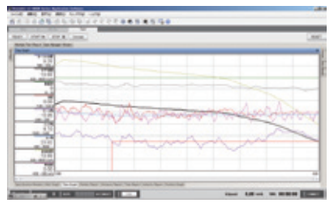


■ Overview
This is the software for acceleration/ deceleration tests on a straight line such as starting-acceleration test, passing-acceleration test, brake test, coasting test. Creates a report on the basis of speed, time and distance.

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

■ Operating environment
Same as the software for GPS speedometer

LC-0832 Fuel Consumption Test Software

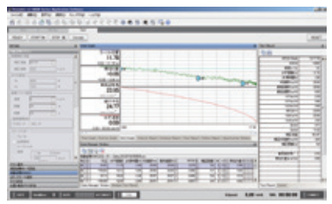


■ Overview
This is the software for level ground fuel consumption test, and pattern fuel consumption test. Input the pulse of DF-210B/DF-2200 On-board Digital Flow Meter to the pulse input unit, and calculate, display, and record the fuel consumption from the obtained data and driving data.

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

■ Operating environment
Same as the software for GPS speedometer

LC-0833 Orbit display software



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

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

■ Operating environment
Same as the software for GPS speedometer

Calibration Service

Calibration Service System

Ono Sokki provides reliable and high level calibration as a measuring instrument manufacturer based on the skills and know-how which has been acquired through many years of practice to meet ISO 9001 Quality System and the general requirements for the competence of calibration. ISO/IEC 17025.
Ono Sokki is registered, accredited by NITE (National Institute of Technology and Evaluation) under 7 scopes based on the JCSS of calibration laboratory accreditation system enforced by Measurement Law, article 143.

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

Ono Sokki Quality Assurance group is accredited as Accredited Calibration Laboratories to meet MRA.
JCSS 0170 is the accreditation number.

JCSS system applicable products

Acoustics/Ultrasound (Dec 2005)
- Sound level meters
- Measurement microphones
- Sound calibrators

Acceleration (Dec 2012)
- Accelerometer detectors
- Calibrator for accelerometers

Torque (Oct 2018)
(calibration range: 1 to 5,000 N・m)
- Torque detectors

Time & Frequency & Rotational speed (Dec 2020)
(calibration range: 0.5 to 100,000 r/min)
- Tachometers
- Rotation detectors

Electricity (Jun 2015)
(Direct current・Low frequency)
- FFT Analyzers

Speed (Mar 2019)
- Vehicle speed meters

Fluid flow (Nov 2014)
- Fuel flow meters
  (diesel, industrial gasoline)

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

Quality Assurance

Establishment of Quality Assurance

In line with our policy on quality, which aims to "Continue to provide satisfaction and security from the customer's perspective", Ono Sokki has been establishing quality control activities on a corporate-wide scale. As a result of these activities, Technical Center/head office have been certified as conforming to the ISO 9001 Quality System.
Ono Sokki not only aims to maintain this certification, but will also strive to improve and enhance its quality assurance system, based on ISO 9001 Quality System in order to continually deliver better quality products to customers. As a result of our achievements, Ono Sokki has been named Japan's first official supplier of sound level meter as Accredited Calibration Laboratory since September 1997.

Traceability

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

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

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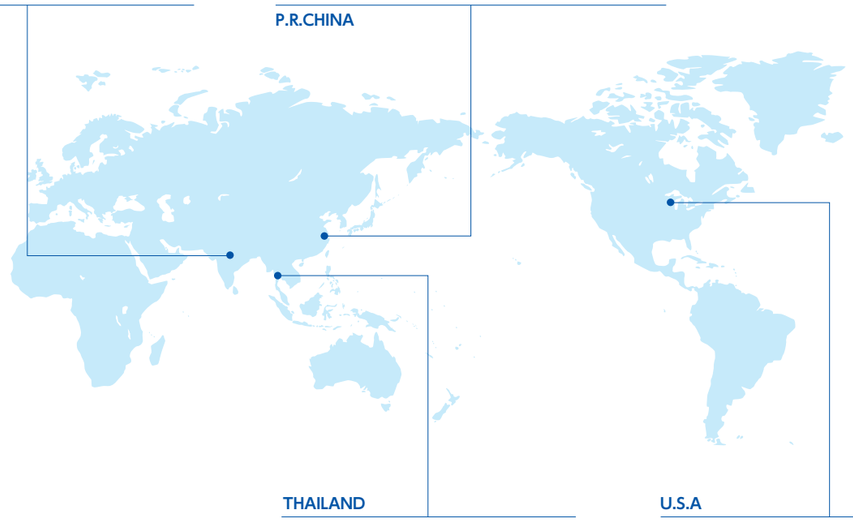

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