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HONDA ELECTRONICS CO., LTD.
Industrial Equipment Division

Ultrasonics

Cleaners / Processing Tools / Measuring Instruments
General Catalog

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Ultrasonic cleaners

Ultrasonic cleaning

Ultrasonic cleaning technology removes fine particles of dust and contamination from objects (workpieces) that are submerged in water or solvent, by subjecting them to ultrasonic waves.

- **The cleaning effects are achieved by combining the "physical effects" of ultrasonic waves with the "chemical effects" of the cleaning liquid.**
- **Physical effects**
  Effects such as cavitation, vibrational acceleration, and rectilinear flow can remove, disperse, and emulsify the contamination.
- **Chemical effects**
  The chemical effects of the cleaning liquid, along with the acceleration of chemical reactions by ultrasonic waves, can dissolve and degrade the contamination.

Low frequency cleaning

■Separate type ▶page8～
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High frequency cleaning

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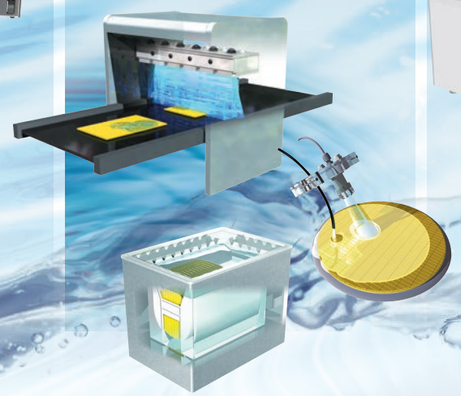


Sonic monitor

▶page16

Low frequency cleaning

Pressure impact by cavitation is effective for cleaning persistent contamination.

■Separate type
Mainly used for general industrial applications.
Custom, made-to-order transducer units are also available.
■Benchtop type
Suitable for cleaning small quantities of small-sized items.
Can also be used as test cleaning machines in facilities such as laboratories.

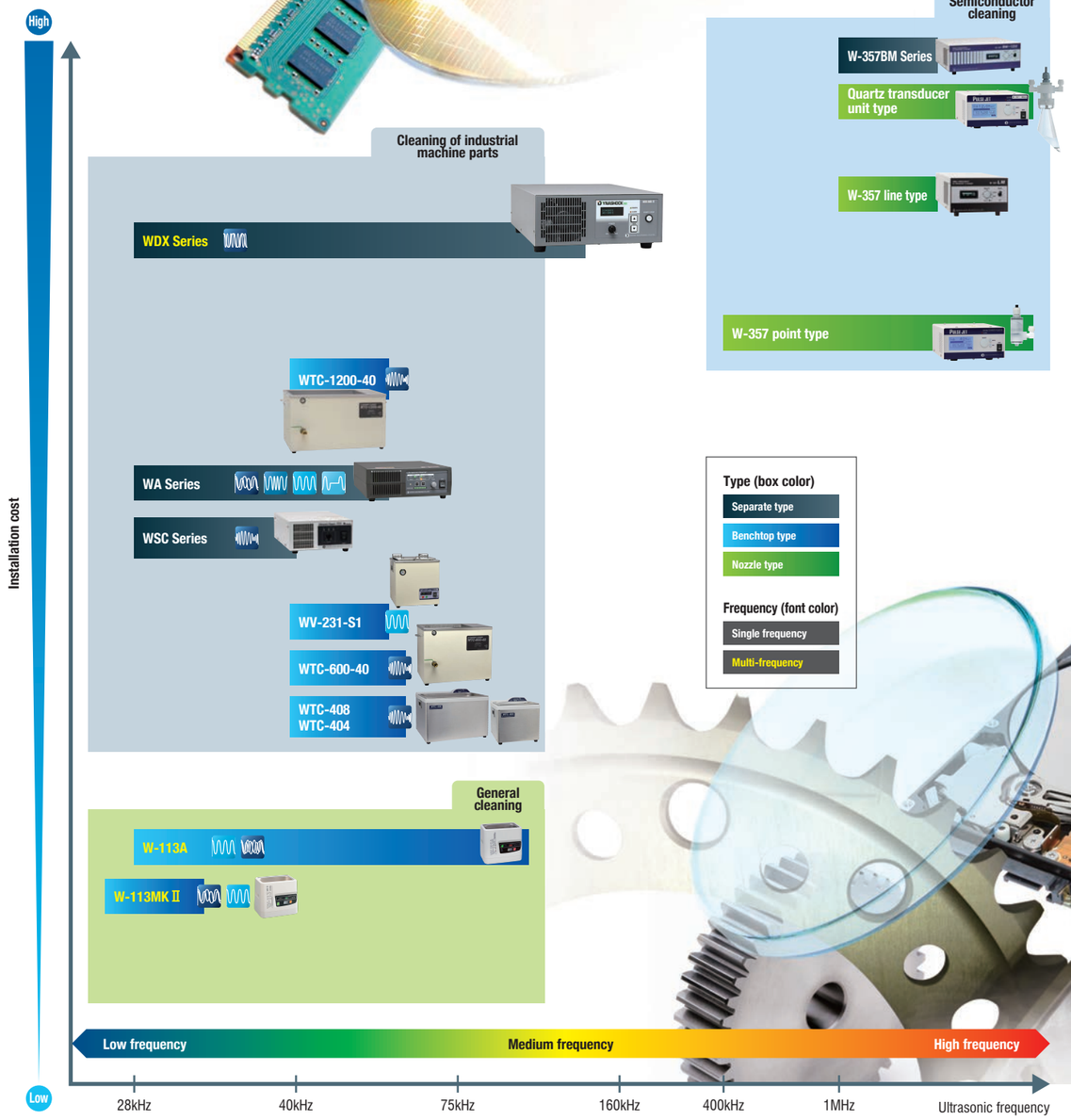
High frequency cleaning

Vibrational acceleration and rectilinear flow enable the removal of submicron size particles without damaging the workpiece, making this method suitable for precision or ultra-precision cleaning of silicon wafers (for semiconductors), glass masks, LCD glass substrate, and HDD.

Sonic monitor

Useful for checking the oscillation status of ultrasonic cleaners in daily inspections, by displaying the relative values.

Lineup of ultrasonic cleaners



★Installation costs vary depending on the choice of transducer unit, output, etc.

Types of oscillation modes

Adjacent dual-frequency switching oscillation mode (DUAL)
- The pumping effect makes this mode suitable for cleaning inside fine tubes or through-hole boards.
- The area of cavitation is not stationary, and ultrasonic waves propagate farther.

Single frequency oscillation mode (SINGLE)
- Strong cavitation is generated, making this mode suitable for removing persistent contamination.

Multi-oscillation mode (MULTI)
- The 28 kHz frequency is suitable for cleaning persistent contamination, 45 kHz is effective at cleaning fine parts, and 100 kHz enables superfine cleaning with minimal damage. To prevent standing waves that result in uneven cleaning, the oscillations at these three frequencies are repeated sequentially.

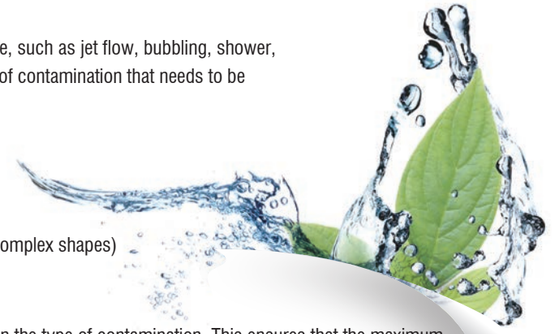
FM oscillation mode (F.M.)
- Ultrasonic frequency modulation makes it possible to move the position of standing waves, resulting in cleaning that is more uniform.
- The cavitation position changes, preventing damage to the workpiece.

Pulse oscillation mode (PULSE)
- The single-frequency intermittent pulse output enables gentle cleaning, and the reduced ultrasonic attenuation facilitates degassing.

DYNASHOCK modulation (DM)
- This type of oscillation achieves optimal cleaning power, with two frequencies simultaneously transmitted at a specific ultrasonic power ratio.

FM + AM modulation (FM+AM)
- Ultrasonic waves are distributed uniformly with low power consumption.
  Unevenness is minimized in this mode, which is effective at responding to load fluctuations due to the workpieces, liquid type, and liquid depth.

In addition to ultrasonic cleaning, there are other industrial cleaning methods available, such as jet flow, bubbling, shower, agitation, and vapor cleaning. Cleaning methods are selected according to the types of contamination that needs to be removed from the workpieces, and the cleaning characteristics that are required.



The characteristics of ultrasonic cleaning are:

- Uniform cleaning quality
- Reduced cleaning time
- Ability to clean all parts of items (particularly suitable for fine parts or parts with complex shapes)

■Selecting the ultrasonic cleaner

In ultrasonic cleaning, it is important to select the appropriate cleaning liquid based on the type of contamination. This ensures that the maximum cleaning effects can be achieved by the combination of the physical effects of the ultrasonic waves and the chemical effects of the cleaning liquid.

Consider the points listed below when selecting the ultrasonic cleaner.
(1) Purpose of cleaning/Type of contamination·····Degreasing, removing abrasive material or particles, etc.
(2) Type of workpiece·····Material, size (including basket size, if basket is used), etc.
(3) Type of ultrasonic cleaner·····Separate type, benchtop type, quartz vibration unit type, nozzle type

* Before selecting the ultrasonic cleaner, it is important to determine which processes to incorporate into your cleaning system. At a minimum, the overall cleaning system must include the three processes of "cleaning" → "rinsing" → "drying". Benchtop cleaners are only capable of performing the "cleaning" process, so it is necessary to consider how the subsequent processes of "rinsing" and "drying" will be performed.

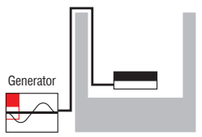
Selecting the frequency

	Frequency	Contamination	Applications	Damage	Characteristics
Low	28kHz	Oil, visible contamination, large contamination	Degreasing metal parts, degreasing resin parts	Big	Used to remove persistent contamination such as grease, due to the strong cleaning energy. Enhances the effectiveness of the cleaning liquid.
	40kHz	Contamination over 10 μm, dust	Initial cleaning of LCD glass, cleaning precision metal parts		Often used to clean precision parts, since there is less damage to the workpiece than at 28 kHz.
	75kHz ~ 100kHz	Over 5 μm - 10 μm	Cleaning HDD, CSP boards, precision metal parts, optical disks, HD heads		Often used if there is damage to the workpiece at 40 kHz. This frequency has recently gained attention due to the relatively strong cleaning energy and less damage to the workpiece.
	120kHz ~ 160kHz	1 μm - 10 μm	Compound wafers, HDD		Used to perform initial cleaning of wafers. Possible to remove fine contamination with minimal damage to the workpiece.
	400kHz	0.2 μm~5 μm	Silicon wafers, glass wafers, glass substrate		May be suitable for various types of precision cleaning, due to the ability to remove a wide range of particle sizes.
	1MHz	0.2 μm - 1 μm	Final cleaning of glass substrate, silicon wafers (with circuit), glass masks		Used to remove small particles that are not visible to the naked eye. Less damage to the workpiece. Widely preferred as the frequency to use for wafer cleaning.
High	3MHz	Below 0.2 μm	Silicon wafers (with circuit), glass masks	Small	Used to remove finer particles than at 1 MHz.

■Selecting the type of ultrasonic cleaner

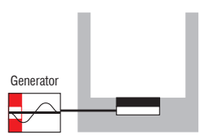
●Separate type

Separate type ultrasonic cleaners consist of an oscillator and transducer unit. Various combinations can be selected to suit the application, facility, and purpose.



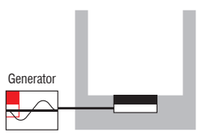
N type

Combination of generator and transducer unit that is immersed in the tank. Can be used with the customer's existing cleaning tank.



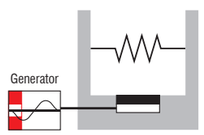
F type

Combination of generator and vibration plate type transducer unit. Can be incorporated into existing equipment.



S type

Combination of generator and special cleaning tank. Easy to set up and start using.

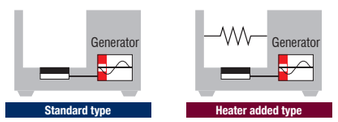


SH type

S type cleaner with heater. The effects of warm water achieve stronger cleaning power.

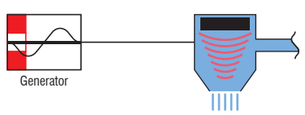
●Benchtop type

Compact all-in-one unit is easy to set up.



●Nozzle type

Cleaning is performed using water flow with high frequency ultrasonic waves.



●Quartz transducer unit type

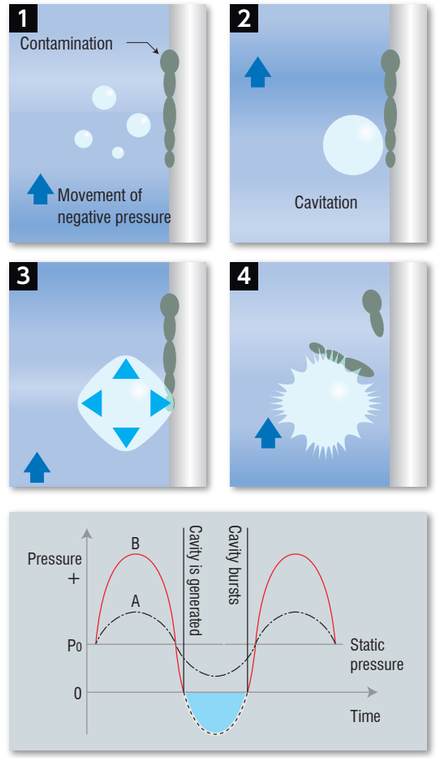
Ultrasonic waves are applied to the quartz transducer unit, which is used to clean semiconductor wafers.

Low / medium frequency cleaning

Explanation

Cavitation

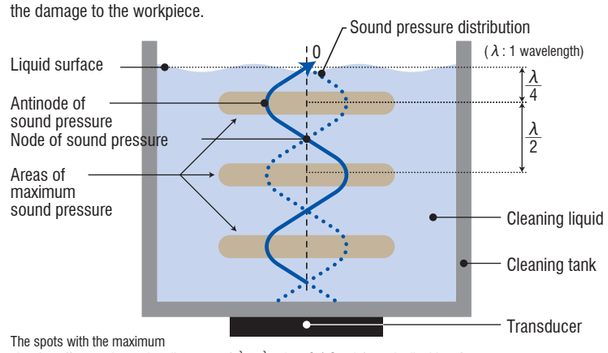
Countless gas molecules exist in liquid. When powerful ultrasonic waves are emitted in liquid at frequencies of 20 kHz to 100 kHz, alternating cycles of positive and negative pressure are applied to the gas molecules. The positive pressure compresses the gas molecules, and the immediately following negative pressure causes them to expand dramatically. The gas molecules reach a very high pressure when they are compressed repeatedly through this process, and they collapse when the limit is reached. This phenomenon of generating extremely high-impact pressure is called cavitation. The shock waves that are created when bubbles burst act to separate contamination from the workpiece. This is called the cavitation effect.
In an ultrasonic cleaner, the way that cavitation is generated varies depending on the depth and type of liquid. It is therefore essential to control these conditions in order to ensure proper ultrasonic cleaning. For example, if it appears that cavitation is lingering on the vibration surface, the ultrasonic waves are not being generated effectively in the liquid, and damage to the vibration surface (erosion), which causes deterioration of the vibration plate, is accelerated. In this situation, a slight change to the liquid depth can improve the efficiency of cavitation, enabling more effective ultrasonic cleaning.



***Erosion**
Erosion is a phenomenon whereby the surface of soft material such as aluminum is worn away by the physical power that is generated by the ultrasonic cavitation phenomenon (at high local temperatures of 5,000 K or greater, and high local pressures of approximately 1,300 atmospheres or greater). The amount of erosion that occurs is directly proportional to the strength of the ultrasonic waves, and inversely proportional to the frequency.

Standing waves (uneven cleaning)

When ultrasonic waves are emitted, standing waves occur in the liquid according to the frequency. These standing waves, which result in spots where the cleaning effect is strong, are located at distances that are an integral multiple of $\lambda/2$. (λ is one wavelength.)
Although standing waves have strong cleaning power, they also have the potential to damage the workpiece. To minimize the undesirable effect of standing waves, it is possible to take measures such as agitating the workpiece or using multiple frequencies.
It is necessary to carefully consider the balance between the cleaning effect and the damage to the workpiece.



The spots with the maximum cleaning effect are located at distances of $\frac{\lambda}{4}+\frac{\lambda}{2}n$ (n= 0,1,2,···) from the liquid surface.

1 wavelength = Acoustic velocity ÷ Frequency

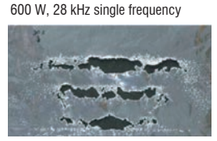
$$\left(\lambda=\frac{c}{f}\right)$$

λ : wavelength (m)
c : Acoustic velocity (m/s)
f : Frequency (Hz)
※c···For water : 1,500m/s

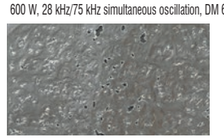
When the frequency is 40 kHz, one wavelength is calculated as:
1,500,000 (mm/s) ÷ 40,000 (Hz) = 37.5 (mm)
The standing wave interval is calculated as: 37.5 mm ÷ 2 = approx. 19 mm
In other words, an area of strong cleaning effect is located at each 19 mm interval.

■Comparison using aluminum foil

600 W, 28 kHz single frequency



WDX-600- Ⅰ
600 W, 28 kHz/75 kHz simultaneous oscillation, DM 60%



DYNASHOCK 超音波洗浄 TM

WDX Series

Low/medium frequency separate type

Patented

Strike a balance between uniform cleaning and minimal damage, and adjust the cleaning strength, from gentle to powerful, to best suit your application

WDX-600-I
WDX-1200-I

WDX-600-Ⅱ

DYNASHOCK® Modulation (DM) mode

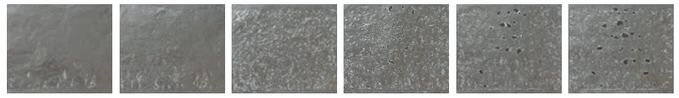
In DYNASHOCK® Modulation (DM) mode, two frequencies are simultaneously transmitted from a transducer at a specific total output power. The frequency component ratios of the two frequencies can be controlled by setting the DM modulation ratio (0 to 100%). This enables you to adjust the cleaning strength, from gentle to powerful, to achieve the optimum cleaning effect for your application.

* DYNASHOCK® is the registered trademark of Honda Electronics Co., Ltd.
In Japan, China and Europe under the EUTM.

Evaluation of DM modulation ratios using aluminum foil

(Using WDX-600-I with output at constant 600 W)

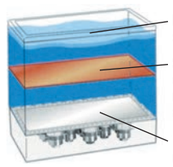
Toward liquid surface ⇕ Toward transducer

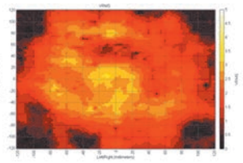


DM 0% DM 20% DM 40% DM 60% DM 80% DM 100%

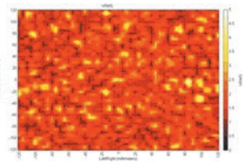
Gentle cleaning — Powerful cleaning

●By selecting the DM modulation ratio, uniform ultrasonic waves can be generated uniformly throughout the tank with high sound pressure. This enables cleaning to be performed evenly.





Sound pressure distribution with conventional mode



Sound pressure distribution with DM mode (WDX-600-I)

●The digital control system enables a variety of functions.

Optimum cleaning
Optimum frequency control and ultrasonic output control enable stable ultrasonic cleaning.

Easy maintenance
The auto-tuning function eliminates the need to calibrate the generator when the transducer unit is replaced.

Monitoring function
The front panel display shows the output power, which is one of the factors to monitor when controlling the ultrasonic cleaning unit.

Supports a wide range of power input
Power sources from 200 to 240 V AC are supported.

Abnormality diagnosis function
When an abnormality occurs, an error message is displayed to indicate the cause, thereby enabling a quick response.

Sweep function
The DM frequency sweep function enables ultrasonic cleaning to be performed more evenly.

Generator

Model No.	WDX-600-I	WDX-1200-I	WDX-600-Ⅱ
Oscillation mode	DYNASHOCK Modulation (DM) mode (modulation ratio: 0 to 100%) + Sweep function		
Rated output	600 W	1200 W	600 W
Nominal oscillation frequency	28 kHz & 75 kHz		40 kHz、120 kHz
Power input	200 V - 240 V AC Single phase 50/60 Hz 1200 VA	200 V - 240 V AC Single phase 50/60 Hz 2400 VA	200 V - 240 V AC Single phase 50/60 Hz 1450 VA
Dimensions (W x D x H mm)	330 x 462 x 148 (including rubber feet)		
Weight	11 kg	12 kg	11 kg

• **I/O interface** **Remote function:** Ultrasonic oscillation ON/OFF (contact input),
Output function: Alarm output when error occurs (Relay contact output: Open when error occurs)
• **Variable output range:** 0 - 100% • **Display function:** Power output (W), DM modulation ratio (%), error messages
• **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 5 to 80% (no condensation)
• **Power cable length:** 3.5 m • **Outline drawing** ▶Page25

■ **Transducer unit**

Powerful, high-efficiency ultrasonic cleaner, equipped with our own bolt-clamped Langevin type transducer

The transducer unit uses bolt-clamped Langevin type transducers with high electro-acoustic conversion efficiency and excellent durability.
Standard specifications that meet various frequencies and output power are available.

Generator + Transducer unit

Transducer units can be manufactured with custom specifications, such as decompression, upon request.

■ Immersible type

N TYPE | Immersible type

Model No.	N06-DX1	N12-DX1	N06-DX2
Generator Model No.	WDX-600-I	WDX-1200-I	WDX-600-Ⅱ
Maximum allowable input	600 W	1200 W	600 W
Nominal oscillation frequency	28 kHz、75 kHz		40 kHz、120 kHz
Effective cleaning area (W x Dmm)	350 x 200	420 x 300	350 x 200
Dimensions (W x Dmm)	350 x 200 x 100	420 x 300 x 100	350 x 200 x 75
Material	Case: SUS304 (SUS316L is available for custom orders)		
Weight	14 kg	18 kg	11 kg

• **Liquid temperature range**: 5 to 80°C • **Transducer**: Bolt-clamped Langevin type transducer
• **Transducer cable length**: 2.5 m (blade part: 2 m) + Output cable length 3.5 m • **Outline drawing** ▶Page26

■ Vibration plate type

F TYPE | Vibration plate type

Model No.	F06-DX1	F12-DX1	F06-DX2
Generator Model No.	WDX-600- I	WDX-1200- I	WDX-600- Ⅱ
Maximum allowable input	600 W	1200 W	600 W
Nominal oscillation frequency	28 kHz、75 kHz		40 kHz、120 kHz
Effective cleaning area (W x Dmm)	350 x 200	420 x 300	350 x 200
Dimensions (W x Dmm) (wires not included)	390 x 240 x 83 t=3 mm	460 x 340 x 83 t=3 mm	390 x 240 x 57 t=3 mm
Material	Board: SUS304 (SUS316L is available for custom orders) Packing: EPDM, t=3 mm (Viton and other materials are available for custom orders)		
Weight	10 kg	16 kg	8 kg

• **Accessories**: 2 types of holding fittings, 2 types of packing (EPDM), nuts
• **Liquid temperature range**: 5 to 100°C • **Transducer**: Bolt-clamped Langevin type transducer
• **Transducer cable length**: 3.5 m + Output cable length 3.5 m • **option**: Oscillator cover • **Outline drawing** ▶Page26

■ Tank type

S TYPE | Tank type

Model No.	S06-DX1	S12-DX1	S06-DX2
Generator Model No.	WDX-600- I	WDX-1200- I	WDX-600- Ⅱ
Maximum allowable input	600 W	1200 W	600 W
Nominal oscillation frequency	28 kHz、75 kHz		40 kHz、120 kHz
Effective cleaning area (W x Dmm)	370 x 250	500 x 300	370 x 250
Dimensions (W x Dmm)External:	422 x 302 x 405 (including rubber feet)	550 x 350 x 402 (including rubber feet)	422 x 302 x 405 (including rubber feet)
Inside tank:	370 x 250 x 250 (23 L)	500 x 300×250 (35 L)	370 x 250 x 250 (23 L)
Material	Tank: SUS304 (SUS316L is available for custom orders)		
Weight	22 kg	39 kg	19 kg

■ **Included accessory:** Lid
• **Liquid temperature range**: 5 to 100°C • **Transducer**: Bolt-clamped Langevin type transducer
• **Transducer cable length**: 3.5 m • **Outline drawing** ▶Page26 • **Option:** Cleaning basket (KG10F / KG11T) ▶Page44

■ Tank type with heater

SH TYPE | Tank type with heater

Model No.	SH06-DX1	SH12-DX1	SH06-DX2
Generator Model No.	WDX-600- I	WDX-1200- I	WDX-600- Ⅱ
Maximum allowable input	600 W	1200 W	600 W
Nominal oscillation frequency	28 kHz、75 kHz		40 kHz、120 kHz
Heater	200 V AC Single phase 50/60 Hz 2 kW	200 V AC Single phase 50/60 Hz 3 kW	200 V AC Single phase 50/60 Hz 2 kW
Effective cleaning area (W x Dmm)	370 x 250	500 x 300	370 x 250
Dimensions (W x Dmm)External:	580 x 310 x 406 (including rubber feet)	710 x 360 x 405 (including rubber feet)	580 x 310 x 406 (including rubber feet)
Inside tank:	370 x 250 x 250 (23 L)	500 x 300 x 250 (35 L)	370 x 250 x 250 (23 L)
Material	Tank: SUS304 (SUS316L is available for custom orders)		
Weight	28 kg	46 kg	25 kg

■ **Included accessory:** Lid
• **Liquid temperature range**: 5 to 100°C • **Transducer**: Bolt-clamped Langevin type transducer
• **Transducer cable length**: 3.5 m • **Outline drawing** ▶Page27 • **Option:** Cleaning basket (KG10F / KG11T) ▶Page44
* The heater is designed for use with water. Do not use with liquids other than water. A separate power supply is required for the heater.

WA Series

WA-600-28
WA-600-40
WA-1200-28
WA-1200-40

Low frequency separate type

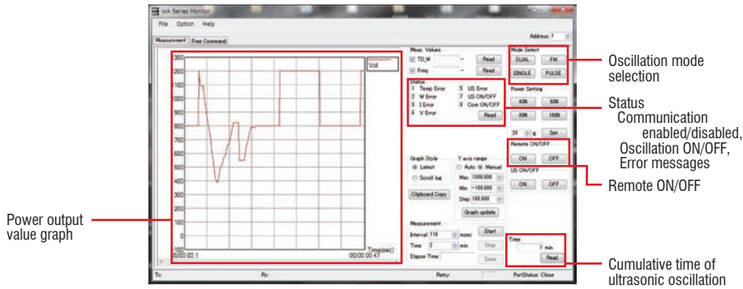
New standard model of ultrasonic cleaner with communication functions that support day-to-day management

selectable

RS-485 communication function

RS-485 communication (MODBUS® RTU) enables you to configure various settings and check the operating status.
The frequency and output power settings, as well as the oscillation status, can be read out, which can be used in preventive maintenance.

* MODBUS is the registered trademark of Schneider Electric USA, Inc.



Optimum and stable cleaning

The digital control system enables automatic frequency tracking and constant power output, which ensures that ultrasonic wave oscillation is performed at the optimum frequency with stable and constant output in response to fluctuations in the load, such as the liquid depth, liquid temperature, liquid type, decompression status, and workpiece status. As a result, optimum cleaning is achieved.

Easy maintenance

When the transducer unit is replaced by one with the same specifications, there is no need to calibrate the generator. When an abnormality occurs with the generator, the cause is diagnosed and the corresponding error is indicated by one of the six different LED lamp illumination patterns on the front panel.

Generator

Model No.		WA-600-28T	WA-600-40T	WA-1200-28T	WA-1200-40T
Oscillation mode		Adjacent dual-frequency switching oscillation (DUAL) FM oscillation (FM) Single frequency oscillation (SINGLE) Pulse oscillation (PULSE)			
Rated output	DUAL,FM	400 W		800 W	
	SINGLE	600 W		1200 W	
	PULSE	600 W		1200 W	
Nominal oscillation frequency		28 kHz	40 kHz	28 kHz	40 kHz
Power input		Selectable (at time of ordering) from 200 V , 220 V, 230 V, 240 V AC Single phase 50/60 Hz 1200 VA		Selectable (at time of ordering) from 200 V , 220 V, 230 V, 240 V AC Single phase 50/60 Hz 2400 VA	
Interface	Analog output	4 to 20 mA current output			
	Contact output	2 contacts Alarm output, Oscillation detection output			
	External drive input	Ultrasonic oscillation ON/OFF (contact input)			
	RS-485 communication	MODBUS (RTU) protocol *1			
Dimensions (W x D x H mm)		336 x 400 x 125 (including rubber feet)			
Weight		6 kg			

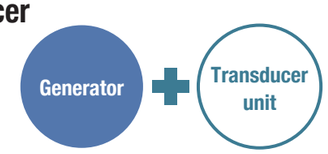
- **DUAL/FM frequency modulation width:** Central frequency ±1 kHz
- **Variable output range:** 20 - 100% • **Output display:** LED level indicator (responds to output)
- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 5 to 80% (no condensation)
- **Power cable length:** 3.5 m • **Outline drawing** ▶Page25

*1 RS-485 communication enables you to configure various settings and check the operating status.

■ Transducer unit

Powerful, high-efficiency ultrasonic cleaner, equipped with our own bolt-clamped Langevin type transducer

The transducer unit uses bolt-clamped Langevin type transducers with high electro-acoustic conversion efficiency and excellent durability.
Standard specifications that meet various frequencies and output power are available.



Transducer units can be manufactured with custom specifications, such as decompression, upon request.

■ Immersible type

N TYPE | Immersible type

Model No.	N06-28A	N06-40A	N12-28A	N12-40A
Generator Model No.	WA-600-28T	WA-600-40T	WA-1200-28T	WA-1200-40T
Maximum allowable input	600 W		1200 W	
Nominal oscillation frequency	28 kHz	40 kHz	28 kHz	40 kHz
Effective cleaning area (W x Dmm)	350 x 200		420 x 300	
Dimensions (W x Dmm)	350 x 200 x 100	350 x 200 x 75	420 x 300 x 100	420 x 300 x 75
Material	Case: SUS304 (SUS316L is available for custom orders)			
Weight	14 kg	11 kg	18 kg	14 kg

- **Liquid temperature range**: 5 to 80°C • **Transducer**: Bolt-clamped Langevin type transducer
- **Transducer cable length**: 2.5 m (blade part: 2 m) + Output cable length 3.5 m • **Outline drawing** ▶Page26

■ Vibration plate type

F TYPE | Vibration plate type

Model No.	F06-28A	F06-40A	F12-28A	F12-40A
Generator Model No.	WA-600-28T	WA-600-40T	WA-1200-28T	WA-1200-40T
Maximum allowable input	600 W		1200 W	
Nominal oscillation frequency	28 kHz	40 kHz	28 kHz	40 kHz
Effective cleaning area (W x Dmm)	350 x 200		420 x 300	
Dimensions (W x Dmm) (wires not included)	390 x 240 x 83 t=3 mm	390 x 240 x 57 t=3 mm	460 x 340 x 83 t=3 mm	460 x 340 x 57 t=3 mm
Material	Board: SUS304 (SUS316L is available for custom orders) Packing: EPDM, t=3 mm (Viton and other materials are available for custom orders)			
Weight	10 kg	8 kg	16 kg	13 kg

- **Accessories**: 2 types of holding fittings, 2 types of packing (EPDM), nuts
- **Liquid temperature range**: 5 to 100°C • **Transducer**: Bolt-clamped Langevin type transducer
- **Transducer cable length**: 3.5 m + Output cable length 3.5 m • **option**: Oscillator cover • **Outline drawing** ▶Page26

■ Tank type

S TYPE | Tank type

Model No.	S06-28A	S06-40A	S12-28A	S12-40A
Generator Model No.	WA-600-28T	WA-600-40T	WA-1200-28T	WA-1200-40T
Maximum allowable input	600 W		1200 W	
Nominal oscillation frequency	28 kHz	40 kHz	28 kHz	40 kHz
Effective cleaning area (W x Dmm)	370 x 250		500 x 300	
Dimensions (W x Dmm)External:	422 x 302 x 405 (including rubber feet)		550 x 350 x 402 (including rubber feet)	
Inside tank:	366 x 246 x 248 (23 L)		500 x 300 x 250 (deepest section) to 224 (shallowest section) (35 L)*1	
Material	Tank: SUS304 (SUS316L is available for custom orders)			
Drain valve	Rc 1/2		Rc 3/4	
Weight	22 kg	19 kg	39 kg	34 kg

- **Included accessory:** Lid
- **Liquid temperature range**: 5 to 100°C • **Transducer**: Bolt-clamped Langevin type transducer
- **Transducer cable length**: 3.5 m • **Outline drawing** ▶Page26 • **Option:** Cleaning basket (KG10F / KG11T) ▶Page44

■ Tank type with heater

SH TYPE | Tank type with heater

Model No.	SH06-28A	SH06-40A	SH12-28A	SH12-40A
Generator Model No.	WA-600-28T	WA-600-40T	WA-1200-28T	WA-1200-40T
Maximum allowable input	600 W		1200 W	
Nominal oscillation frequency	28 kHz	40 kHz	28 kHz	40 kHz
Heater	200 V AC Single phase 50/60 Hz 2 kW		200 V AC Single phase 50/60 Hz 3 kW	
Effective cleaning area (W x Dmm)	370 x 250		500 x 300	
Dimensions (W x Dmm)External:	580 x 310 x 406 (including rubber feet)		710 x 360 x 405 (including rubber feet)	
Inside tank:	370 x 250 x 250 (23 L)		500 x 300 x 250 (deepest section) to 224 (shallowest section) (35 L)*1	
Material	Tank: SUS304 (SUS316L is available for custom orders)			
Drain valve	Rc 1/2		Rc 3/4	
Weight	28 kg	25 kg	46 kg	40 kg

- **Included accessory:** Lid
- **Liquid temperature range**: 5 to 100°C • **Transducer**: Bolt-clamped Langevin type transducer
- **Transducer cable length**: 3.5 m • **Outline drawing** ▶Page27 • **Option:** Cleaning basket (KG10F / KG11T) ▶Page44

* The heater is designed for use with water. Do not use with liquids other than water. A separate power supply is required for the heater.

*1 The bottom surface of the tank is angled to facilitate drainage.

WSC Series

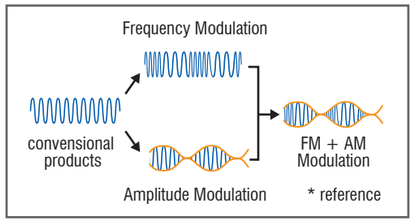
WSC28 Standard
WSC28 High-Power
WSC40 Standard
WSC40 High-Power

Low frequency separate type

Combination of FM + AM oscillation achieves more uniform cleaning and lower power consumption

FM + AM

FM, which stands for frequency modulation, is the process of varying the frequency continuously. AM, which stands for amplitude modulation, is the process of varying the output continuously.
FM + AM spreads the ultrasonic waves evenly throughout the entire tank to achieve more uniform cleaning, and it provides stable operation in response to load fluctuations due to the status of the workpiece, liquid type, and liquid depth.



Energy-saving, compact design

The power consumption is approximately 1/3 that of conventional products (in our comparison), and the size of the generator is also approximately 1/3.

No need to perform generator calibration

Maintenance is simplified by eliminating the need to calibrate the generator when the transducer unit is replaced by one with the same specifications.

Wide variable output range

Wide-ranging power control is available to suit the requirements of your cleaning and processing operations.

Generator

Model No.	WSC28		WSC40	
Type	Standard	High-Power	Standard	High-Power
Oscillation mode	FM + AM modulation			
Maximum output (average output)	600 W (200 W)	1200 W (400 W)	600 W (200 W)	1200 W (400 W)
Nominal oscillation frequency	28 kHz		40 kHz	
Power input	200 - 230 V AC Single phase 50/60 Hz			
	300 VA	600 VA	300 VA	600 VA
Dimensions (W x D x H mm)	210 x 250 x 107 (including rubber feet)			
Weight	3.6 kg			

• **I/O interface** **Remote function:** Ultrasonic oscillation ON/OFF (contact input),
Output function: Alarm output when error occurs (Relay contact output: Open when error occurs)
• **Variable output range:** 0 to 100%, continuously variable • **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 5 to 80% (no condensation)
• **Power cable length:** 3.5 m • **Outline drawing** Page25 • **Options:** I/O remote cable (5 m)(RK01) Page44

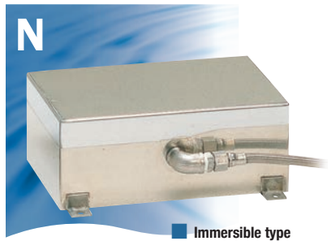
■ Transducer unit

Powerful, high-efficiency ultrasonic cleaner, equipped with our own bolt-clamped Langevin type transducer

The transducer unit uses bolt-clamped Langevin type transducers with high electro-acoustic conversion efficiency and excellent durability.
Standard specifications that meet various frequencies and output power are available.

Generator + Transducer unit

Transducer units can be manufactured with custom specifications, such as decompression, upon request.



Immersible type

N TYPE | Immersible type

Model No.	NST-28SC	NHP-28SC	NST-40SC	NHP-40SC
Type	Standard	High-Power	Standard	High-Power
Generator Model No.	WSC28 Standard	WSC28 High-Power	WSC40 Standard	WSC40 High-Power
Maximum allowable input	600 W	1200 W	600 W	1200 W
Nominal oscillation frequency	28 kHz	28 kHz	40 kHz	40 kHz
Effective cleaning area (W x Dmm)	350 x 200	420 x 300	350 x 200	420 x 300
Dimensions (W x D x H mm)	350 x 200 x 100	420 x 300 x 100	350 x 200 x 75	420 x 300 x 75
Material	Case: SUS304 (SUS316L is available for custom orders)			
Weight	8 kg	14 kg	7 kg	12 kg

• **Maximum liquid temperature:** 80°C • **Transducer:** Bolt-clamped Langevin type
• **Transducer cable length:** 2.5 m (blade part: 2 m) + Output cable length 3.5 m • **Outline drawing** Page26

Vibration plate type

F TYPE | Vibration plate type

Model No.	FST-28SC	FHP-28SC	FST-40SC	FHP-40SC
Type	Standard	High-Power	Standard	High-Power
Generator Model No.	WSC28 Standard	WSC28 High-Power	WSC40 Standard	WSC40 High-Power
Maximum allowable input	600 W	1200 W	600 W	1200 W
Nominal oscillation frequency	28 kHz	28 kHz	40 kHz	40 kHz
Effective cleaning area (W x Dmm)	350 x 200	420 x 300	350 x 200	420 x 300
Dimensions (W x D x H mm) (wires not included)	390 x 240 x 83 t=2.5 mm	460 x 340 x 83 t=2.5 mm	390 x 240 x 57 t=2.5 mm	460 x 340 x 57 t=2.5 mm
Material	Board: SUS304 (SUS316L is available for custom orders) Packing: EPDM, t=3 mm (Viton and other materials are available for custom orders)			
Weight	5 kg	9 kg	4 kg	8 kg

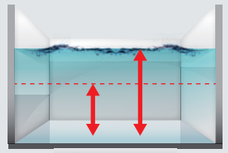
• **Accessories:** 2 types of holding fittings, 2 types of packing (EPDM), nuts
• **Maximum liquid temperature:** 100°C • **Transducer:** Bolt-clamped Langevin type
• **Transducer cable length:** 3.5 m + Output cable length 3.5 m • **Option:** Oscillator cover • **Outline drawing** Page26

Ultrasonic cleaners Precautions for use

Follow the proper procedures when using an ultrasonic cleaner.Failure to do so may result in damage to the ultrasonic cleaning equipment or limit the functionality.

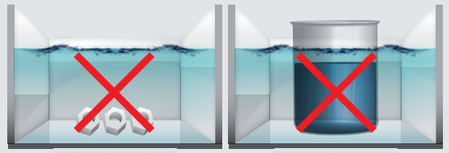
(1) Depth

- Always fill the cleaning tank with the appropriate amount of cleaning liquid before operating the cleaner.
- Make sure that the cleaning liquid fills the tank at least halfway. In the case of a heated tank, make sure that the tank is at least 80% full.
- Using the cleaner without any cleaning liquid (heating an empty tank) or an insufficient amount of cleaning liquid could result in a breakdown.



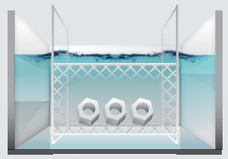
(2) Never place directly on surface

- Do not place inner tank or beakers or workpieces directly on the vibration surface. Doing so could cause heating problems or abnormal ultrasonic vibration, resulting in a breakdown.



(3) Use of optional items recommended

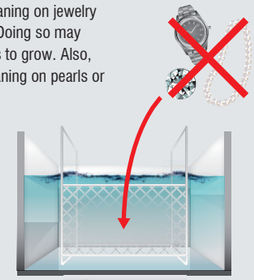
- Use an optional cleaning basket or beaker rack.



Various laws and regulations are established to ensure the proper handling of cleaning liquid and waste liquid. Always comply with the relevant laws and regulations.

(4) Easily damaged items

- Do not perform ultrasonic cleaning on jewelry that is scratched or cracked. Doing so may cause the scratches or cracks to grow. Also, do not perform ultrasonic cleaning on pearls or tortoise shell.
- Do not perform ultrasonic cleaning on wristwatches. Liquid may enter even if the item is considered waterproof, resulting in damage.



(5) Contamination of vibration surface

- If contamination accumulates on the ultrasonic vibration surface, it could result in a breakdown. Periodically clean the vibration surface.

* Additional precautions and safety information are provided in the instruction manual. Make sure to thoroughly read and understand the manual before operating the ultrasonic cleaner.

WSC(M) Series

WSC28 (M)
WSC40 (M)

Low frequency separate type

selectable

Compact cleaner for industrial applications saves space in production lines or when integrating with other equipment

- Can be manufactured with your requested size of transducer.
- The combination of input voltage (100 V, or 200 to 230 V) and ultrasonic frequency (28/40 kHz) can be selected.
- Remote operation using external input is available.
- Supports 24 hour continuous operation.

Generator

Model No.	WSC28 (M)		WSC40 (M)	
Number of transducers	1	2	1	2
Oscillation mode	FM + AM modulation			
Maximum output (average output)	60 W (20 W)	100 W (33 W)	60 W (20 W)	100 W (33 W)
Nominal oscillation frequency	28 kHz		40 kHz	
Power input	Selectable (at time of ordering) from 100 V AC, or 200 to 230 V AC Single phase 50/60 Hz			
	55 VA	100 VA	55 VA	100 VA
Dimensions (W x D x H mm)	210 x 250 x 107 (including rubber feet)			
Weight	3.6 kg			

- **I/O interface** **Remote function:** Ultrasonic oscillation ON/OFF (contact input),
  Output function: Alarm output when error occurs (Relay contact output: Open when error occurs)
- **Variable output range:** 0 to 100%, continuously variable
- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 5 to 80% (no condensation)
- **Power cable length:** 3.5 m
- **Outline drawing** Page25
- **Options:** I/O remote cable (5 m)(RK01) Page44

Transducer unit (One transducer specification)

Model No.	Vibration plate type/Tank type (open)		Immersible box type (closed)	
Number of transducers	1			
Maximum output (average output)	60W			
Nominal oscillation frequency	28kHz	40kHz	28kHz	40kHz
Material	SUS304 (SUS316L is available for custom orders)			
Dimensions (W x D x H mm)	100 x 100 x 83 (wires not included) t=3mm	100 x 100 x 57 (wires not included) t=3mm	100 x 100 x 100	100 x 100 x 75
Maximum liquid temperature	100°C		80°C	
Transducer cable length	3.5m		1.5m (blade part: 1m)	

*Custom sizes and materials are available upon request.
*Vibration type oscillator cover is optional

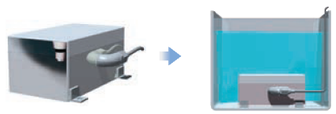
Transducer unit (2 transducers specification)

Model No.	Vibration plate type/Tank type (open)		Immersible box type (closed)	
Number of transducers	2			
Maximum output (average output)	100W			
Nominal oscillation frequency	28kHz	40kHz	28kHz	40kHz
Material	SUS304 (SUS316L is available for custom orders)			
Dimensions (W x D x H mm)	160 x 100 x 83 (wires not included) t=3mm	160 x 100 x 57 (wires not included) t=3mm	160 x 100 x 100	160 x 100 x 75
Maximum liquid temperature	100°C		80°C	
Transducer cable length	3.5m		1.5m (blade part: 1m)	

*Custom sizes and materials are available upon request.
*Vibration type oscillator cover is optional

Vibration plate type

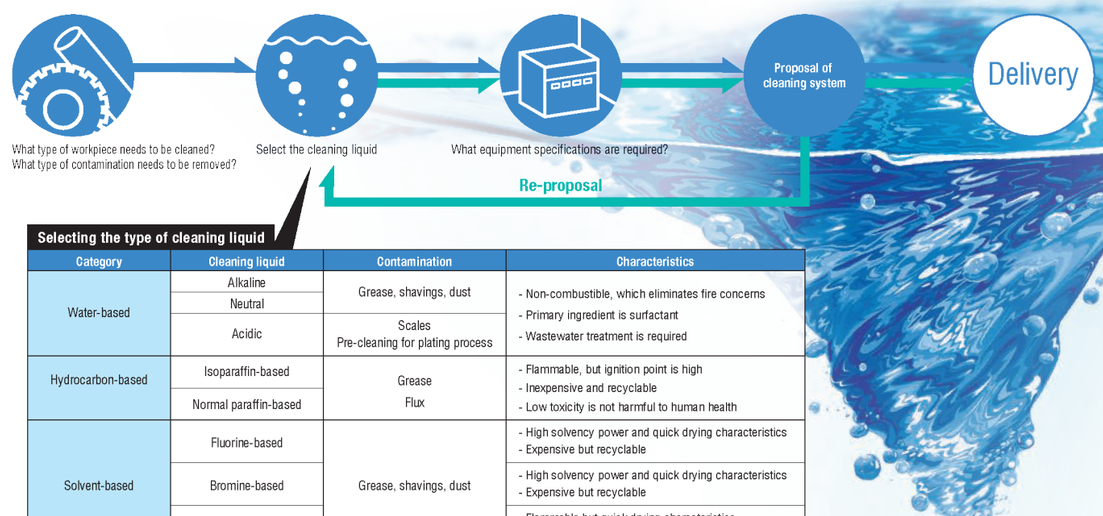
Immersible type



We welcome requests for customized instruments designed to further enhance the cleaning effects!

We at Honda Electronics manufacture our own bolt-clamped Langevin type transducers with piezoelectric ceramics.
Because we use our own unique transducers that we design ourselves, we are able to meet a wide variety of specific needs by flexibly providing transducer units of various sizes and specifications, such as decompression, and by manufacturing customized instruments.

Cleaning system proposal process



Selecting the type of cleaning liquid

Category	Cleaning liquid	Contamination	Characteristics
Water-based	Alkaline	Grease, shavings, dust	- Non-combustible, which eliminates fire concerns - Primary ingredient is surfactant - Wastewater treatment is required
	Neutral		
	Acidic	Scales Pre-cleaning for plating process	
Hydrocarbon-based	Isoparaffin-based	Grease Flux	- Flammable, but ignition point is high - Inexpensive and recyclable - Low toxicity is not harmful to human health
	Normal paraffin-based		
Solvent-based	Fluorine-based	Grease, shavings, dust	- High solvency power and quick drying characteristics - Expensive but recyclable
	Bromine-based		- High solvency power and quick drying characteristics - Expensive but recyclable
	Alcohol-based		- Flammable but quick drying characteristics - Inexpensive

Equipment example

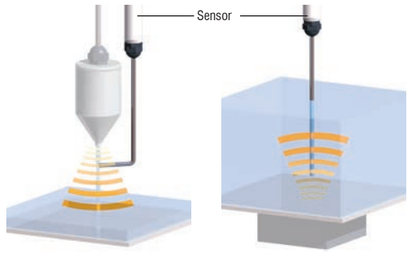
- **Overflow**
  Liquid circulation is improved, and contamination that rises to the liquid surface in the cleaning tank is effectively removed.
- **Heater**
  The optimum liquid temperature can be set, enhancing the cleaning effect.
- **Filter**
  The contamination in the liquid is collected and filtered out so that it does not reattach to the items that are being cleaned.
- **Agitation**
  The cleaning basket moves up and down, which reduces unevenness in cleaning and helps to shake off the contamination.

SONIC MONITOR
HUS-3

Sonic Monitor - Adjustment and inspection/quality control for cleaners -

Essential tool for quality control of cleaning, featuring a portable design and rechargeable battery

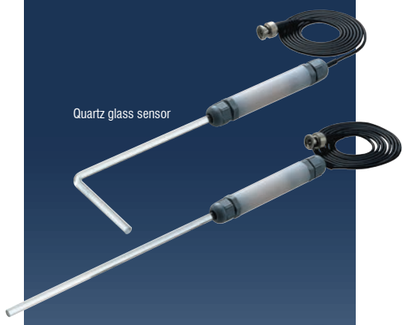
HUS-3 unit

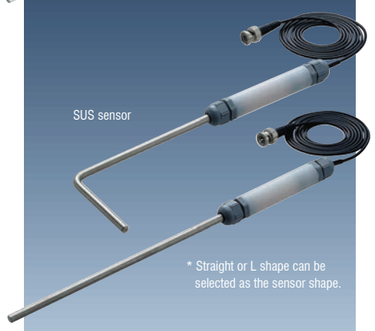


The sensor is placed in the ultrasonic cleaning tank (or in flowing water), and the strength of the ultrasonic waves is indicated in mV.


Carrying case

- Supports a wide range of frequencies, from 10 kHz (low) to 5 MHz (high).
- Rechargeable battery enables use in a variety of places.
  (provides approximately 10 hours of use)
- Readings can be obtained simply by dipping the tip of the sensor into the liquid.


Quartz glass sensor


SUS sensor

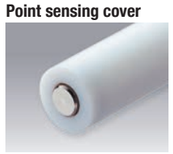
* Straight or L shape can be selected as the sensor shape.

Main unit

Model No.	HUS-3
Frequency characteristics	10 kHz - 5 MHz
Power input	Dedicated lithium ion battery 14.8 V DC 1.5 W
Measurement range	10 mV / 50 mV / 100 mV / 500 mV
Meter indication values	Sensor detection voltage (mV) rms
Dimensions (W x D x H mm)	179 x 132 x 55
Weight	640 g (including battery)

- **Included accessories:** AC adapter for charging
  Dedicated lithium ion battery
- **Operating temperature range:** 5 to 40°C
- **AC adapter for charging:** Power input 100 to 240 V AC, 50/60 Hz
- **Options:** Point sensing cover, Charging stand

Point sensing cover



* Cover for pinpointing the location to measure.
(for straight type only)
* Contact us if you wish to remove or install the point sensing cover.

Sensor

Model No.	HUS-5 SPS	HUS-5 SPL	HUS-5 SUS	HUS-5 SUL
Shape	Straight	L shape	Straight	L shape
Material	Quartz glass		SUS316L	
Length (mm)	340	260 (L shape part 80)	340	260 (L shape part 80)
Weight	80 g		140 g	
Incompatible liquids	Heated strong alkali, hot phosphoric acid, hydrofluoric acid		All acids	

- **Liquid temperature range:** 0 to 70°C
- **Cable length:** 1.5 m

*** Calibration cannot be performed for this equipment.**
*** This equipment provides relative values, and not absolute values.**
*** This equipment could fail if it is set up to perform continuous operation.**

Ultrasonic cleaner
with decompression chamber
WV-231-S1

Benchtop type

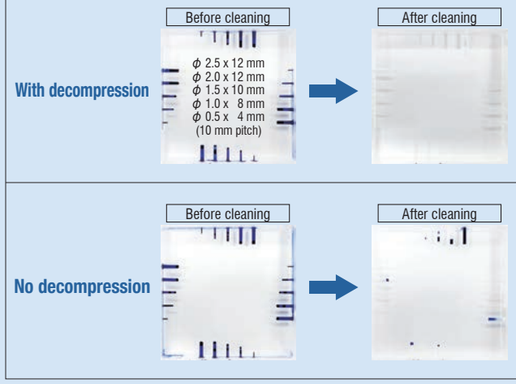
Equipped with decompression function (for water-based solution)

- Able to clean micropores and blind holes, which could not be cleaned with conventional ultrasonic cleaners.
- Improved strength of cavitation effect, which is an important aspect of ultrasonic cleaner performance.
- Rapidly removes contamination by automatically and repeatedly applying normal pressure and decompression.
- Two types of decompression cycles are available for selection.

Model No.	WV-231-S1
Oscillation mode	Single frequency oscillation
Rated output	200 W
Nominal oscillation frequency	40 kHz
Power input	100 V AC Single phase 50/60 Hz 500 VA
Dimensions (W x D x H mm) External:	382 x 367 x 440 (including rubber feet)
Inside tank:	280 x 220 x 254 (12 L)
Drain valve	Rc 1/2
Weight	35 kg

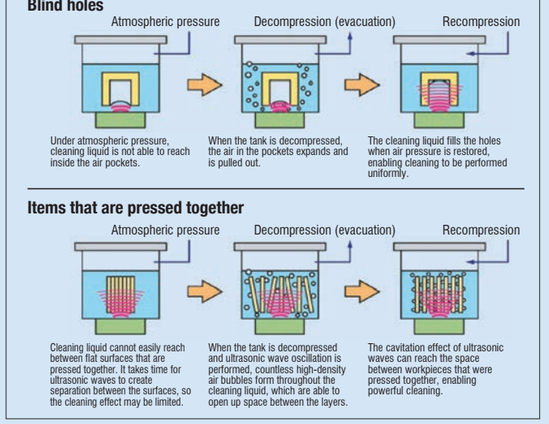
- **Maximum liquid temperature:** 70°C
- **Transducer: Bolt-clamped Langevin type**
- **Timer:** 0 to 60 min (1 min increments)
- **Decompression function:** Max. -75 kPa *May vary depending on liquid depth.
- **Switching of decompression/normal pressure:** (1) 1 cycle (90 seconds of decompression/15 seconds of normal pressure) 〈The display LED lights up〉
  (2) 1 cycle (45 seconds of decompression/15 seconds of normal pressure) 〈The display LED flashes in 0.5 second intervals〉
- **Power cable length:** 2 m
- **Materials: Tank:** SUS304, Lid: SUS304
- **Options:** Cleaning basket (KG15F), Beaker rack (BR06), Beakers(BK02) Page44

■Cleaning data <Cleaning test of blind holes in glass plates (100 x 100 x 19 t)>



* Water-soluble ink was used as the test contamination.
* The cleaning results may vary depending on the conditions.

■Advantages of ultrasonic cleaning with decompression



WTC-600-40
WTC-1200-40

Enables cleaning of large items with simple hands-free operation

- High-efficiency, energy-saving model that uses FM (frequency modulation) + AM (amplitude modulation) to achieve uniform cleaning.
- In addition to the drain valve, a drain installation hole for overflow makes it easy to expand the circulation system.

Model No.	WTC-600-40	WTC-1200-40
Oscillation mode	FM + AM modulation	
Maximum output (average output)	600 W	1200 W
Nominal oscillation frequency	40 kHz	
Power input	100 V AC 50/60 Hz 300 VA	200 - 230 V AC Single phase 50/60 Hz 600 VA
Dimensions (W x D x H mm) External:	600 x 410 x 472 (including rubber feet)	800 x 460 x 472 (including rubber feet)
Inside tank:	400 x 350 x 272 (40 L) *	610 x 400 x 268 (69 L) *
Drain valve	Rc 3/4	Rc 1
Weight	28 kg	40 kg

- **Liquid temperature range:** 5 to 80°C
- **Transducer:** Bolt-clamped Langevin type
- **Variable output range:** 0 to 100%, continuously variable
- **Timer:** 10 min /20 min/ 30 min/ Continuous
- **Operation switch:** ON/OFF via photoelectric sensor (with voice guidance)
- **Power cable length:** 3.5 m
- **Tank material:** SUS304
- **Outline drawing** Page26
- **Options:** Cleaning basket (KG08T / KG09T), Lid (FT05 / FT06), Stand (DA01 / DA02) Page44

*1 The bottom surface of the tank is angled to facilitate drainage.

WTC-404 WTC-408

WTC-404

WTC-408

Equipped with 4 oscillation modes
Achieved powerful washing while suppressing unevenness

Washing modes that can be selected by application

Achieves a stable washing performance by selecting a washing mode suitable for the application.

STANDARD
Enables washing with little unevenness. Evenly balanced with characteristics of both POWERFUL and MULTI modes.

POWERFUL
Suited for removal of tough stains through concentrated ultrasonic waves.

MULTI
Suited for precision washing that effectively removes stains in hidden areas.

BURST
Enables washing with a focus on energy saving through intermittent oscillation of ultrasonic waves.

Functionality in addition to a simple design

Because of the smooth design with protrusions of the water drain valve and power cord eliminated, there are no limitations in terms of installation positions. Since the switches and power cord are positioned on the back, they are protected from getting wet.

Easily switch modes through button operations

The timer, output, and temperature adjustment can be easily set through simple button operations.

Model No.		WTC-404	WTC-408
Oscillation mode		FM + AM modulation	
		Selectable from 4 modes (STANDARD / POWERFUL / MULTI / BURST)	
Output	Maximum	420 W	840 W
	Average	140 W	280 W
Nominal oscillation frequency		40 kHz	
Power input		100 V AC 50/60Hz 450VA	100 V AC 50/60Hz 900VA
Heater		250 W	500 W
Dimensions (W x D x H mm) External:		339 x 365 x 327 (including handles and rubber feet)	544 x 425 x 402 (including handles and rubber feet)
Inside tank:		300 x 240 x 150 (10.5L) *1	505 x 300 x 200 (29.5L) *1
Drain valve		Rc 3/8 , with hose nipple (outer diameter 14)	
Weight		9kg	15kg

■ **Included accessories:** Drainboard
• **Liquid temperature range:** 5 to 65 ℃ • **Transducer:** Bolt-clamped Langevin type • **Variable output range:** 25 to 100 %
• **Timer:** 0 to 99 min (1 min increments) • **Heater control temperature range:** 30 to 60℃ (10℃ units)
• **Power cable length:** 2 m • **Tank material:** SUS304
• **Options:** Cleaning basket(KG06F,KG07F), Lid(FT03,FT04) *2 , Beaker rack(BR03,BR04), Beakers(BK02) Page44

*1 Dimensions at top of tank, which is tapered.
*2 The basket and lid cannot be used simultaneously

W-113A

Compact 3-frequency multi-oscillation method type

- Prevents unevenness due to standing waves during washing through the multi-oscillation method.
- Enables arbitrary setting of the oscillation time for the 3 frequencies.
- Enables selection of frequencies based on the work material and stain.

Model No.	W-113A
Oscillation mode	Single frequency oscillation Oscillation with switching triple frequencies in order
Rated output	100 W
Nominal oscillation frequency	28KHz , 45kHz , 100kHz
Power input	100 V AC 50/60 Hz 200 VA
Dimensions (W x D x H mm) External:	290 x 208 x 249 (including rubber feet)
Inside tank:	240 x 140 x 100 (3L) *1
Drain valve	inner dia. 6, outer dia. 12, peacock type
Weight	4.4 kg

■ **Included accessory:** Lid
• **Maximum liquid temperature:** 80℃
• **Transducer:** Bolt-clamped Langevin type
• **Timer :** Total cleaning time : 1 to 30 min.(1 min increments) , Each frequency set time : 1 to 99 seconds
• **Power cable length :** 2 m
• **Material:** Main unit / lid : Polypropylene (PP), Tank: SUS304
• **Options:** Cleaning basket(KG03F), Beaker rack(BR01), Beakers(BK02) Page44

*1 Dimensions at top of tank, which is tapered.

W-113 MK-Ⅱ

Adjacent dual-frequency BAKUSEN (blast cleaning) mode effectively cleans persistent contamination

- BAKUSEN (blast cleaning) mode instantaneously generates powerful energy and high-order oscillation, which achieves high cleaning efficiency.
- Able to perform cleaning inside narrow tubes and through-hole boards.

Model No.	W-113MK-Ⅱ
Oscillation mode	Single frequency oscillation/High-speed switching oscillation (BAKUSEN)
Rated output	110 W
Nominal oscillation frequency	24 kHz、31 kHz
Power input	100 V AC 50/60 Hz 200 VA
Dimensions (W x D x H mm) External:	290 x 208 x 249 (including rubber feet)
Inside tank:	240 x 140 x 100 (3 L) *1
Weight	4.4 kg

■ **Included accessories:** Lid
• **Maximum liquid temperature**: 80℃
• **Transducer:** Bolt - clamped Langevin type
• **Timer:** 1 to 99 min (1 min increments)
• **Power cable length:** 2 m
• **Material:** Main unit/lid: Polypropylene (PP), Tank: SUS304
• **Options:** Cleaning basket (KG03F), Beaker rack (BR01) Page44

*1 Dimensions at top of tank, which is tapered.

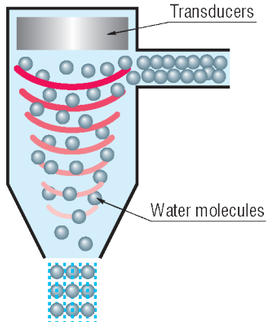
High frequency cleaning

Explanation

Nozzle type cleaner

■Cleaning with particle acceleration

When vibrational acceleration is applied in ultrasonic cleaning, the impact of accelerated water molecules against the workpiece separates the particles of contamination from the workpiece. The cleaning effect is markedly stronger at higher frequencies, because the acceleration increases in proportion to the square of the frequency. This method is particularly effective for removing extremely fine particles that have strong adhesion.



Changes to particle amounts before and after PULSE JET cleaning

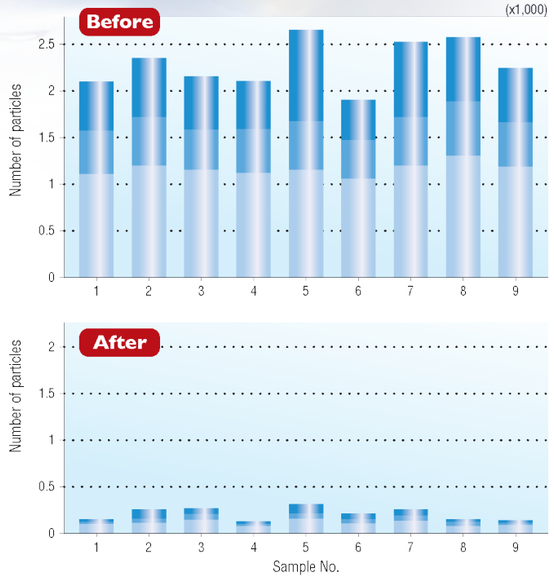
Workpiece size

300 x 300 x 1.1mm

Measurement area

280 x 280mm

Both sides of blank glass



Particle size

S : 3.0～ 5.0μm

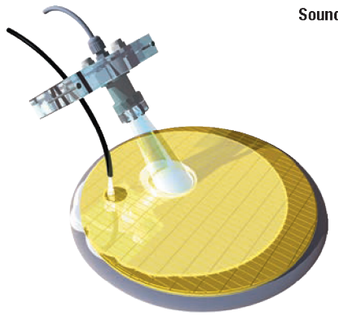
M : 5.0～10.0μm

L : 10.0μm～

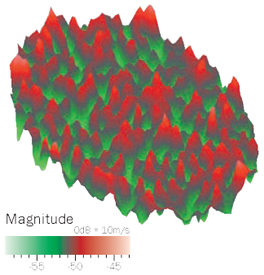
Quartz transducer unit type cleaner

■Next-generation cleaning with minimal damage and high cleaning performance

In 2006, Honda Electronics developed the world's first quartz transducer unit type ultrasonic cleaning unit. With this method, ultrasonic waves are applied to the quartz transducer unit, which is used to clean semiconductor wafers. Smaller amounts of cleaning liquid are used compared to batch and nozzle type cleaners, and the cleaning liquid only comes into contact with the quartz glass, thereby ensuring a higher degree of cleanliness. In addition, the shape of the quartz transducer unit may be modified to ensure effective cleaning for different applications, such as low-damage cleaning, wide-area cleaning, or cleaning of special parts such as beveled surfaces and notches.



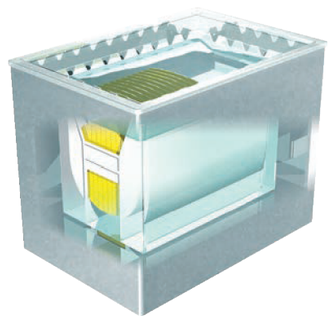
Sound pressure distribution for W-357-1MQB-SK



Batch type cleaner

■Batch cleaning of semiconductor wafers

Multiple semiconductor wafers are placed in a tank for MHz-band ultrasonic cleaning, which is performed on all of the wafers simultaneously. This cleaning method has become the mainstream for the following reasons:
(1) Many wafers can be cleaned at the same time, which saves time.
(2) Less cleaning liquid is used than when wafers are cleaned individually.
(3) It is easier to use specific cleaning liquids such as when cleaning with dual tanks.
Normally, when cleaning liquid is used in batch cleaning, ultrasonic waves are applied indirectly using a dip type cleaning method with a dual structure of cleaning tank and quartz tank. In this method, the use of a quartz tank can prevent the elution of metal ions and impurities, and it is also effective for maintaining cleanliness.
However, there is a problem of particles reattaching to items in batch cleaning, due to the increasingly large sizes and fine patterns of semiconductor wafers.



W-357 -1MQG-SKC series

W-357 -1MQG-SKH series

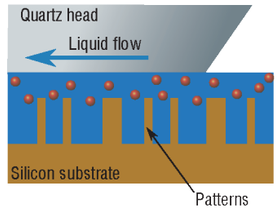
-with liquid supply hole

Quartz transducer unit type cleaner

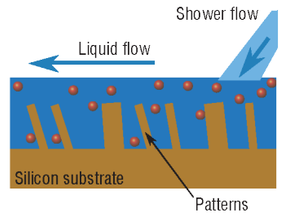
Cleans fine-patterned wafers with minimal damage

- Equipped with a transducer cooling mechanism, which enables a maximum output that is 2.4 times higher than standard models
- Frequency fluctuation is reduced by cooling the transducer, enabling stable continuous operation
- The cooling mechanism prevents rapid temperature changes in the transducer, which ensures a long service life

Quartz transducer unit type



Shower type



Cleaning of patterned Si wafer

Generator

Model No.		W-357-1MQG-SKC	W-357-2MQG-SKC	W-357-3MQG-SKC
Oscillation mode		Single frequency oscillation		
Rated output		12 W		
Nominal oscillation frequency		1 MHz	2 MHz	3 MHz
Power input		100 - 240 V AC Single phase 50/60 Hz 300 VA		
Interface	Analog output	4 to 20 mA current output		
	Contact output	Alarm output		
	External drive input	2 contacts Sensor input, Remote input		
	RS-422A communication	dedicated protocol		
Dimensions (W x D x H mm)		185 x 265 x 100 (including rubber feet)		
Weight		2.2 kg		

- **Variable output range:** 0 to 12 W
- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 10 to 85%
- **Ratings of contact points for external drive:** Ultrasonic oscillation control (on control side) contact input: 12 V DC, 18 mA or more
  Alarm output (this equipment) contact capacity: 24 V DC, 0.5 A
- **Included cables:** Power cable: (select from 100 V AC/2 m, 200 V AC/3 m), Control cables (5 m) x 4

Transducer unit

Model No.	W-357-1MQG-SKC	W-357-2MQG-SKC	W-357-3MQG-SKC
Flow rate	Not specified		
Weight	Approx. 600 g		
Length	Approx. 159 mm		Approx. 169 mm
Dimensions of chuck	dia.24 or 34 mm		
Cleaning area	24 (cm²)		27 (cm²)

- **Liquid Temperature :** 20 to 50°C • **Transducer :** PZT
- **Material:** Transducer unit: Quartz, Quartz glass Packing: Silicone rubber Case: PCTFE
- **Liquid contact surface material:** Transducer unit: Quartz glass
- **Cable length:** Output cable 1.5 m + Relay cable 3.5 m
- **Air purge coupling:** Compatible tube (outer diameter: 6)

W-357-1MQG-SKH, W-357-2MQG-SKH and W-357-3MQG-SKH are the models that have liquid supply holes on the quartz transducer units. All specifications are the same as SKC series.
Cleaning liquid can be applied through a hole located at the center of the quartz transducer unit.

W-357-1MPG

Standard nozzle

Nozzle type cleaner - PULSE JET point type

This point type, nozzle type ultrasonic cleaner is mainly used for cleaning wafers and hard disks. Ultrasonic waves are applied to the stream of water from the nozzle tip, to ensure effective cleaning. The emitted stream of water works in conjunction with the propagated ultrasonic waves to remove the contamination from the item that is cleaned, and it also functions as a transport medium to carry the contamination away. As is characteristic of nozzle type cleaners, this model prevents particles from reattaching to the cleaned object, and it is effective for removing submicron contamination. A wide selection of variations are available to suit your applications and cleaning liquids.

Removes fine contamination and prevents particles from reattaching

●The digital control system enables a variety of functions.

No need to perform generator calibration
Maintenance is simplified by eliminating the need to calibrate the generator when the transducer standard nozzle is replaced by one with the same specifications.

Constant power oscillation
The transducer drive frequency tracks the oscillator to ensure a constant voltage and current phase for the transducer. Control is performed using constant power, in order to maintain a stable energy supply to the transducer. This enables the device to provide stable ultrasonic oscillation in response to changes in water temperature and ambient temperature.

Error detection function
Alarm output enables monitoring of generator and nozzle abnormalities.
Disconnected cables, short circuits, power abnormalities, excessive current, transducer impedance abnormalities, and insufficient water flow can be detected.

Output monitoring
RS-422A is supported, which enables external control of output power. Output is available at 4 to 20 mA.

CE compliance is possible.
Contact us separately for details.

Generator

Model No.		W-357-1MPG
Oscillation mode		Single frequency oscillation
Rated output		40 W
Nominal oscillation frequency		1 MHz
Power input		100 - 240 V AC Single phase 50/60 Hz 300 VA
Interface	Analog output	4 to 20 mA current output
	Contact output	Alarm output
	External drive input	2 contacts Sensor input, Remote input
	RS-422A communication	dedicated protocol
Dimensions (W x D x H mm)		180 x 250 x 100 (including rubber feet)
Weight		2.2 kg

- **Variable output range:** 0 W to 40 W
- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 10 to 85%
- **Ratings of contact points for external drive:**
  Ultrasonic oscillation control (on control side) contact input: DC12 V AC, 18 mA or more
  Alarm output (this equipment) contact capacity: DC 24V 0.5A
- **Included cables:** Power cable: (select from 100 V AC/2 m, 200 V AC/3 m), Control cables (5 m) x 4

Transducer standard nozzle

Flow rate	0.9 L/min
Dimensions	dia. 25 x 78 mm
Nozzle diameter	dia. 4 mm
Weight	300 g

- **Liquid temperature range:** 20 to 50°C
- **Transducer:** PZT
- **Material:** Nozzle: PCTFE, PTFE
  Packing: Perfluoro compound
  Vibration plate: Special ceramic
- **Liquid contact surface material:**
  Nozzle: PCTFE, PTFE
  Packing: Perfluoro compound
  Vibration plate: Special ceramic
- **Inlet:** Compatible tube (outer diameter: 6)
- **Cable length:** Output cable 5 m

W-357-1.5MPG

●High frequency of 1.5 MHz enables removal of fine particles. RS-422A communication is available.

Generator

Model No.		W-357-1.5MPG
Oscillation mode		Single frequency oscillation
Rated output		40 W
Nominal oscillation frequency		1.5 MHz
Power input		100 - 240 V AC Single phase 50/60 Hz 300 VA
Interface	Analog output	4 to 20 mA current output
	Contact output	Alarm output
	External drive input	2 contacts Sensor input, Remote input
	RS-422A communication	dedicated protocol
Dimensions (W x D x H mm)		180 x 250 x 100 (including rubber feet)
Weight		2.2 kg

- **Variable output range:** 0 W to 40 W
- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 10 to 85%
- **Ratings of contact points for external drive:**
  Ultrasonic oscillation control (on control side) contact input: DC12 V AC, 18 mA or more
  Alarm output (this equipment) contact capacity: DC 24V 0.5A
- **Included cables:** Power cable: (select from 100 V AC/2 m, 200 V AC/3 m), Control cables (5 m) x 4

Transducer nozzle

Flow rate	0.9 L/min (straight coupling)
Dimensions	29 x 34 x 92 mm
Nozzle diameter	dia. 4 mm
Weight	300 g

- **Liquid temperature range:** 20 to 50°C
- **Transducer:** PZT
- **Material:** Nozzle: PCTFE, PTFE
  Packing: Perfluoro compound
  Vibration plate: Tantalum
- **Liquid contact surface material:**
  Nozzle: PCTFE, PTFE
  Packing: Perfluoro compound
  Vibration plate: Tantalum
- **Inlet:** Compatible tube (outer diameter: 6)
- **Cable length:** Output cable 5 m

W-357-3MPG

●Higher frequency of 3 MHz enables the removal of finer particles with minimal damage.

Generator

Model No.		W-357-3MPG
Oscillation mode		Single frequency oscillation
Rated output		40 W
Nominal oscillation frequency		3 MHz
Power input		100 - 240 V AC Single phase 50/60 Hz 300 VA
Interface	Analog output	4 to 20 mA current output
	Contact output	Alarm output
	External drive input	2 contacts Sensor input, Remote input
	RS-422A communication	dedicated protocol
Dimensions (W x D x H mm)		180 x 250 x 100 (including rubber feet)
Weight		2.2 kg

- **Variable output range:** 0 W to 40 W
- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 10 to 85%
- **Ratings of contact points for external drive:**
  Ultrasonic oscillation control (on control side) contact input: DC12 V AC, 18 mA or more
  Alarm output (this equipment) contact capacity: DC 24 V 0.5 A
- **Included cables:** Power cable: (select from 100 V AC/2 m, 200 V AC/3 m), Control cables (5 m) x 4

Transducer nozzle

Flow rate	0.9 L/min (straight coupling)
Dimensions	29 x 34 x 92 mm
Nozzle diameter	dia. 4 mm
Weight	300 g

- **Liquid temperature range:** 20 to 50°C
- **Transducer:** PZT
- **Material:** Nozzle: Special ceramic, PCTEF
  Packing: Viton rubber, Silicone rubber
  Vibration plate: Special ceramic
- **Liquid contact surface material:**
  Nozzle: Special ceramic, PCTEF
  Packing: Silicone rubber
  Vibration plate: Special ceramic
- **Inlet:** Compatible tube (outer diameter: 6)
- **Cable length:** Output cable 5 m

W-357-04PG

●Applied for various precision cleaning in mid-range frequencies (400 kHz) including cleaning after CMP of wafers and buffing material removal from industrial lenses.

Generator

Model No.		W-357-04PG
Oscillation mode		Single frequency oscillation
Rated output		80 W
Nominal oscillation frequency		400 kHz
Power input		100 - 240 V AC Single phase 50/60 Hz 300 VA
Interface	Analog output	4 to 20 mA current output
	Contact output	Alarm output
	External drive input	2 contacts Sensor input, Remote input
	RS-422A communication	dedicated protocol
Dimensions (W x D x H mm)		180 x 250 x 100 (including rubber feet)
Weight		2.2kg

- **Variable output range:** 0 to 80 W • **Ambient operating environment:** Temperature: 5 to 40 °C, Humidity: 10 to 85 %
- **Ratings of contact points for external drive:**
  Ultrasonic oscillation control (on control side) contact input: 12 V DC, 18 mA or more
  Alarm output (this equipment) contact capacity: 24 V DC, 0.5 A
- **Included cables: Power cable:** (select from 100 V AC/2 m, 200 V AC/3 m) , Control cables (5 m) x 4

Transducer nozzle

Model No.	W-357-04PG-TD
Flow rate	4L/min
Dimensions	60 x 69 x 134 mm
Nozzle diameter	dia. 8mm
Weight	700g

- **Liquid temperature range:** 20 to 50 °C
- **Transducer:** PZT
- **Material:** Nozzle: Polypropylene (PP) and Special ceramic, Packing: Silicone rubber, Vibration plate: Tantalum
- **Inlet:** Compatible tube (outer diameter: 13)
- **Cable length:** Output cable 5 m

W-357BM Series

W-357BM-600

W-357BM-1200

Separate type batch cleaner

Ultrasonic cleaner for removing submicron particles

●Digital control system enables stable oscillation.
●Versatile interface enables control that is compatible with other cleaning equipment.

Generator

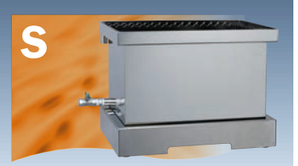
Model No.		W-357BM-600	W-357BM-1200
Oscillation mode		Single frequency oscillation	
Rated output		600 W	1200 W
Variable output range		100 W to 600 W	200 W to 1200 W
Nominal oscillation frequency		1 MHz	
Power input		200 - 240 V AC Single phase 50/60 Hz 1200 VA	200 - 240 V AC Single phase 50/60 Hz 2400 VA
Display		Vacuum fluorescent display (VFD), 16 characters x 2 lines	
Interface	Analog output	4 to 20 mA current output	
	Contact output	3 contacts Alarm output, Oscillation detection output, Power ON output	
	External drive input	2 contacts Sensor input, Remote input	
	RS-485 communication	MODBUS® protocol, RTU mode	
Dimensions (W x D x H mm)		220 x 360 x 143 (including rubber feet)	360 x 360 x 143 (including rubber feet)
Weight		5kg	7kg

- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 5 to 80% (no condensation)
- **Power cable length:** 3m • **Outline drawing** Page25

* MODBUS is the registered trademark of Schneider Electric USA, Inc.

Transducer unit

Vibration plate type



Tank type

Upon request, transducer units can be manufactured with custom specifications.
- **Maximum allowable input :** 600 W / 1200 W / 1800 W / 2400 W / 3000 W / 3600 W
- **Compatible wafers :** 6 inch / 8 inch / 12 inch

F TYPE | Vibration plate type

Model No.	W-357BM-600F	W-357BM-1200F
Generator Model No.	**W-357BM-600**	**W-357BM-1200**
Maximum allowable input	600 W	1200 W
Nominal oscillation frequency	1 MHz	
Effective cleaning area (W x D mm)	135 x 160	272 x 154
Dimensions (W x D x H mm) (wiring and tubing not included)	250 x 220 x 68	355 x 245 x 68
Material	Plate: SUS316L, Electropolished surface	
Weight	3.3 kg	7 kg
Compatible wafers	6 inch	8 inch
Transducer cable length	5 m	5 m x 2

- **Liquid contact surface material:**Vibration plate:SUS316L • **Liquid temperature range:** 5 to 80 °C
- **Transducer:** PZT • **Outline drawing** Page27

S TYPE | Tank type

Model No.	W-357BM-600S	W-357BM-1200S
Generator Model No.	**W-357BM-600**	**W-357BM-1200**
Maximum allowable input	600 W	1200 W
Nominal oscillation frequency	1 MHz	
Effective cleaning area (W x D mm)	135 x 160	135 x160 2 locations
Dimensions (W x Dmm)External:	302 x 296 x 372	496 x 336 x 372
Inside tank:	248 x 236 x 252	442 x 276 x 252
Material	Tank: SUS316L , Packing: Viton and PTFE	
Drain valve	Rc 1/2	
Weight	11.6 kg	18 kg
Compatible wafers	6 inch	6 inch x 2
Transducer cable length	5 m	5 m x 2

- **Liquid contact surface material:**Vibration plate, Tank: SUS316L **Packing:** PTFE **Drain:** SUS304
- **Liquid temperature range:** 5 to 80 °C • **Transducer:** PZT • **Outline drawing** Page27

W-357LM Series

More compact than conventional model.

W-357LM-80
W-357LM-180
W-357LM-380
W-357LM-580

Nozzle type cleaner - PULSE JET line type

In these line type, nozzle type ultrasonic cleaners, which are mainly used for cleaning LCD glass, ultrasonic waves are applied to a streaming curtain of cleaning liquid to remove particles. Like point type cleaners, these models prevent particles from reattaching to the cleaned object, and they are effective for removing submicron contamination.

200 - 240

W-357LM-80 Suitable for cleaning LCD glass up to 80 mm wide

Output power adjustment between 10 and 110 W.

W-357LM-180 Suitable for cleaning LCD glass up to 180 mm wide

The nozzle is made of polypropylene (PP), which minimizes the generation of metal ions.

Output power adjustment between 20 and 220 W.

W-357LM-380 Suitable for cleaning LCD glass up to 380 mm wide

The nozzle is made of polypropylene (PP), which minimizes the generation of metal ions.

Output power adjustment between 30 and 330 W.

W-357LM-580 Suitable for cleaning LCD glass up to 580 mm wide

The nozzle is made of polypropylene (PP), which minimizes the generation of metal ions.

Output power adjustment between 40 and 440 W.

Generator

Model No.		W-357LM-80	W-357LM-180	W-357LM-380	W-357LM-580
Oscillation mode		Single frequency oscillation			
Rated output		110 W	220 W	330 W	440 W
Variable output range		10 to 110 W	20 to 220 W	30 to 330 W	40 to 440 W
Nominal oscillation frequency		1 MHz			
Power input		200 - 240 V AC Single phase 50/60 Hz 300 VA	200 - 240 V AC Single phase 50/60 Hz 600 VA	200 - 240 V AC Single phase 50/60 Hz 750 VA	200 - 240 V AC Single phase 50/60 Hz 900 VA
Interface	Analog output	4 to 20 mA current output			
	Contact output	3 contacts Alarm output, Oscillation detection output, Power ON output			
	External drive input	2 contacts Sensor input, Remote input			
	RS-485 communication	MODBUS® protocol, RTU mode			
Dimensions (W x D x H mm)		220 x 360 x 143 (including rubber feet)			
Weight		5kg			

- **Ambient operating environment:** Temperature: 5 to 40°C, Humidity: 5 to 80% (no condensation)
- **Power cable length:** 3 m • **Outline drawing** Page28

* MODBUS is the registered trademark of Schneider Electric USA, Inc.

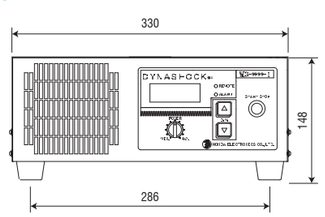
Transducer nozzle

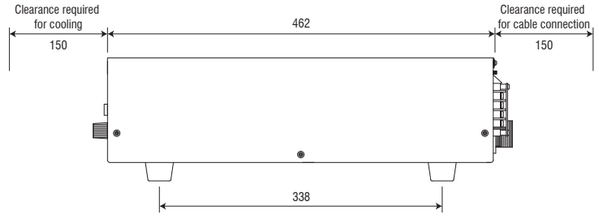
Generator Model No.	W-357LM-80	W-357LM-180	W-357LM-380	W-357LM-580
Flow rate	8L/min	18L/min	30L/min	45 to 60L/min
Dimensions	113 x 85 x 40	282 x 182 x 105	482 x 182 x 105	682 x 182 x 105
Nozzle diameter	95 x 2	194 x 2	400 x 2	600 x 2
Effective cleaning area	80 x 2	180 x 2	380 x 2	580 x 2
Weight	2 kg	2.7 kg	4.5 kg	6 kg
Material	Nozzle: SUS304 Packing: Silicone rubber Vibration plate: Tantalum	Nozzle: Polypropylene (PP) Packing: Silicone rubber Vibration plate: Tantalum		
Inlet	15A(1/2B) elbow	Compatible tube (inner diameter: 11, outer diameter: 13)		

- **Liquid temperature range:** 20 to 40 °C • **Transducer:** PZT
- **Cable length:** Output cable 5 m ● **Outline drawing** Page28

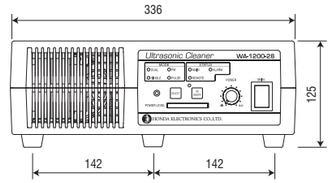
Generator

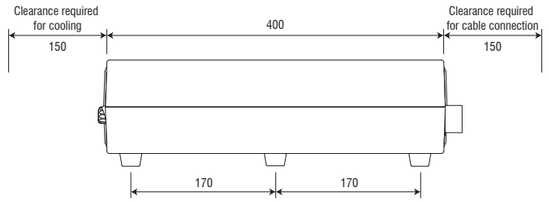
WDX Series



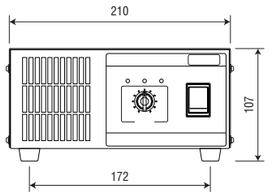


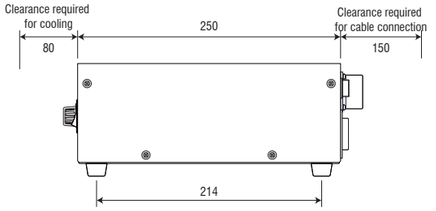
WA Series



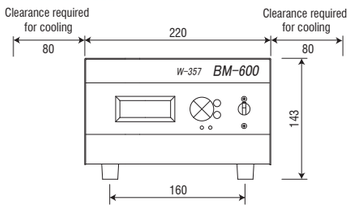


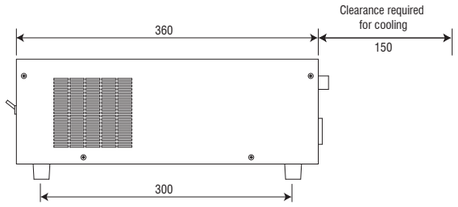
WSC Series / WSC(M) Series



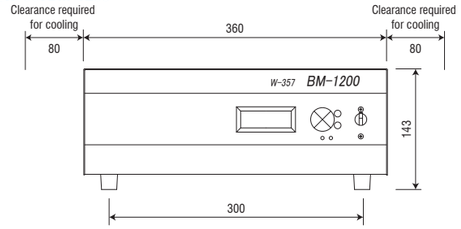


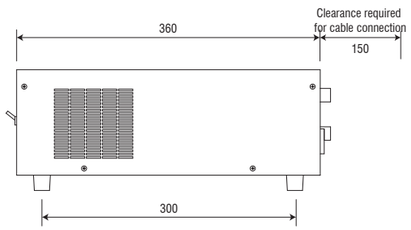
WW-357BM-600



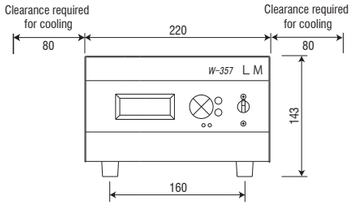


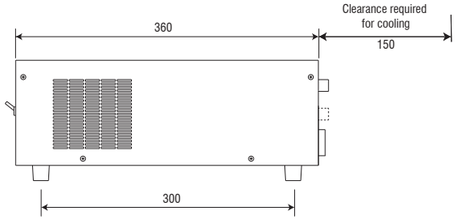
W-357BM-1200





W-357LM Series



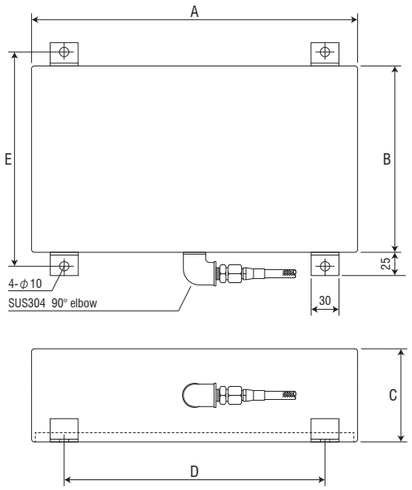


(Unit: mm)

* Actual product dimensions may vary slightly from those provided here.

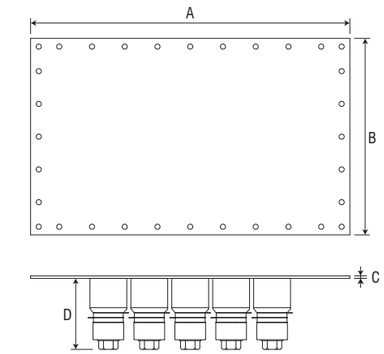
■Transducer unit

■N type Immersible type



Transducer Unit Model No.	A	B	C	D	E
N06-DX1	350	200	100	280	230
N12-DX1	420	300	100	320	330
N06-DX2	350	200	75	280	230
N06-28A	350	200	100	280	230
N06-40A	350	200	75	280	230
N12-28A	420	300	100	320	330
N12-40A	420	300	75	320	330
NST-28SC	350	200	100	280	230
NHP-28SC	420	300	100	320	330
NST-40SC	350	200	75	280	230
NHP-40SC	420	300	75	320	330

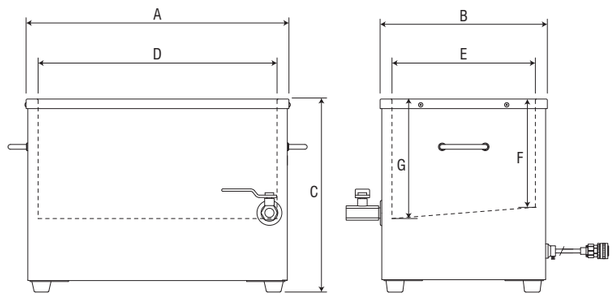
■F type Vibration plate type



Transducer Unit Model No.	A	B	C (t)	D
F06-DX1	390	240	3.0	80
F12-DX1	460	340	3.0	80
F06-DX2	390	240	3.0	57
F06-28A	390	240	3.0	80
F06-40A	390	240	3.0	54
F12-28A	460	340	3.0	80
F12-40A	460	340	3.0	54
FST-28SC	390	240	3.0	68
FHP-28SC	460	340	3.0	68
FST-40SC	390	240	3.0	54
FHP-40SC	460	340	3.0	54

* Contact us for details when transducer cover is attached.

■S type Tank type

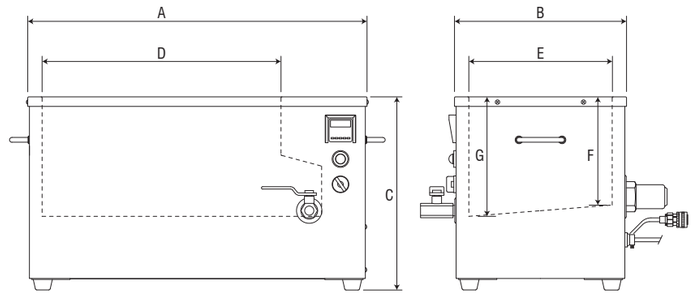


Transducer Unit Model No.	A	B	C	D	E	F	G
S06-DX1	422	302	405	370	250	250	250
S12DX-1	550	350	402	500	300	250	250
S06DX-2	422	302	405	370	250	250	250
S06-28A	422	302	405	366	246	248	248
S06-40A	422	302	405	366	246	248	248
S12-28A	550	350	402	500	300	224	250
S12-40A	550	350	402	500	300	224	250

* The positions of parts such as drains, cables, and handles may vary depending on the model. Contact us for details.

■Transducer unit

■SH TYPE Tank type with heater

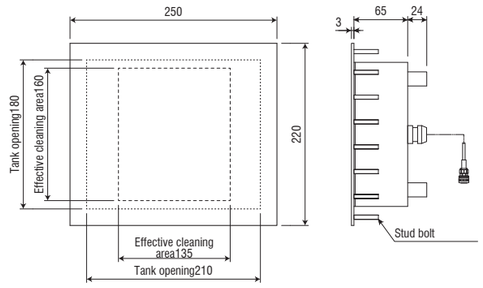


Transducer Unit Model No.	A	B	C	D	E	F	G
SH06-DX1	580	310	406	370	250	250	250
SH12-DX1	710	360	405	500	300	250	250
SH06-DX2	580	310	406	370	250	250	250
SH06-28A	580	310	406	370	250	250	250
SH06-40A	580	310	406	370	250	250	250
SH12-28A	710	360	405	500	300	224	250
SH12-40A	710	360	405	500	300	224	250

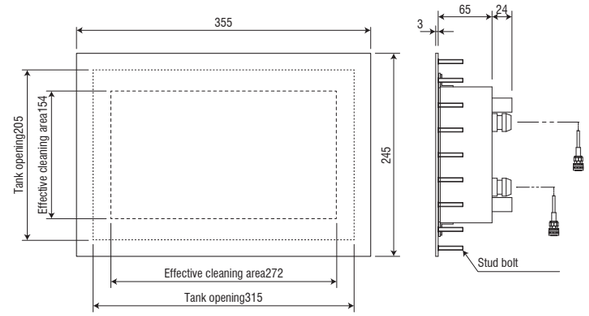
* The positions of parts such as drains, cables, and handles may vary depending on the model. Contact us for details.

■W-357BM Series F TYPE Vibration plate type

W-357BM-600

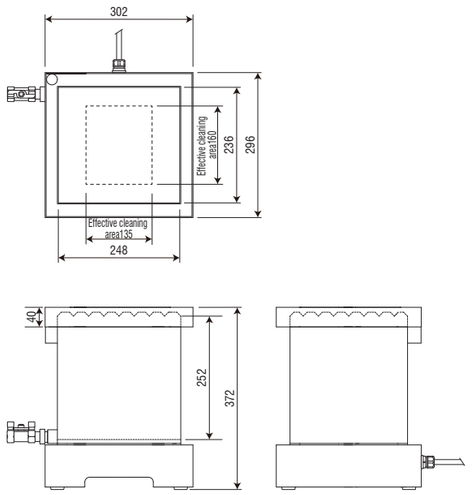


W-357BM-1200

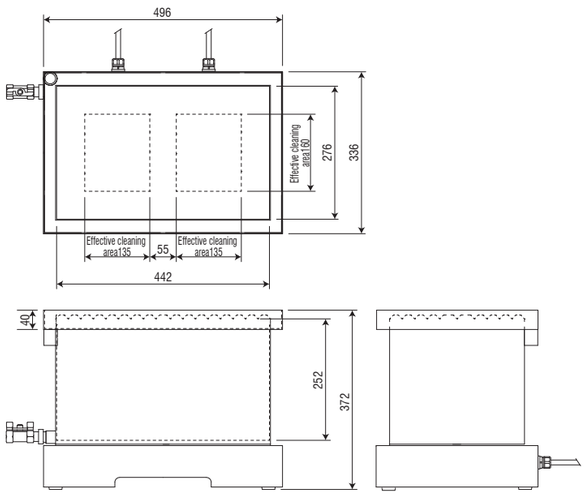


■W-357BM Series S TYPE Tank type

W-357BM-600



W-357BM-1200

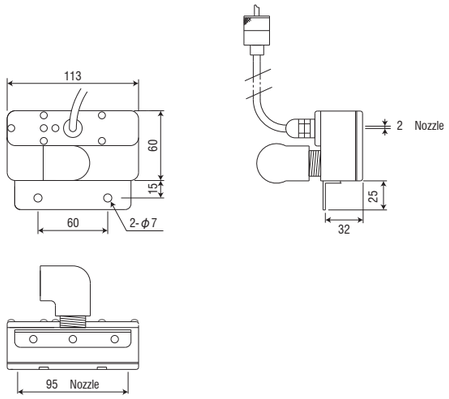


(Unit: mm)

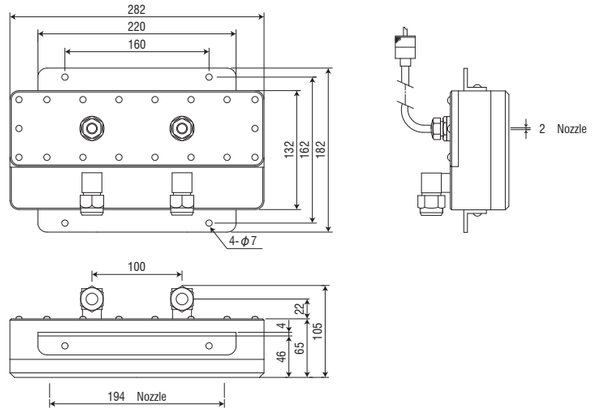
* Actual product dimensions may vary slightly from those provided here.

■Transducer nozzle

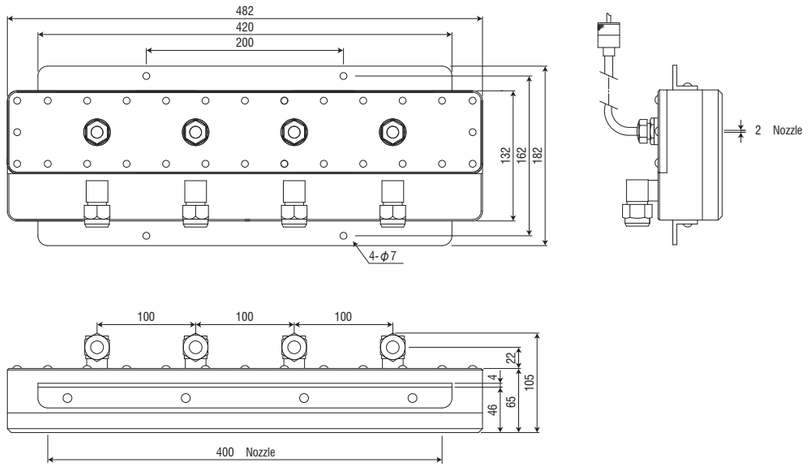
■W-357LM-80



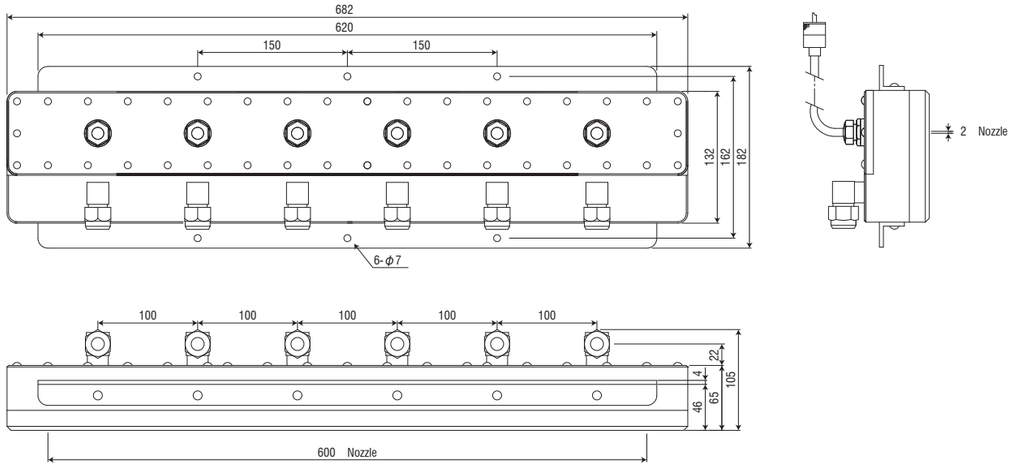
■W-357LM-180



■W-357LM-380



■W-357LM-580



(Unit: mm)

* Actual product dimensions may vary slightly from those provided here.

Ultrasonic processing tools

Using ultrasound in power tool applications

Ultrasonic waves can be used in power tool applications by transmitting the vibrational energy through a medium (liquid, solid, or gas). This is called "high-power ultrasound". Typical application examples include cleaning, cutting, and welding.

Characteristics of ultrasound

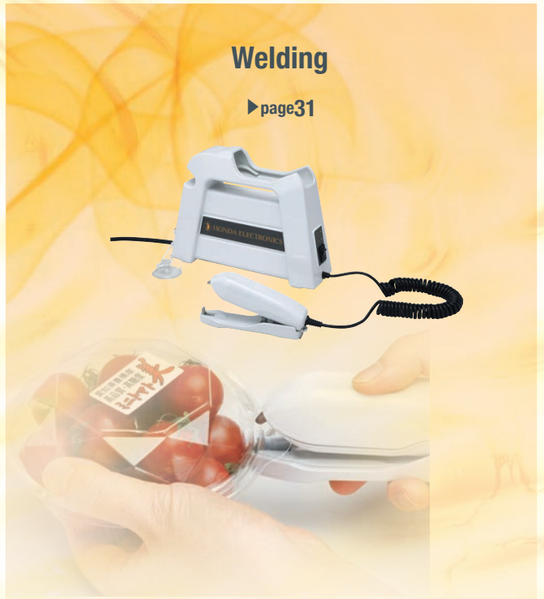
- Transmits more easily through higher density media (gas < liquid < solid)
- Longitudinal waves are generated in a gas or liquid, while waves such as longitudinal, transverse, torsional, or surface waves may be generated in a solid
- High sound pressure and strong power density are generated with small vibrational displacement
- A higher amplitude increases the transmission distance for ultrasonic waves at the same frequency

Cutting

▶page30

Welding

▶page31



Cutting

When ultrasonic vibration is applied to a blade, the friction between the blade and the cutting surface is reduced, dramatically increasing the cutting ability.

Welding

When ultrasonic vibration is repeatedly applied to the materials of two surfaces that are touching each other, frictional heat is instantly generated between the two surfaces, causing them to soften and weld together.

Ultrasonic cutting

Cutting with ultrasonic vibration

When ultrasonic vibration is applied to a blade, the friction between the blade and the workpiece is reduced. As a result, less physical force is reguired when cutting the workpiece.

* If the blade is not capable of cutting the material by itself (without ultrasonic vibration), it will not be able to cut the material when ultrasonic vibration is applied.

Ultrasonic cutter

ZO-95

Equipped with a super high mode! High-end ultrasonic cutter model

- Application of our newly developed ultrasonic transducers
- Enables power switching in 3 levels (S-High/High/Normal)
- Work can easily be performed using the foot switch.
- The hand piece can be switched, reducing replaced so that the time to exchange the blade is reduced.*

*Purchase of an option hand piece is required

Model No.	ZO-95	
Oscillation frequency	40 kHz	
Power Source	AC adapter	INPUT : 100-240 V AC 50/60Hz OUTPUT : 12 V DC
Max. power consumption	Max. 110 VA	
Ambient temperature	Temperature: 10 to 35 °C (No condensation)	
Dimensions (W x D x H mm)	Main unit: Handpiece:	185 x 169 x 55 ϕ28 x 150 (including blade)
Handpiece cable	1.6 m (straight cable)	
Weight	Main unit(Generator): Hand-piece:	Approx. 1.2 Kg Approx. 350g (including hand-piece cable)

■ **Included accessories:** BDC-200P (1 case of 40 replacement blades *Blades with holes cannot be used), Blade fixture ZH04 (1 pc), Blade fixing screws HB03 (3 pcs), Hexagon wrench RR02 (1 pc), AC adapter (1 pc), Torque screwdriver ZH25T(1 pc), Foot switch ZH801(1 pc)

Main applications and use examples

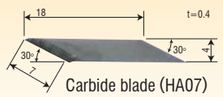
- Plastic, accessories, gate cutting of parts, deburring
- Cutting plastic models, etc.
- Cutting film, sheets, cloth, etc.
- Cutting substrate patterns

Resin and plate thickness that can be cut (approximate)

- Resin: ABS, PP, PET, acrylic
- Board thickness: 3 mm or less (depending on blade and material)

Ultrasonic cutter blade selection

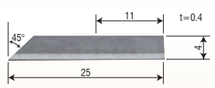
Standard blade (HA04)
Material: SK-2



Carbide blade (HA07)
Material: Tungsten carbide
* Superior wear resistance, used in a wider range of applications than steel
* Not electrically conductive or magnetic

Zirconium ceramic standard blade (ZH48)
Material: Zirconium ceramic

Square blad (ZH41) *1
Material: SKH
* Popular option for hole cutting processes



Long blade (ZH10) *1
Material: SKH

Round tip blade (ZH09)
Material: SKH

Round tip blade (ZH42) *1
Material: SKH

*1 The effective length of the blade is 11 mm shorter when installed in the handpiece.

Ultrasonic cutter

ZO-91

Standard model ultrasonic cutter with user-friendly design

- Equipped with new TAF™ circuit that adds power when cutting is difficult!
- Able to select Normal mode or High mode.

Model No.	ZO-91	
Oscillation frequency	40 kHz	
Power Source	AC adapter	INPUT : 100-240 V AC 50/60Hz OUTPUT : 12 V DC
Max. power consumption	Max. 85 VA	
Ambient temperature	Temperature: 10 to 35 °C (No condensation)	
Dimensions (W x D x H mm)	Main unit: Handpiece:	173 x 89 x 76 ϕ32 x144 (including blade)
Handpiece cable	1.6 m (straight cable)	
Weight	Main unit(Generator): Hand-piece:	Approx. 300 g Approx. 70 g (including hand-piece cable)

■ **Included accessories:** BDC-200P (1 case of 40 replacement blades *Blades with holes cannot be used), Blade fixture ZH04 (1 pc), Blade fixing screws HB03 (3 pcs), Hexagon wrench RR02 (1 pc), AC adapter (1 pc)

Main applications and usage examples

- Gate cutting and deburring plastic, small objects, and parts
- Cutting plastic models
- Cutting films, sheets, cloth, etc.
- Cutting substrate patterns

Resin and plate thickness that can be cut (approximate)

- Resin: ABS, PP, PET, acrylic
- Board thickness: 3 mm or less (depending on blade and material)

*1 The included power cable complies with regulations and safety standards in Japan (100 V). If you intend to use this product outside Japan, purchase and use a power cable that complies with the relevant regulations and safety standards of your country or region.

Ultrasonic welder

Portable ultrasonic welder

SONAC-37

Sonic sealer

Using the vibrational energy of ultrasound for welding.

Ultrasonic vibration generates frictional heat on objects at the point of contact, and the heat causes the material to melt and become welded.

No preheating is required, so the welder can be used as soon as it is turned ON. The lack of a heat source also makes it very safe to use. In addition, ultrasonic welders are well-suited for use in food packaging applications, because the absence of metal staples and adhesives eliminates the concerns for product contamination.

Facilitates packaging operations with safe, energy-saving, eco-friendly design

- Ultrasonic vibration (approx. 60,000 cycles per second) enables safe and easy welding.
- The lightweight, compact handpiece is easy to use, and it fits into the unit for storage.
- No metal staples are used, which removes the risk of product contamination and eliminates the need to separate the waste materials after use.
- Durability is improved with empty welding prevention function.

Model No.	SONAC-37
Rated output	20 W
Nominal oscillation frequency	57 kHz
Power input	100 V AC 50/60 Hz 30 W
Dimensions (W x D x H mm) Main unit: (excluding protrusions) Handpiece:	70 x 220 x 165 32 x 125 x 49
Weight	920 g

Standard (YK01)

For creating a tamper-evident seal (YK02)
* A hole is created in the package when the seal is broken, making it easy to recognize whether or not the package has been opened.

■ **Included accessories:** Welder clasp (YK01)
- **Transducer:** Bolt-clamped Langevin type transducer
- **Effective welding range:** 6 x 3 mm
- **Output cable length:** 0.5 m (curled cable)
- **Protective equipment:** Thermostat, Empty welding prevention function
- **Power cable length:** 1.5 m
- **Option:** Welder clasp (YK02) P45

Main applications and usage examples

- Food packaging (OPS, A-PET)
- Blister packages
- Temporary tacking of synthetic clothing
- Industrial film
- Sealing of plastic bags
- Resin tape (tags, garden tape)

- **Welding examples**

Food packaging

Non-woven cloth

Plastic bag

Net packaging

Ultrasonic measuring instruments

Using ultrasound in information processing applications

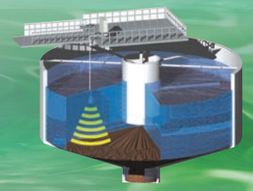
Ultrasonic waves can be used in information processing applications by transmitting signals from an ultrasonic sensor through a medium (liquid, solid, or gas). Typical application examples include level meters, and flowmeters.

Characteristics of ultrasound

- The speed of sound is slower than that of radio waves and light, so measurement results are more accurate. Ultrasound is particularly useful when performing measurements in a solid or medium with low light transmittance, or when measuring distance to a transparent object that does not reflect light.
- Ultrasonic wavelengths are shorter and have better directivity than those at audible frequencies.
- Attenuation of ultrasonic waves is greater than that of audible frequencies, so the waves tend to travel shorter distances.

Level meter

■Non-contact level measurement ▶page34
■Interface level measurement ▶page36



Flowmeter

▶page38

Level meter

■**Non-contact level measurement**
There is no physical contact between the sensor and surface, enabling continuous measurement of tank levels even under dusty conditions.
■**Interface level measurement**
The interface level can be measured in cloudy sewage water or in deep tanks, without dropping the sensor down to the sediment layer.

Flowmeter

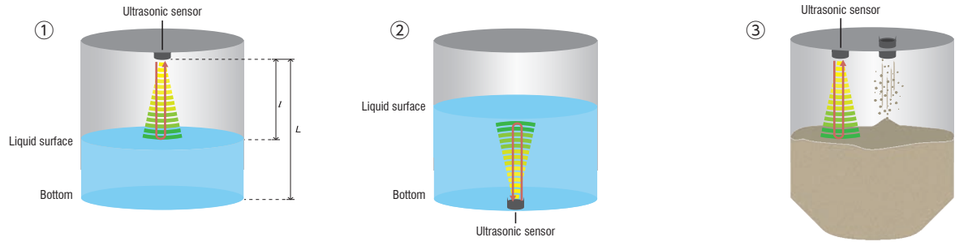
Ultrasonic waves are used to measure the fluid velocity, which is then used to calculate the flow rate.

Distance measurement using ultrasonic waves

The distance to an object can be measured by applying ultrasonic waves and measuring how much time it takes to bounce back.

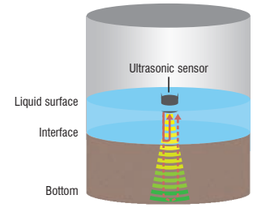
Level meter

The ultrasonic level meter makes use of the phenomenon in which ultrasonic waves are reflected on liquid surfaces and measures the distance from the ultrasonic sensor to the liquid surface. Using this technology, the liquid quantity within the tank and the amount of remaining raw materials can be managed.
For liquid quantity management, the liquid quantity can be calculated based on the calculation results from the distance (L) from the ultrasonic sensor to the bottom of the tank provided in advance and the distance (l) to the liquid surface.
The measurement methods include (1) a method that makes use of reflections on the liquid surface from air and (2) a method to use reflections on the border of the gas by sending ultrasonic waves from the bottom surface. At factories and plants, the method is applied to control inflow and outflow quantities to and from the tank by calculating the rising and dropping of the liquid surface in real time. (3) As with the liquid surface, reflecting signals of ultrasonic waves can be detected from powder as well, and can be used to manage the remaining quantity of raw materials, etc. Using the signal output by the level meter, the inflow and outflow of liquids to and from the tank can be controlled using a pump, preventing risks of falling when performing manual measurements at high places.



Interface level meter

Since ultrasonic waves reflect on the border surface of mediums, measurements of border surface levels, that may be split in 2 levels in the tank can be performed.
Ultrasonic waves are output from a sensor set underwater and reflected from the border surface. The height of the border surface is calculated by the time the reflected wave is received.
Measurement is possible without disrupting the formed sludge surface since measurements are performed without coming in contact with sediments such as sludge. Also, border surface level measurement in unclear treated water with low light transmission is possible.
Slurry discharge pump operation can be controlled using measurement data of the border surface level meter. Also, it is useful when determining the timing to inject flocculants (pac) since the sludge subsidence state can be confirmed.



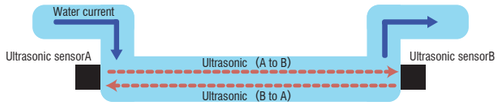
Measurement of liquid flow velocity using ultrasonic waves

Liquid flow velocity is measured using ultrasonic waves, enabling calculation of the flow rate using that flow velocity.

Flowmeter

The ultrasonic flowmeter has the following characteristics
- The ultrasonic sensor does not come in contact with fluids to be measured
- No pressure loss since there are no structures in the piping
- A wide range of measurements from low flow velocity (several centimeters per second) to high flow velocity (several tens of meters per second) can be performed
- To increase the measurement precision, straight pipe parts are required before and after

The transmission time difference method is applied as the main measurement method.



Transmission time difference type ultrasonic flowmeters calculate the flow rate by calculating the flow velocity from the time difference achieved by measuring the transmission time of the ultrasonic wave emitted from the upper stream that is received at the lower stream (route A to B) as well as the transmission time from the lower stream to the upper stream (route B to A) using ultrasonic sensors that are placed on the upper stream (A) and lower stream (B) of the flow.
Since the transmission time difference method uses transmission of ultrasonic waves, it is optimal when measuring clean fluids with a small amount of bubbles and floating matter as well as minimal ultrasonic wave attenuation.
For example, it is applied to equipment that perform flow rate management of chemical liquids for semiconductor manufacturing equipment and water processing.

Ultrasonic non-contact level measurement

HD323

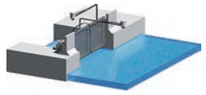
Low-cost model with two-wire system, featuring a graphic LCD display

- Two-wire system reduces the cost of installation, wiring, and operation
- Graphic LCD display shows the A-mode waveform
- When performing measurements, masking can be applied to objects positioned between the sensor and target

Main applications and usage examples

- Management of liquid level in tanks
- Management of sewage level inside pipes
- Measurement of water level in lakes, ponds, and rivers

■ Measurement of liquid level



■ Management of river water level

Model No.		HD323
Number of channels		1
Frequency		50 kHz
Measurement target		Liquid
Measurement distance range		0.25 to 7.5 m
Resolution	Measurement	1 mm
	Display	1 mm
Accuracy		±0.25% F.S. (±18.8 mm)
Data update cycle		10 sec
Sensor directivity angle		14°(-6 dB) 10°(-3 dB)
Power source	Voltage	24 V DC ±10%
	Power consumption	0.6 W
Display		Graphic LCD
Display size		HD320: LCD (28.1 x 9.1 mm) HD323: LCD (50 x 25 mm)
Output	4 to 20 mA current output	Resolution: 12 bits (Max. load resistance 500Ω, 24 V)

	Main unit (Sensor)
Ambient operating temperature	-20 to +70°C
Material	PP (Polypropylene)
Protection standard	IP65 equivalent (Without lid: IP20 equivalent)
Dimensions	dia. 93 x 110 mm
Wiring cable length	10 m
Weight	350 g
Mounting screws (former JIS)	G2 (PF2)

What is a two-wire system?

A two-wire system supplies electric power through the data line, so that the electrical wiring can be performed with only two lines (the power + data wire, and the ground wire).

Use resin nuts, flanges, etc. for installation.
Do not use metal nuts, flanges, etc. Doing so may cause measurement errors.

HD353-A

Low-cost DSP level meter

- Graphic LCD display shows the A-mode waveform
- Wide measurement range, from 0.3 to 10 m
- When performing measurements, masking can be applied to objects positioned between the sensor and target
- Remote operation is enabled with RS-485 (MODBUS® protocol), 4 to 20 mA current output, and alarm output contact points

Main applications and usage examples

- Management of liquid/powder levels in tanks
- Measurement of water level in lakes, ponds, and rivers

Model No.		HD353-A
Number of channels		1
Frequency		50 kHz
Measurement target		Liquid/powder
Measurement distance range (1/2 for powder)		0.3 to 10 m
Resolution	Measurement	1 mm
	Display	1 mm
Accuracy		±0.25% F.S. (±2.5 cm)
Data update cycle		0.5 sec
Sensor directivity angle		14°(-6 dB) 10°(-3 dB)
Power source	Voltage	12 V - 24 V DC ±10%
	Power consumption	3 W
Display		Graphic LCD
Display size		HD350: LCD (28.1 x 9.1 mm) HD353: LCD (50 x 25 mm)
Output	Alarm output	1 point each for upper/lower
	4 to 20 mA current output	Resolution: 12 bits (Max. load resistance 500Ω)
Interface		Transmission distance: Max. 1200 m

	Main unit (Sensor)
Ambient operating temperature	-20 to +70°C
Material	PP (Polypropylene)
Protection standard	IP65 equivalent (Without lid: IP20 equivalent)
Dimensions	dia. 93 x 110 mm
Wiring cable length	10 m
Weight	350 g
Mounting screws (former JIS)	G2 (PF2)

Option ● **30 m cable (HD-002)** P41

* MODBUS is the registered trademark of Schneider Electric USA, Inc.

Use resin nuts, flanges, etc. for installation.
Do not use metal nuts, flanges, etc. Doing so may cause measurement errors.

HD1200

■TS40T-5

■TS40-5

Equipped with DSP that achieves stable measurement

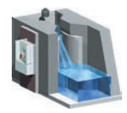
- A unique level detection algorithm is achieved with DSP, which enables stable measurement by eliminating the effects of noise and unwanted reflection
- Two sensors can be connected to the main unit at the same time, so measurement can be performed at two separate locations with different measurement ranges
- Log data can be stored on a micro SD™ card
- Standard-equipped with a weir type flowmeter function

Main applications and usage examples

- Management of liquid/powder levels in tanks
- Measurement of water level in lakes, ponds, and rivers
- Weir type flow measurement

■ Measurement of liquid level

■ Measurement of powder level



■ Application in large capacity weir

Model No.		HD1200
Number of channels		2
Frequency		10 to 60 kHz (selected according to sensor specifications)
Measurement target		Liquid/powder
Resolution	Measurement	1 mm
	Display	1 mm
Accuracy		±0.25% F.S.
Data update cycle		Approx. 2 sec (varies depending on sensor specifications)
Power source	Voltage	100 V - 240 V AC ±10%
	Power consumption	10 VA
Display		LCD display (with backlight)
Output	Alarm output	4 points per channel 250 V AC, 5 A (relay contact)
	4 to 20 mA current output	Resolution: 12bit (Max. load resistance 600Ω)
Interface		RS485 (Transmission distance: Max. 1200 m) RS232C (Transmission distance :Max. 10 m)
External memory		microSD™

Model No.	HD1200
Ambient operating temperature	-20 to 70°C
Material	ABS
Structure	IP66 equivalent
Dimensions (W x D x H mm)	176 x 84 x 237
Weight	1.8 kg

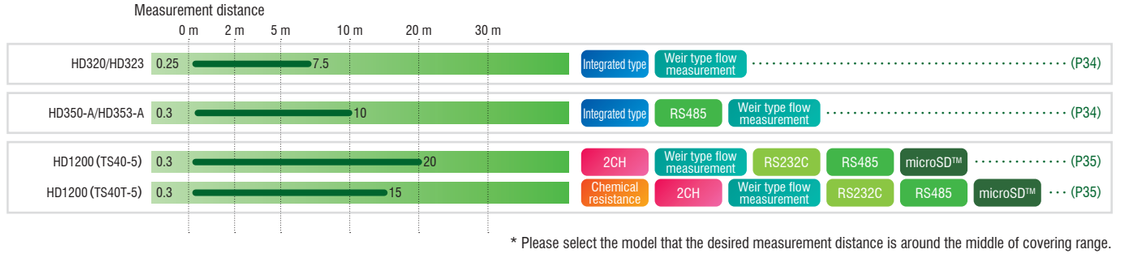
Note: Weir type flowmeter is available for CH1 only.

* microSD™ is the trademark or registered trademark of SD Card Association.

Model No.	Sensor	
	TS40-5	TS40T-5
Frequency	40 kHz	
Measurement distance range (1/2 for powder)	0.3 to 20 m	0.3 to 15 m
Sensor directivity angle	12°(-6 dB) 8°(-3 dB)	22°(-6 dB) 16°(-3 dB)
Ambient operating temperature	-20 to 70°C	
Material	Epoxy/silicone/PP	PVDF
Structure	IP68 equivalent	IP68 equivalent
Dimensions	dia. 84 x 90mm	dia. 98 x 87 mm
Sensor cable length	5 m	
Weight	500 g	860 g
Sensor mounting screws (former JIS)	R1 (PT1)	G1 (PF1)

• The sensors cannot be used in a hydrofluoric acid environment.
* Contact us if sensor cable extension is required.

Ultrasonic level meter selection guide



* Please select the model that the desired measurement distance is around the middle of covering range.

Ultrasonic interface level measurement

Ultrasonic interface level meter

HL2000

Enables stable measurement of sludge interface in sedimentation tanks

- Non-contact measurement is performed with a stationary sensor, which eliminates the risk of the sensor interfering with the rake. The sensor also does not disturb the interface, enabling long-term stable measurement
- Distances of 0.4 to 10 m from the sensor transmission surface can be measured
- Two sensors can be connected to the unit at the same time, so interface measurements can be performed at two locations (The second sensor is optional)

Main applications and usage examples

- Management of interfaces in sedimentation tanks at industrial wastewater treatment facilities
- Management of interfaces in sedimentation tanks at sewage treatment facilities

Model No.		HL2000
Number of channels		2
Frequency		400 kHz
Measurement target		Sludge interface
Measurement distance range		0.4 to 10 m
Resolution	Measurement	1 cm
	Display	1 cm
Data update cycle		1 sec
Sensor directivity angle (half of full angle of sound pressure)		6°
Power source	Voltage	100 V - 240 V AC ±15%
	Power consumption	10 VA
Display		LCD display (with backlight)
Output	Alarm output	2 points each for upper/lower channel 250 V AC, 30 V DC, 5 A (relay contact)
	4 to 20 mA current output	Resolution: 16 bits, 1 point per channel (Max. load resistance 450Ω)
Interface		RS232C (Transmission distance: Max. 10 m)

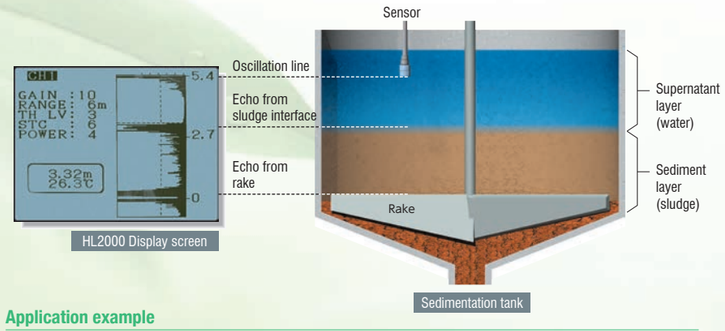
	Main unit	sensor
Ambient operating temperature	-10 to 60°C	-5 to 60°C
Material	Painted steel	Case: PVC Cable: PVC
Structure	IP54 equivalent	IP68 equivalent
Dimensions (W x D x H mm)	280 x 92.5 x 322	dia. 80 x 95
Sensor cable length	—	20 m
Max. sensor cable length	—	100 m*
Weight	3.6 kg	2.2 kg

*** Contact us if sensor cable extension is required.**

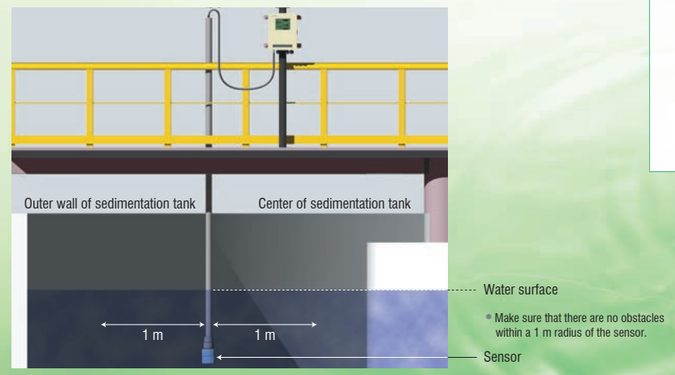
Option ● **Cleaning nozzle**

Ultrasonic interface level meter concept and application example

Concept



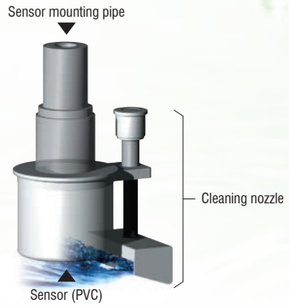
Application example



● Make sure that there are no obstacles within a 1 m radius of the sensor.

Sensor cleaning procedure

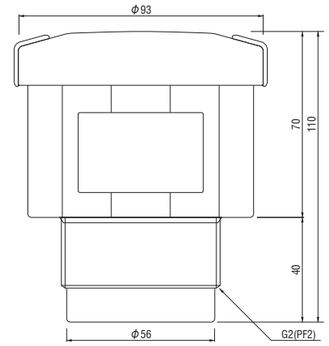
- Contamination on the sensor surface interferes with sludge interface measurement. Use the cleaning nozzle to keep the sensor clean.
- Constantly supply water to the cleaning nozzle. (The recommended flow rate is 20 L/min.)



Outline drawings

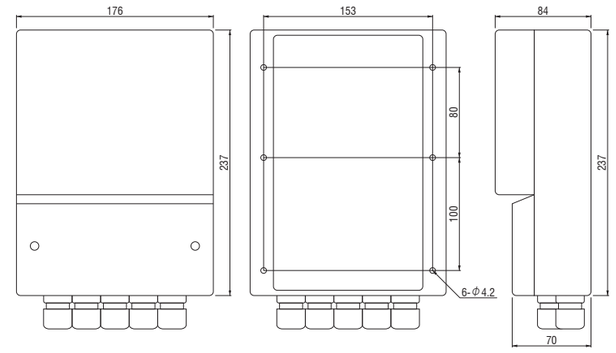
HD320・HD323・HD350-A・HD353-A

Main unit (Sensor)

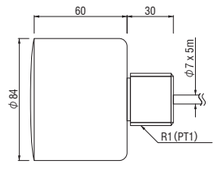


HD1200

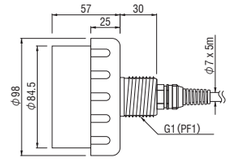
Main unit



TS40-5

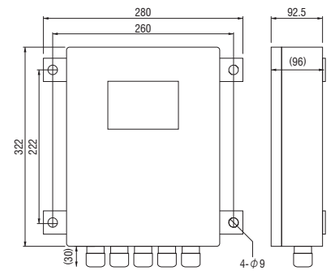


TS40T-5

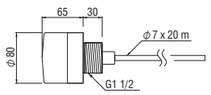


HL2000

Main unit



Sensor



Ultrasonic flow measurement

Ultrasonic flowmeter

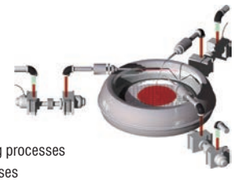
HLF800 Series

Converter HLF810

Converter HLF820

Equipped with a digital signal processor that enables high-precision, stable flow measurement

- Stable flow measurement is achieved with our unique signal arithmetic processing method performed by a digital signal processor (DSP)
- The ability to use two channels saves space and improves cost effectiveness
- Wiring work is simplified with detachable sensors and cables
- With no moving parts in the flow path, there is minimal pressure loss
- The use of NEW PFA on all liquid contact surfaces provides high corrosion resistance, which is suitable for measuring the flow rates of DIW or chemical liquids
- Complies with EMC (EN 61326) and RoHS directives
- Able to select from models with a display (HLF820) or without a display (HLF810)

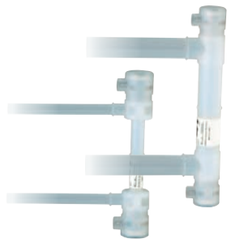


Main applications and usage examples

- Measuring the flow of deionized water or ultrapure water for semiconductor manufacturing processes
- Managing the flow of highly corrosive chemical liquids used in chemical treatment processes
- Measuring the flow of slurry liquids for chemical mechanical polishing (CMP) processes

Two different sizes of sensors can be connected to the same converter

The ability to connect two sensors to one converter saves space and improves cost performance, by enabling flow rates to be measured at multiple locations. The sensors can be used to measure the flow rates of different fluids, or different sizes of sensors can be connected.



Equipped with VFD display

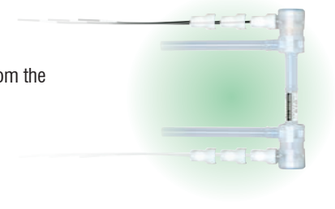
The vacuum fluorescent display (VFD) provides excellent visibility. (HLF820 only)

Supports measurement of high-temperature chemical liquids

Suitable for use in recent applications that incorporate a diversity of chemicals at a wide range of temperatures. All liquid contact surfaces are made of NEW PFA, which provides excellent chemical resistance. Our self-developed transducers enable flow measurement at high temperatures of up to 200°C (K type). *The maximum temperature for the 04 size model is 180°C.

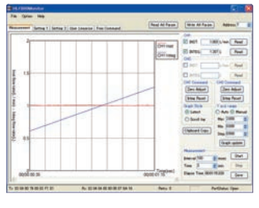
Detachable cables enable easy installation

Setup is simplified with cables that can be detached from the sensor unit
before installation, and then reattached later.
Cable lengths of 5 m or 7 m can be selected.

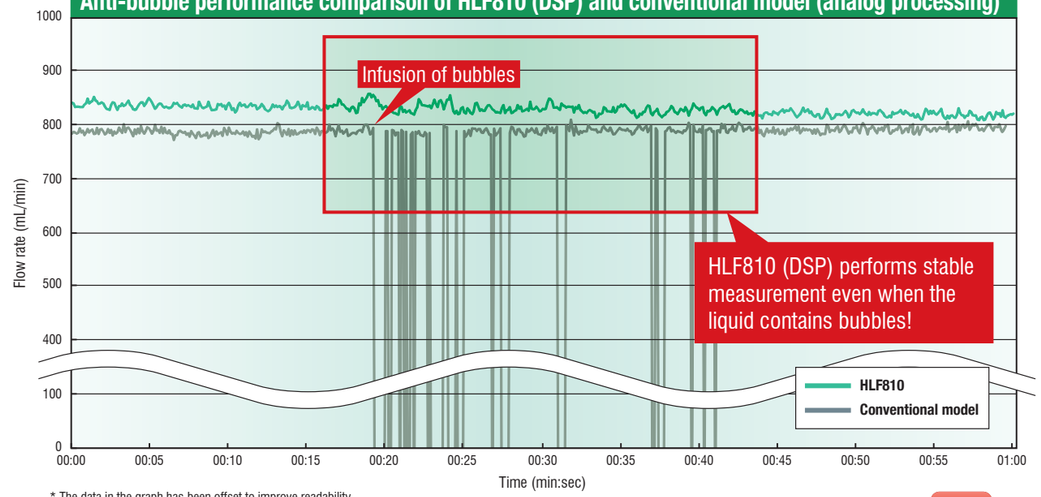


RS-485 enables remote monitoring via computer

With the standard-equipped RS-485 communication function, the dedicated control software (HLF800 Monitor) can be used on a computer to set the parameters and monitor the flow rate data remotely.



Anti-bubble performance comparison of HLF810 (DSP) and conventional model (analog processing)



* The data in the graph has been offset to improve readability.

Patented CE

Converter

Model No.		HLF810	HLF820
Measurement method		Measuring propagation time difference between sending and receiveng ultrasonic wave	
Accuracy		±1% F.S. (DIW at 20°C)	
Data update cycle		0.01 sec	
Power source	Voltage	24 V DC ±10% (21.6 to 26.4 V)	
	Power consumption	4 W	5 W
Display		—	Vacuum fluorescent display (VFD), 16 characters x 2 lines
Digital input		Open collector input or non-voltage contact input, 2 points Selectable from integrated value reset or zero-point adjustment	
Output	4 to 20 mA current output	2 points Resolution: 12 bits (Max. load resistance 600Ω)	
	Digital output	Open collector output (Max. 35 V/0.1 A), 2 points Selectable from comparison, integrated pulse, instantaneous frequency, or error output	
Interface		RS485 (MODBUS® protocol, RTU mode) Up to 32 converters can be concatenated (Address setting: 1 to 32) Baud rate: 9600,19200,38400,57600bps	
Case material		ABS	
Ambient operating temperature		0 to 50°C (No condensation)	
Weight		130 g	230 g
Installation method		DIN rail	Panel mount

* MODBUS is the registered trademark of Schneider Electric USA, Inc.

Sensor

Model No.		HLFS01-04		HLFS01-06		HLFS01-08		HLFS01-12		HLFS01-16	
Measurement target		Ultrapure water/Deionized water/Chemical liquids									
Flow rate measurement range		0 to 2 L/min		0 to 6 L/min		0 to 20 L/min		0 to 50 L/min		0 to 80 L/min	
Connection tube size		1/4"		3/8"		1/2"		3/4"		1"	
Accuracy *1	Measured flow rate	0 to less than 800mL/min	800 to 2000mL/min	0 to less than 2000mL/min	2000 to 6000mL/min	0 to less than 4.3L/min	4.3 to 20L/min	0 to less than 11.8L/min	11.8 to 50L/min	0 to less than 20L/min	20 to 80L/min
	Flow rate accuracy	±8mL/min	±1% R.D.	±20mL/min	±1% R.D.	±43mL/min	±1% R.D.	±118mL/min	±1% R.D.	±200mL/min	±1% R.D.
Max. operating pressure		0.5MPa (0 to 90°C) / 0.2MPa (90 to 200°C)								*2	
Fluid temperature	Standard type	0 to 90 °C								—	
	High-temperature type	0 to 180 °C		0 to 200 °C							
Ambient operating temperature		0 to 80 °C									
Liquid contact surface material		NEW PFA									
Weight		90 g		110 g		130 g		160 g		220 g	
Pressure loss factor		3.7863		0.6937		0.1146		0.0138		0.0033	

*1 deionized water at 20 °C Repeat accuracy in our testing environment
*2 0.5 MPa (0 to 60 °C) / 0.2 Mpa (60 to 200 °C)

Pressure loss

$\Delta P = AQ^2$ ΔP: Pressure loss[kPa] A: Pressure loss factor (DIW at 20°C) Q: Flow rate[L/min]

Connection cable between converter and sensor

Model No.	HLFS01 cable 5 m	HLFS01 cable 7 m
Material	ETFE	
Length	5 m	7 m
Weight	150 g	210 g

Type name and specifications

HLFS01-○○△□

Applicable temperature None: Standard, 0 to 90°C
K: High-temperature, 0 to 200°C (or up to 180°C for 04 type)

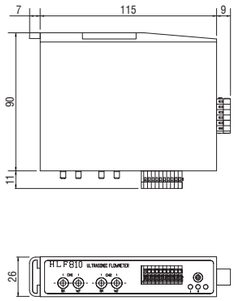
Shape U: U-shape Z: Z-shape

Connection tube size 04: 1/4″
06: 3/8″
08: 1/2″
12: 3/4″
16: 1″ * See table above for flow rates

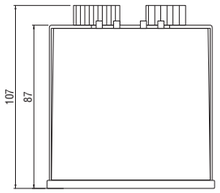
Outline drawings

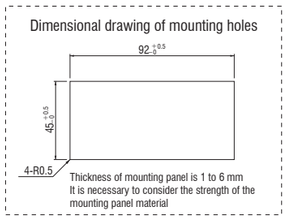
HLF810/820

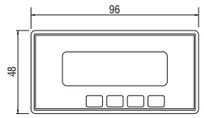
Converter (HLF810)

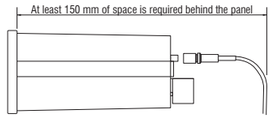


Converter (HLF820)



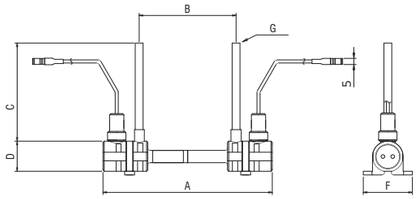


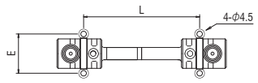


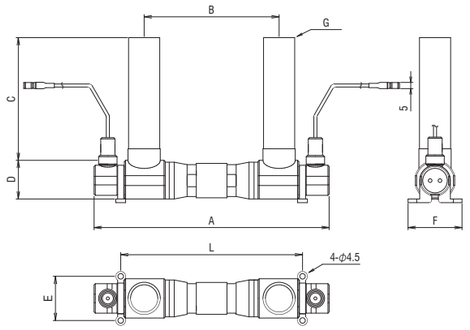


Sensor (HLFS01)

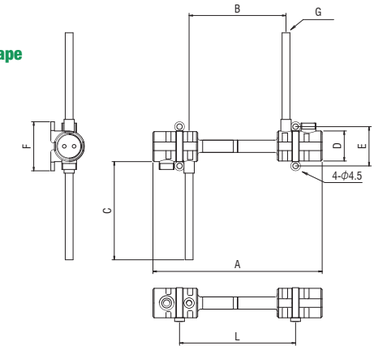
U-shape

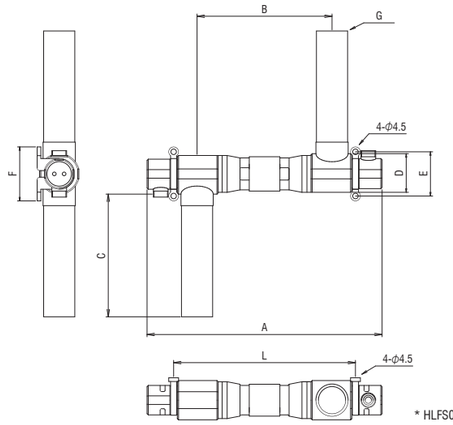






Z-shape





* HLFS01-16 only

* HLFS01-16 only

Model No.	A	B	C	D	E	F	G	L
HLFS01-04	138	80	80	24.5	32	40	1/4"	94.6
HLFS01-06	145	80	100	24.5	32	40	3/8"	101.6
HLFS01-08	178	110	100	24.5	32	40	1/2"	134.6
HLFS01-12	184	110	100	24.5	32	40	3/4"	140.6
HLFS01-16	192	110	100	31.5	36	44	1"	148.2

(Unit: mm)

* Actual product dimensions may vary slightly from those provided here.

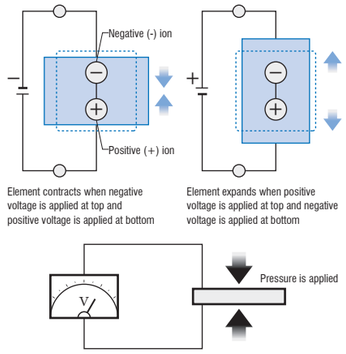
Transducers - Piezoelectric ceramics -

Using piezoelectric ceramics in ultrasonic cleaners

For processing equipment

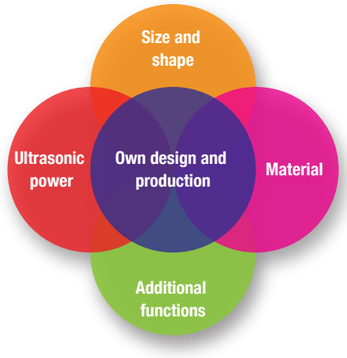
Bolt-clamped Langevin type transducers

Ordinary sound is generated by the vibrations that occur when an object is struck. However, a special method is required to generate high frequency sound such as ultrasound. By attaching electrodes to a vibration element (ceramic) and applying AC voltage, the element expands and contracts repeatedly to generate vibrations that produce ultrasound. Conversely, when pressure is applied to the vibration element, voltage is generated between the electrodes. This phenomenon is called the piezoelectric effect, and this type of element is called an electro-acoustic conversion element or transducer. Piezoelectric ceramics are polycrystalline ceramics that consist of high-purity powders (titanium oxide, barium oxide, etc.) sintered at high temperatures. When polarization treatment is applied, this type of ceramic acquires the same piezoelectric properties exhibited by single-crystal materials such as quartz. These piezoelectric ceramics have unlimited potential for use in electronics and ultrasonic sensors.

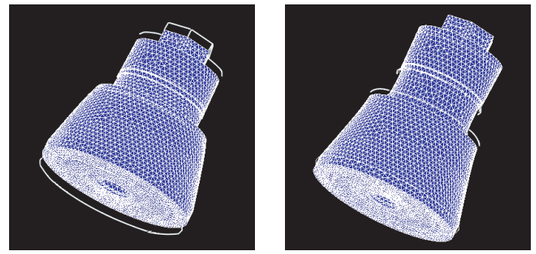


Our strong point

Honda Electronics produces transducers from piezoelectric ceramic materials. Our unique self-developed transducers are designed and manufactured to achieve optimum performance with excellent quality, low cost, and quick delivery, and they are incorporated into our own ultrasonic products.



Transducer design based on FEM analysis



Variety of specially designed ultrasonic transducers
The shape and performance of ultrasonic transducers are optimized to suit the application

Special material

HEC-1540P4HFD

Special shape

HEC-1560P2HFE

Special processing

HC-2024

Bolt-clamped Langevin type transducers

Using piezoelectric ceramics in ultrasonic cleaners

Piezoelectric ceramics are mechanically connected in series, which makes them robust and capable of high-amplitude oscillation without damage. In addition, due to the high electro-acoustic conversion efficiency and low heat generation, stable operation is achieved even at high temperatures.

PZT type

Model No.	Weight (g)	Diameter (mm)	Length (mm)	Bolt size	Frequency (kHz)	Measurement voltage (Vrms)	Impedance (Ω)	Electrostatic capacity (pF)	Allowable input power (W)*1
HEC-45282	395	45	80	M10 P1.0	28	1.0	35 or less	3300	50
HEC-60282	410	60	68	M10 P1.0	28	1.0	35 or less	3300	50
HEC-45402	225	45	54	M10 P1.0	40	1.0	35 or less	3300	50

(Measurement condition : Room temperature 25±3°C)

*1 Reference power value.

Lead-free type

brand name LEAD OFF™

Model No.	Weight (g)	Diameter (mm)	Length (mm)	Bolt size	Frequency (kHz)	Measurement voltage (Vrms)	Impedance (Ω)	Electrostatic capacity (pF)	Allowable input power (W)*1
HEC-45282Z	395	45	80	M10 P1.0	28	1.0	75±25	1300	50
HEC-45284Z	405	45	85	M10 P1.0	28	1.0	40±20	3300	50
HEC-45382Z	270	45	60	M10 P1.0	38.5	1.0	70±25	1300	50

(Measurement conditions: Room temperature 25±3°C)

"LEAD OFF" is Honda Electronics' brand name of lead-free piezoelectric ceramics.

◆Installation torque for each vibration plate thickness

Vibration plate thickness (mm)	Installation torque (N·m)*2
1.0～1.5	5
1.6～2.0	8
2.1～3.0	10

*2 The installation torque values are for reference only.

Using piezoelectric ceramics in processing equipment

Our original structural design achieves high-amplitude oscillation with a high electro-acoustic conversion efficiency, minimal mechanical vibration loss, and low heat generation.

PZT type

Model No.	Weight (g)	Diameter (mm)	Length (mm)	Bolt size	Frequency (kHz)	Measurement voltage (Vrms)	Admittance (mS)	Electrostatic capacity (pF)	Allowable input power (W)*1	Transmission installation torque (N·m)*2
HEC-1340P4BF	30	13	65	M6 P0.75	40	5	15	2000	20	7
HEC-1540P2BF	40	15	67	M6 P0.75	40	10	10	850	30	7
HEC-1560P4B	30	15	39	M5 P0.5	60	5	40	2000	50	5
HEC-2528P2BF	165	25	88	M8 P1.0	28	10	25	2300	150	15
HEC-2528P4B	180	25	89	M10 P1.0	28	10	40	4300	300	20
HEC-3020P2B	310	30	130	M10 P1.0	20	10	20	2900	200	20
HEC-3028P2BF	225	30	90	M10 P1.0	28	10	20	3000	200	20
HEC-3028P4B	280	30	88	M10 P1.0	28	10	45	5750	400	20
HEC-3039P4B	115	30	60	M10 P1.0	39	1	200	7600	300	20
HEC-4020P4B	570	40	125	M16 P1.0	20	10	100	8400	500	70
HEC-4027P4B	445	40	90	M16 P1.0	27	10	150	10000	500	70
HEC-4028P4BH	435	40	90	M10 P1.0	28	10	150	10000	500	20
HEC-5020P4B	925	50	127	M18 P1.5	20	10	200	15500	700	80
HEC-5020P6B	980	50	124	M18 P1.5	20	10	250	23000	1000	80
HEC-6015P4B	1800	60	161	M20 P1.5	15	10	150	10500	1500	100
HEC-7015P4B	2590	70	164	M24 P1.5	15	10	250	20000	2000	110

(Measurement conditions: Room temperature 25±3°C)

*1 Reference power value.

*2 The installation torque values are for reference only.

High-power type

Model No.	Weight (g)	Diameter (mm)	Length (mm)	Bolt size	Frequency (kHz)	Measurement voltage (Vrms)	Admittance (mS)	Electrostatic capacity (pF)	Allowable input power (W)*1	Transmission installation torque (N·m)*2
HEC-5020P4BW	973	50	127	M18 P1.5	20	10	260	12900	900	80
HEC-5020P6BW	1020	50	124	M18 P1.5	20	10	360	19200	1200	80

(Measurement condition : Room temperature 25±3°C)

*1 Reference power value.

*2 The installation torque values are for reference only.

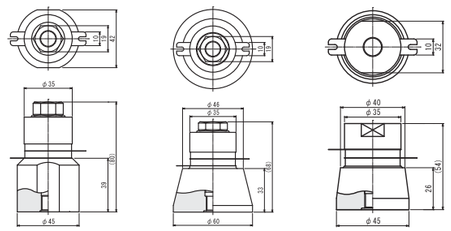
* These are made-to-order products. Contact us for details about delivery times.
* Contact us with inquiries about manufacturing products to custom specifications not described in this catalog.

Outline drawings

■Using piezoelectric ceramics in ultrasonic cleaners

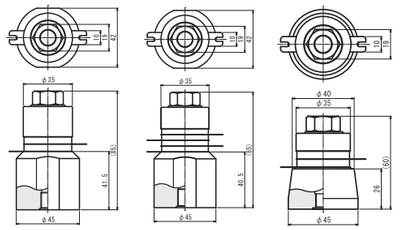
PZT type

■HEC-45282 ■HEC-60282 ■HEC-45402



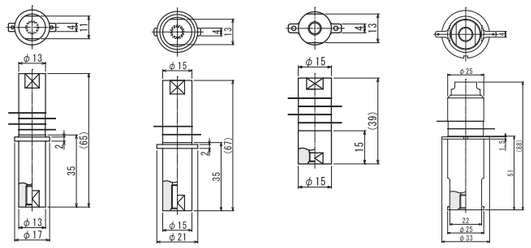
brand name LEAD OFF™ **Lead-free type**

■HEC-45282Z ■HEC-45284Z ■HEC-45382Z

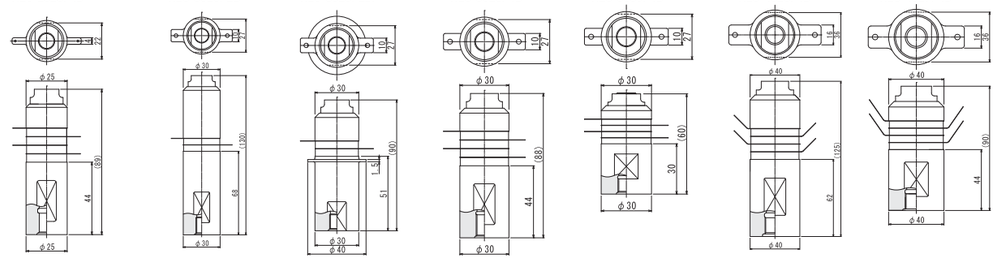


■Using piezoelectric ceramics in processing equipment

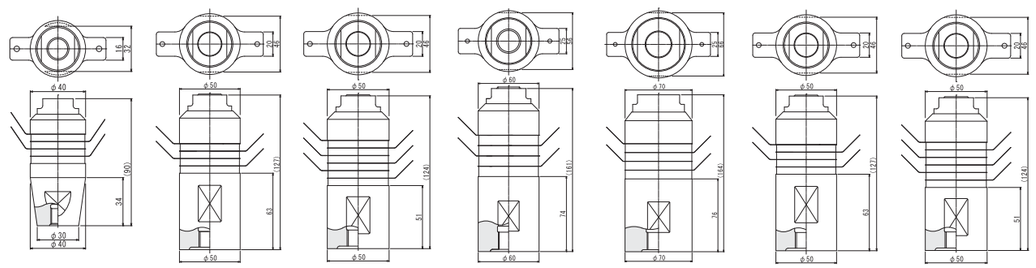
HEC-1340P4BF HEC-1540P2BF HEC-1560P4B HEC-2528P2BF



HEC-2528P4B HEC-3020P2B HEC-3028P2BF HEC-3028P4B HEC-3039P4B HEC-4020P4B HEC-4027P4B



HEC-4028P4BH HEC-5020P4B HEC-5020P6B HEC-6015P4B HEC-7015P4B HEC-5020P4BW HEC-5020P6BW



(Unit: mm)

Optional Parts

Options for ultrasonic cleaners

Cleaning basket

Model No.	Dimensions (mm)	Compatible models	Remarks
KG03F	 195 x 105 x 50	W-113A W-113MK Ⅱ	Mesh: 4 Pitch: 5.5 mm SUS304
KG06F	 255 x 195 x 101	WTC-404	Mesh: 4 Pitch: 5.5 mm SUS304
KG07F	 450 x 250 x 128	WTC-408	Mesh: 2.5 Pitch: 9 mm SUS304
KG08T	 370 x 310 x 208	WTC-600-40	Mesh: 2.5 Pitch: 9 mm SUS304
KG09T	 580 x 360 x 208	WTC-1200-40	Mesh: 2.5 Pitch: 9 mm SUS304
KG10F	 355 x 235 x 170	WDX-600- Ⅰ WA-600 Series	Mesh: 4 Pitch: 5.5 mm SUS304
KG11T	 470 x 270 x 163	WDX-1200- Ⅰ WA-1200 Series	Mesh: 4 Pitch: 5.5 mm SUS304
KG15F	 260 x 200 x 135	WV-231-S1	Mesh: 4 Pitch: 5.5 mm SUS304

Lid

Model No.	Dimensions (mm)	Compatible models	Remarks
FT03	 320 x 263 x 30	WTC-404	SUS304
FT04	 527 x 324 x 30	WTC-408	SUS304
FT05	 440 x 390 x 1.2	WTC-600-40	SUS304
FT06	 650 x 440 x 1.2	WTC-1200-40	SUS304

Beaker rack

Model No.	Dimensions (mm)	Compatible models	Remarks
BR01	 245 x 146 2 holes (ϕ 90.5)	W-113A W-113MK Ⅱ	PP (Polypropylene)
BR03	 315 x 255 4 holes (ϕ 90.5)	WTC-404	PP (Polypropylene)
BR04	520 x 315 8 holes (ϕ 90.5)	WTC-408	PP (Polypropylene)
BR06	 270 x 215 x 169 (ϕ 90.5)	WV-231-S1	PP (Polypropylene)

Stand

Model No.	Dimensions (mm)	Compatible models	Remarks
DA01	 593 x 403 x 250	WTC-600-40	SUS304
DA02	 793 x 453 x 250	WTC-1200-40	SUS304

I/O remote cable

Model No.	Dimensions (mm)	Compatible models	Remarks
RK01	 5 m	WSC Series WSC(M) Series	

Beaker

Model No.	Dimensions (mm)	Compatible models	Remarks
BK02	 ϕ 90.3 x 120 500 cc	W-113A W-113MK Ⅱ WV-231-S1 WTC-404 WTC-408	

Point sensing cover

Model No.	Dimensions (mm)	Compatible models	Remarks
PS01	 Inner diameter: 7.5 mm	HUS-3	Fluorine resin Packing: Perfluoro elastomer

Battery

Model No.	Compatible models	Remarks
HBP-001 	HUS-3	Lithium ion polymer battery

Charging stand

Model No.	Compatible models	Remarks
JS01 	HUS-3	

Options for ultrasonic processing tools

Blade

Model No.	Compatible models	Remarks
HA04  Standard blade	ZO-95 ZO-91	40 pcs Material: SK-2
HA07  Carbide blade	ZO-95 ZO-91	1 pc Material: Tungsten carbide
ZH41 Zirconium ceramic standard blade	ZO-95 ZO-91	1 pc Material: Zirconium ceramic
HA08  Square blade	ZO-95 ZO-91	1 pc Material: SKH *1
ZH10  Long blade	ZO-95 ZO-91	1 pc Material: SKH *1
ZH09  Round tip blade	ZO-95 ZO-91	1 pc Material: SKH
ZH42  Round tip blade	ZO-95 ZO-91	1 pc Material: SKH *1

*1 The effective length of the blade is 11 mm shorter when installed in the handpiece.

Blade fixture

Model No.	Compatible models	Remarks
ZH04 	ZO-95 ZO-91	

Blade fixing screw

Model No.	Compatible models	Remarks
HB03 	ZO-95 ZO-91	

Hexagon wrench

Model No.	Compatible models	Remarks
RR02 	ZO-95 ZO-91	

Torque screwdriver set

Model No.	Compatible models	Remarks
ZH25T2 	ZO-95 ZO-91	

Cutting mat

Model No.	Dimensions (mm)	Compatible models	Remarks
CM02  150 x 200 x 3		ZO-95 ZO-91	

Maintenance set

Model No.	Compatible models	Remarks
SB01	ZO-95 ZO-91	
SB02	ZO-95 ZO-91	Set only includes sandpaper for SB01

Goggles

Model No.	Compatible models	Remarks
ZH13 	ZO-95 ZO-91	

Carrying case

Model No.	Compatible models	Remarks
ZH804A 	ZO-95	
ZH46A 	ZO-91	

Handpiece

Model No.	Compatible models	Remarks
ZH802	ZO-95	

Foot switch

Model No.	Compatible models	Remarks
ZH801	ZO-95	

Welder clasp

Model No.	Compatible models	Remarks
YK01	SONAC-37	Standard
YK02	SONAC-37	For creating a tamper-evident seal

Options for ultrasonic measuring instruments

Cable

Model No.	Dimensions (mm)	Compatible models	Remarks
HD-002 30 m		HD350-A HD353-A	

Shaping the future with ultrasonic technology

Honda Electronics Co., Ltd, a pioneer in ultrasound

The company history of Honda Electronics Co., Ltd. began with the development of fish finders.
With ultrasound as our foundation, we have continuously developed new technologies, such as cylindrical transducers and precision echo sounders for ultra-shallow water.
All of the divisions within our company work together to share and combine their technologies to achieve synergy. We are actively engaged the development of ultrasound technology that is friendly to people, the Earth and our future.

Ultrasonic diagnostic scanner

High frequency ultrasonic cleaner

Ultrasonic cutter

Ultrasonic cleaner

Ultrasonic interface level meter

Fish finders

What is ultrasound?

It is widely known that in the animal world, dolphins use ultrasound to communicate with each other, and bats use it for navigating and hunting. Ultrasound is defined as sound that is inaudible to the human ear, at frequencies lower than 20 Hz or higher than 20 kHz.
Ultrasound at frequencies higher than 20 kHz is used in a broad array of technologies in a variety of fields.

Strategic Development Center Building (Headquarters)

Company profile

Company name :	Honda Electronics Co., Ltd.
Address :	20 Oyamazuka, Oiwa-cho, Toyohashi, Aichi 441-3193, Japan
Founded :	1956 (incorporated in 1960)
President :	Yosuke Honda
Capital :	100 million yen
Number of employees :	220 (as of April 2021)
Branches :	Tokyo, Osaka, Representative office : Bangkok Representative Office (Thailand)
Products :	Fish finders, GPS plotters, Ultrasonic diagnostic scanner, Ultrasonic cleaner Ultrasonic cutter, Ultrasonic welder, Ultrasonic atomizer unit Ultrasonic level meter, Ultrasonic flowmeter, ultrasonic imaging equipment, ultrasonic microscopes, piezoelectric ceramics, etc.

Industrial Equipment Division

The Industrial Equipment Division develops products based on our core technology of ultrasound, for applications such as cleaning, processing, and measurement. The products are used in a wide variety of fields, from semiconductor manufacturing and metal processing, to plastic molding and the food industry.

Ultrasonic Science Museum

Fundamental principles of ultrasound technology are presented, along with our unique products.
Visitors are invited to learn about the history of ultrasound technology and look forward to future developments.