Ultrasonic Cleaner

DYNASHOCK® Series

WDX-600-II

— Instruction Manual —

- Please carefully read this instruction manual before using this product. Please use the product correctly.
- Please keep this document where it can be easily accessed.

HONDA ELECTRONICS CO.,LTD.

Foreword

Thank you purchasing our ultrasonic cleaner, DYNASHOCK Series. This cleaner effectively removes dirt from various objects (e.g., metal components) by applying vibration to water or a solution.

This document describes how to use this device correctly and also lists important safety instructions to prevent injury, device malfunction, damage (e.g. fire), etc. Please read this document carefully before using the device and use the device by following the safety instructions.

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1. Before Starting Use of this Device

1-1. For Safety

1-1-1. Safety Signs

The following signs describe safety hazards and damages according to the safety level.

Danger	Incorrect use of the device may result in a critical accident and you may be killed or severely injured.
Warning	Incorrect use of the device may result in being killed or severely injured.
Caution	Incorrect use of the device may result in injury or damage to the device.

1-1-2. Signs and Symbols

The following signs and symbols describe the cautions, hints, safety instructions and references.

	Don't		Read the instruction manual.
	Instruction		
	No dry heating		Do not disassemble
	Ground		Danger - Electrocution

2. Safety Instructions

Danger

HIGH VOLTAGE	
 Do not disassembly	Do not disassemble, repair or alter the device. Doing so may result in electrocution, injury or cause a fire.
 Don't	Do not insert fingers, metal objects (e.g., pins, tools) or foreign objects in the fan's suction opening or vent. Doing so may result in electrocution or injury.

This device is not explosion-proof.	
 Don't	Do not use the device in areas exposed to inflammable or explosive gases. Doing so may result in a fire or explosion.

This device radiates strong ultrasonic waves.	
 Don't	Persons with pacemakers must not operate this device or work near this device.

The device must be properly grounded.	
	Firmly connect the ground cable so that it cannot be disconnected. Not doing so may result in electrocution or injury when the device malfunctions or an electrical leakage occurs.
	Do not connect the ground cable to gas or water pipes, lightning rods or telephone ground cables. Doing so may result in a fire or explosion.

Warning

	Use rated power voltage of ±10%. Using irregular power voltage may result in a malfunction or fire.
	The transducer cable and power cable have high-voltage/high-current electricity. Make sure to firmly connect the plugs to their respective connectors. Not doing so may result in electrocution or fire.
 Don't	The transducer in the transducer unit (vibrating plate) has high-frequency high-voltage, and high-frequency high-current. Do not touch the electrodes on the transducer and cable connectors. Doing so may cause electrocution or severe injury.
	Do not change the length of the transducer cable. Do not use another type of cable. Do not alter the crimp-type terminal. The transducer cable has high-frequency high-voltage, and high-frequency high-current. Changing the length of the transducer cable, using another type of cable or altering the crimp-type terminal may result in a malfunction or fire.
	Do not use the device if there is a hole in the ultrasonic vibration plate in the transducer unit. Doing so may result in a malfunction or fire. * When the ultrasonic vibration plate is exposed to strong ultrasonic vibration and cavitation for long periods, erosion occurs and the metal surface become brittle and holes have appeared.
	Do not locate the generator in areas subject to corrosive gas (acid/alkaline). Corrosive gas may shorten the life of the generator and cause it to malfunction.
	Do not use inflammable or combustible solutions as cleaning solutions for this device.
 No dry heating	Do not operate this device without cleaning solution (dry heating). Doing so may cause the transducer to fail. * The solution depth should be at least 100 mm above the transducer radiating surface.

⚠ Caution

❗	Use the generator in an environment where the ambient temperature is 5 - 40°C. The ambient temperature near the generator may become higher than the specified temperature especially in an indoor environment. Using the generator in inappropriate environment shortens the generator life and causes it to malfunction.
	The liquid temperature for the vibration unit is 5 - 80°C for the immersible type and 5 - 100°C for the vibration plate/tank type. Using the transducer in an inappropriate environment shortens the transducer life and causes it to malfunction.
	To connect the power, supply power via a breaker that is 15A or more for each unit. The sensed current of the leak breaker should be 15mA or more for each unit.
	Make sure to install a breaker that is connected in a visible location. If the device fails, you can shut down the breaker.
	Do not block the vent in the front or rear of the generator. Make sure to install the generator so that it is 150mm or more away from the wall. If the vent is blocked, the device's internal temperature increases, causing a fire or malfunction.
	Make sure that the object to be cleaned does not directly touch the ultrasonic vibration surface. If the object comes in contact with the surface, not only does the cleaning effect degrade but the device may fail. * The position of the object to be cleaned should be 50mm or more away from the vibration radiation surface.
	The generator is not waterproof. Install the generator where it will not be subject to liquids. If the generator is wet, it may fail.
	This device generates intense noise (sound pressure/ultrasonic pressure) because it uses ultrasonic vibration. Minimize the use of the generator. Do not work near the transducer unit or the generator for long periods.
	The generator and the transducer unit are calibrated in tandem. Connect the transducer unit (with the same ID as the ID label attached at the rear of the generator) to the generator. If you connect an incorrect transducer unit, a malfunction or failure occurs.
⃠ Don't	Do not use acidic liquid (PH6 or less) as the liquid that comes into direct contact with the transducer unit. It may cause the transducer unit to malfunction. When using an acidic liquid (PH6 or less), use a double tank structure. If the liquid used on the inner of double tank splashes or drips into the outer tank, drain it immediately and clean the cleaning tank cleanly. When using a strongly alkaline liquid that comes into direct contact with the transducer unit, make sure that it does not affect the transducer unit before using it.
	Do not install the generator in a poorly ventilated sealed box. Doing so may result in fire or a malfunction.

－Other Cautions－

[Transducer cable / Power cable]

- To connect the transducer or power cables, first turn off the primary power source.
- Place the connectors for the transducer and power cable in a dry location.
- Do not connect the power cable to an extension cable. Directly connect the power cable to the power outlet. Connecting the power cable to an extension cable may result in electrocution or fire.
- The transducer cable and the power cable are not waterproof. Place the transducer and power cables in a location where they are not subject to water.
- Use only the transducer and power cables that come with the product.
- Do not apply strong force to the transducer or power cables. Do not twist the transducer or power cables.
- Do not excessively bend the transducer or power cables. Do not tightly bundle them. Cables that are excessively bent or tightly bundled may cause noise or heat.

[Generator]

- Do not install the generator in locations subject to dust or mist. This may cause the vent to become blocked with dust or mist, degrading the ventilation/cooling performance and increasing the internal temperature of the device and causing the device to fail.
- Install the generator in a location where it will not be subject to water and the humidity is low (Ambient humidity should be 5 - 80%.). Not doing so may shorten the life of the generator and cause a malfunction.
- Do not install the generator in direct sunlight or near a heat source. Doing so may cause the internal temperature of the device to increase, causing a malfunction.
- Clean the generator vent regularly, removing any dust or foreign objects. If the vent is blocked, the heat dissipation capability is degraded, raising the internal temperature of the device and causes a malfunction.
- If you need to install the generator in a location where the ambient temperature is high, place it in a box, which can be cooled, preventing the temperature inside of the generator from increasing.
- Install the generator on a sturdy and flat surface that is not subject to vibration. Not doing so may shorten the life of the generator and cause a malfunction.
- Do not install or stack more than 3 generator units.
- This device is for indoor use. Make sure this device is used only indoors.
- When inspecting or maintaining this device, first turn the power switch OFF to shut off the primary power source. The device has a high voltage component. If you don't turn off the power switch, you may be electrocuted.
- This device has been developed and manufactured for use in an industrial environment. Do not use this device in any other environment.

[Transducer unit]

- The transducer unit (vibration plate type) has a vibration element and wiring parts that are not waterproof. Install the transducer unit where it is not subject to water.
- The transducer may be electrically-charged with high-voltage. When you install or maintain the transducer unit, make sure to discharge the electricity by shorting the positive/negative terminals of the transducer before installing or maintaining the transducer unit.
- The transducer unit or heavy object being cleaned should be handled by two or more persons or with hoisting equipment.

【Signal cables to I/O terminal block】

- For the signal cable for the remote control or the signal cable to detect errors, use a 10m shielded wire or shorter. Using a longer cable may cause the device to malfunction because of noise.
- Do not bundle the signal cables near the power cables for the generator and the transducer. Doing so may cause the generator and other systems to malfunction because of the noise.
- Connect only one unit in one circuit if you use the remote control function. Connecting more than one unit in parallel or in a series, may cause a malfunction or failure.

[General cautions]

- Do not touch the generator, transducer unit, cables with wet hands.
- Do not insert your hands or fingers into the cleaning solution while the device is running.
- Do not leave a dirty cleaning solution. Dirt may accumulate on the ultrasonic vibration surface, causing a malfunction.
- Store this product in a location not subject to direct sunlight and the temperature is -15°C - 60°C, the humidity is 10% - 85% and there is no condensation.
- Wipe off any moisture, cleaning solution or dirt that is on the generator and the transducer unit with a dry cloth.

3. Overview

The following is a description of the device.

Major functions and features	Operation
■ DYNASHOCK MODULATION(DM) method DM (DYNASHOCK MODULATION) method enables one transducer to simultaneously oscillate two frequencies. You can arbitrary control the ultrasonic power ratio of these frequencies by setting the DM modulation level. You can select a suitable ultrasonic oscillation for the particular application - "Soft cleaning" to "Hard cleaning". You can set the DM modulation level [0 - 100%] with the [D.M. - UP/DOWN] switch on the front panel of the generator.	7-2 (P17)
■ Sweep function You can generate more even ultrasonic waves by adding the Sweep function to the DM oscillation method. You can enable/disable the Sweep function by operating the front panel of the generator.	7-2 (P17)
■ Output adjustment function You can adjust the output power [0 - 100%] with the POWER knob on the front panel of the generator. You can set optimal power for the cleaning application.	7-2 (P17)
■ Frequency automatic tracking function / Constant power control function How the ultrasonic waves are generated in the cleaning solution significantly differs depending on the liquid depth, liquid type, decompression state, load change or voltage change of the object to be cleaned. These functions embedded in the device enable ultrasonic waves to be emitted utilizing the optimal frequency and stable output power for these changes.	—
■ Power display function The display screen on the front panel of the generator displays the output power [W], enabling you to control the ultrasonic waves in daily operation.	5-1 (P10)
■ Error display function The display screen on the front panel of the generator displays error messages with potential causes, enabling you to troubleshoot the error quickly.	10-1 (P21,P22)
■ I/O function 1) Remote control function You can start/stop generating ultrasonic waves by remote operation. 2) Abnormal output function If the device malfunctions, the error can be sent to the remote location.	8 (P18)

4. Package

The product (DYNASHOCK Series) consists of a generator and a transducer unit. The transducer unit may be a immersible type, vibration plate type, tank type or tank with heater type. The product package consist of a standard generator set and a transducer unit set of the selected type.

<<Package>>

[Standard generator set]

Generator ····· 1

Power cable (3.5m) ····· 1

Instruction manual ····· 1

Output cable 3.5m ····· 1 (*1)

*1. An output cable is not provided if the transducer unit is a tank type or tank with heater type.

Components sold separately: Connection terminal board to connect the transducer cable.

[Transducer unit set]

Select one of the following transducer types

① **Immersible type**
Immersible type transducer unit ····· 1
* Transducer cable length: 2.5m (Blade: 2m)

② **Vibration plate type**
Vibration plate type transducer unit ····· 1
* Transducer cable length: 3.5m

* The standard product comes with packing, auxiliary frame, and screws for vibration plate as standard.(Special-order products are sold separately.)

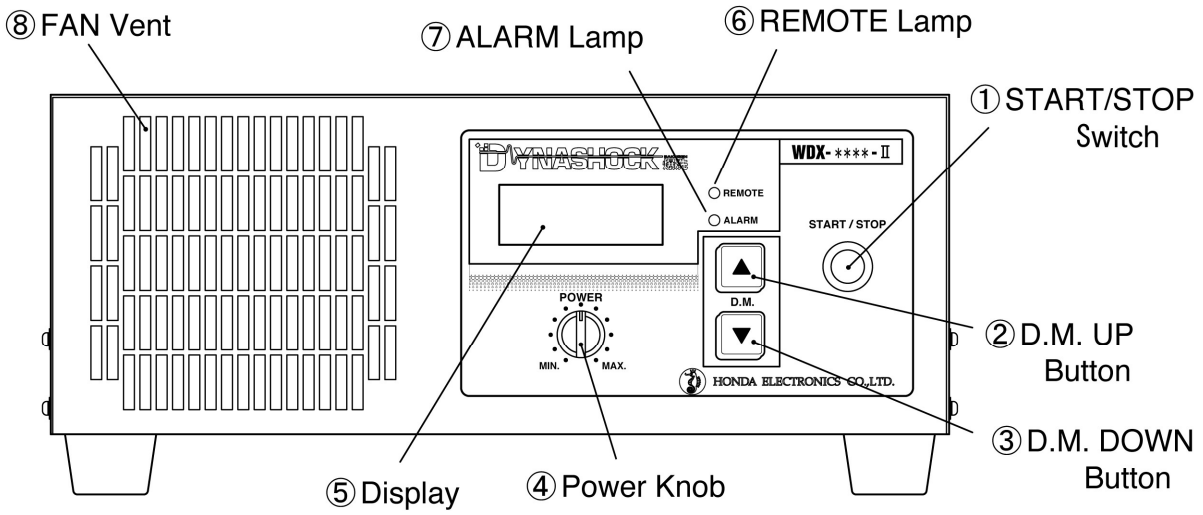
③ **Tank type**
Tank type transducer unit ····· 1
* Transducer cable length: 3.5m
Lid ····· 1
Accessory: Cleaning basket (KG10F)

④ **Tank type with heater**
Tank type with heater transducer unit ····· 1
* Transducer cable length: 3.5m
Lid ····· 1
Accessory: Cleaning basket (KG10F)

5. Components

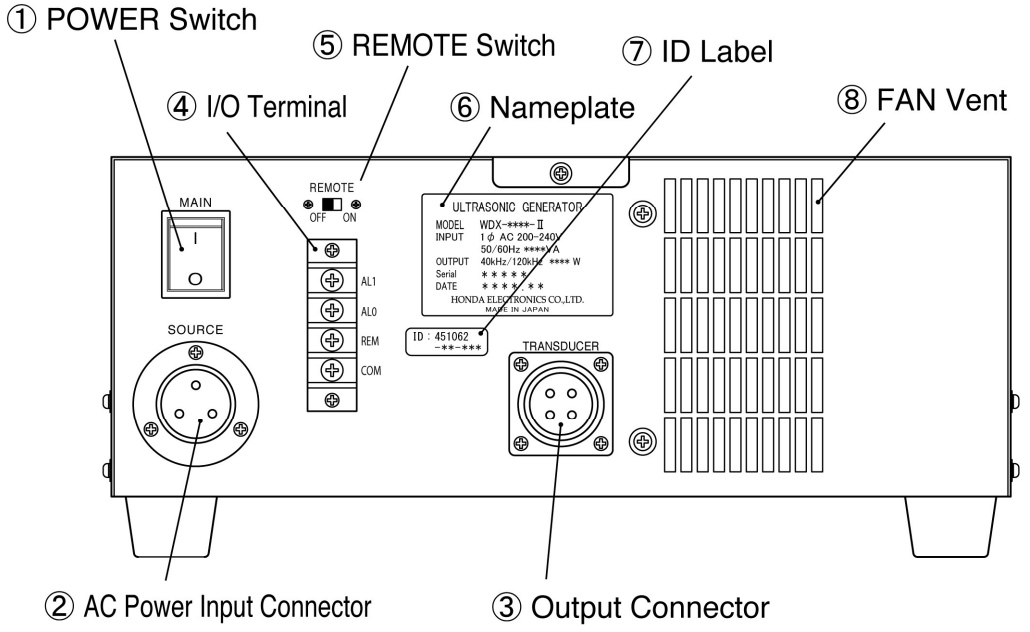
5-1. Generator - Front panel

No.	Name	Function
①	START/STOP switch	You can start/stop generating ultrasonic waves. Pressing this switch once starts generating the ultrasonic waves. The lamp turns on while the ultrasonic waves are generated. This switch is enabled if the REMOTE CONTROL function is disabled (The [REMOTE SET] switch at the rear of the generator is turned OFF).
②	D.M. UP switch	You can increment the DM value (0 - 100%) from the current value. Pressing this switch once increments the DM value 1%. Pressing this switch for 1 second or longer changes the DM value quickly.
③	D.M. DOWN switch	You can decrement the DM value (0 - 100%) from the current value. Pressing this switch once decrements the DM value 1%. Pressing this switch for 1 second or longer changes the DM value quickly.
④	POWER SET knob	You can set the output power. The range of power being output is [0 - 100%].
⑤	Display screen	The display screen displays the output power [W] and DM value [%]. If an error occurs, this display screen displays an error message with the potential cause.
⑥	REMOTE lamp	This lamp is turned ON when the REMOTE CONTRO function is enabled (The [REMOTE SET] switch at the rear of the generator is turned ON).
⑦	ALARM lamp	This lamp turns on when an error occurs.
⑧	FAN vent	The heat in the generator is exhausted and cooled. Make sure there is a space in front of the front panel that is 150mm or more.



5-2. Generator - Rear panel

No.	Name	Function
①	POWER switch	The POWER switch turns the primary power ON/OFF for the generator. This switch has a function to shut down the power when overcurrent occurs.
②	AC POWER INPUT connector	The power cable (provided) is connected to this connector to supply the power voltage to the generator. The power voltage must be ±10% of the rated input voltage (Rating plate of the device).
③	Transducer output connector	The transducer output cable (provided) is connected to this connector to supply the power to the transducer. The transducer unit connected to the generator must have the same ID as the generator ID label number.
④	I/O terminal block	(1) REMOTE terminal You can connect the signal line to the REMOTE terminal to remotely control emitting/stopping the ultrasonic waves. ・ REM terminal - COM terminal: Shorted = Emits the ultrasonic waves ・ REM terminal - COM terminal: Open = Stop emitting the ultrasonic waves
		(2) ALARM terminal You can connect the signal line to the ALARM terminal to output an alarm. ・Normal: AL1 terminal - AL0 terminal: Shorted ・Error/Power OFF: AL1 terminal - AL0 terminal: Open
⑤	REMOTE setting switch	Turning the ON REMOTE setting switch enables the remote control function by a REMOTE terminal. At this time, the START/STOP switch on the generator's front panel is disabled.
⑥	Nameplate	The nameplate displays the model, rated input, rated output and machine's serial number.
⑦	ID label	The ID label displays the ID of the transducer unit that can be connected to the generator.
⑧	FAN vent	The heat in the generator is exhausted and cooled. Make sure there is a space in front of the front panel that is 150mm or more.



6. Installation and Connection

6-1. Installing the Generator and Connecting the Power Cable

1. Install the generator on a sturdy platform that is level and vibration free. Install the generator in a location that is not subject to water and the humidity is low.

Environmental Requirements when Installing the Generator

- The ambient temperature is 5 - 40ºC, the humidity is 80% or less and there should be no condensation.
- The generator must be installed where there is sufficient space in front of the front panel and behind the rear panel.

* Make sure to have a space that is 150mm or more in front of the front panel and behind the rear panel.

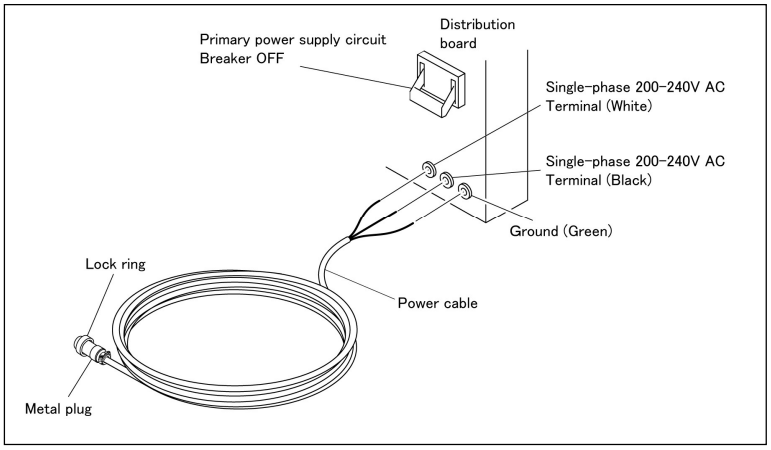
2. Connect the power cable to the breaker side (Single-phase AC: 200V - 240V/50/60Hz).

- To prevent an electrocution accident, turn off the power supply of the breaker and turn OFF the power switch of the generator before you connect the power cable to the breaker.
- Use a 15M or more breaker for each generator. Use a leak breaker of 15mA sensed current for each generator.

■ Connecting the power cable to the ground cable and power source

The following describes the connection polarity of the power cable (provided).

Green : Connected to GROUND
White : Connection to single-phase AC power source
Black : Connection to single-phase AC power source



3. Connect the power cable plug to the power connector at the rear of the generator. Make sure to insert the power cable plug into the power connector until the securing ring is locked.
4. Attach the power connector clamp to the securing ring and lock the securing ring and the clamp with the screw.

* If you embed this device in another device, you don't need to install the power connector clamp.

6-2. Installing the Transducer unit

■ **Task** before installing the transducer unit

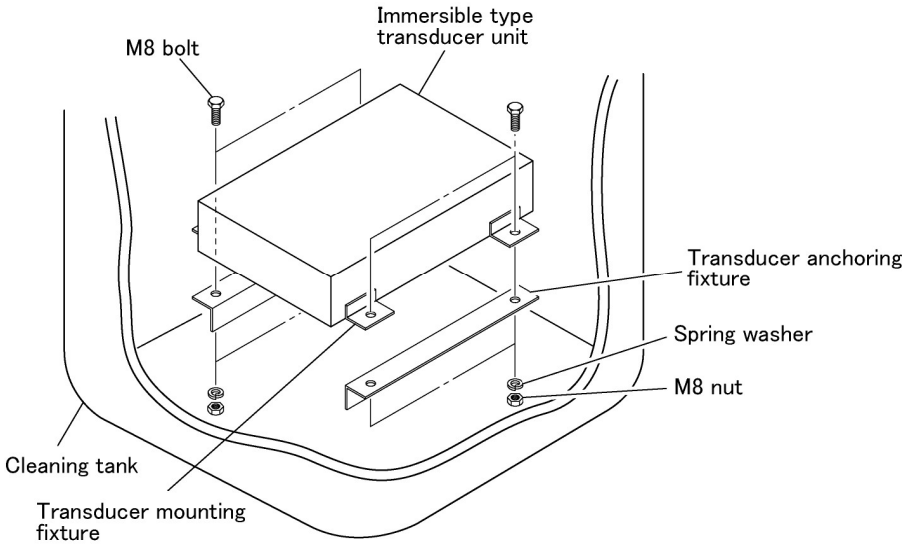
The transducer may be charged with high-voltage. Before you install the transducer unit, temporarily short the plus terminal and the minus terminal of the transducer and discharge the electrical current.

[Installing the immersible type transducer unit]

Installation example

1. Provide a cleaning tank that has sufficient strength and size for the weight and size of the immersible type transducer unit.
2. Install fixing brackets to lock the transducer in the cleaning tank.
3. Insert cushioning material (e.g., Teflon resin) to prevent wear between the fixing brackets (transducer unit) and locking metal fixtures caused by vibration of those metals. (If there are any areas in the bottom of the transducer unit where the metal surfaces may be touching or worn because of vibration, insert the cushioning material between those metal surfaces.)
4. Place the transducer unit on the locking metal fixtures with the cushioning material. Insert the M8 bolts (i.e., stainless steel bolts*1) into the four holes. Screw the bolts tightly with the spring washers and nuts to lock the transducer unit on the locking metal fixtures.

*1. Select the metal fixtures (e.g., Bolt, Stud, Washer, Nut, etc.) suitable for the cleaning solution being used.



5. Pull the transducer cable out from the cleaning tank.

* If the area where wires are pulled out from the tip of the blade hose become immersed in the liquid, the liquid can seep into the transducer unit, causing a malfunction. Make sure to pull the transducer cable out from the cleaning tank.

* Do not pull out the blade hose from the top surface the vibration surface of transducer unit.

6. Connect the transducer cable and output cable.

* For details, see "6.3 Connecting the Transducer cable" (Page 15).

[Installing the vibration plate type transducer unit]

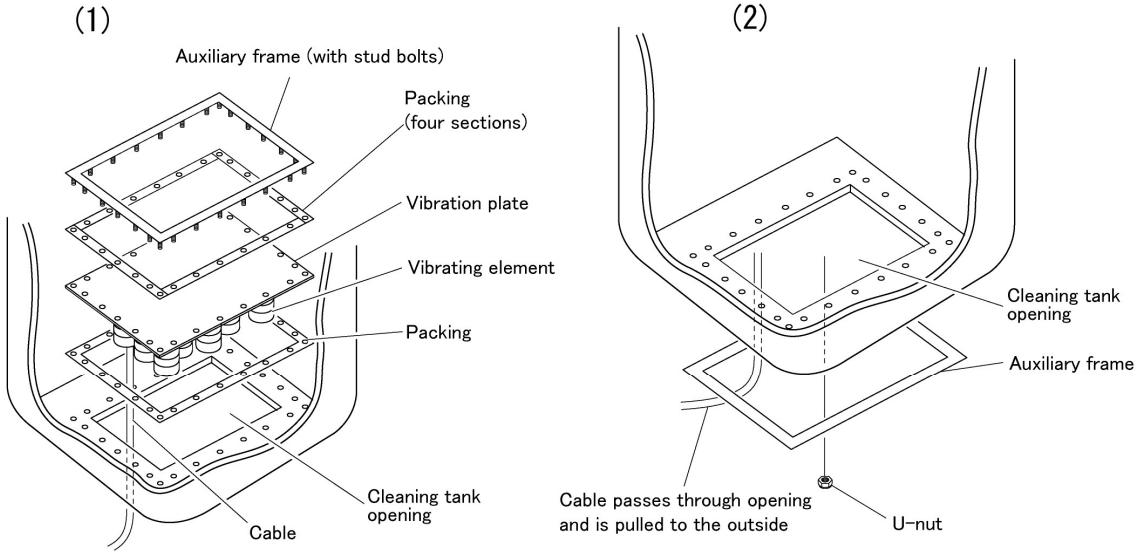
Installation example

1. Provide a cleaning tank that has sufficient strength and size for the weight and size of the vibration plate type transducer unit.

* Be careful to handle and install the vibration plate so as not to warp it. The surface bonded to the transducer may degrade.

2. Install the packing, vibration plate, packing and auxiliary frame (with stud bolt) as shown in Figure (1) below.
3. Install the auxiliary frame under the cleaning tank as shown in Figure (2) below. Lock the auxiliary frame with the U nut. Make sure to tightly screw the U nut so that ultrasonic vibration will not loosen the auxiliary frame. If the auxiliary frame is loose, the cleaning solution may leak.

* Use packing that is a suitable for the cleaning solution. If the packing material that contacts the cleaning solution is not compatible with the cleaning solution, a leak may occur.



4. Pull out the transducer cable and connect it to the output cable.

* For detail, see "6.3 Connecting the Transducer cable" (Page 15).

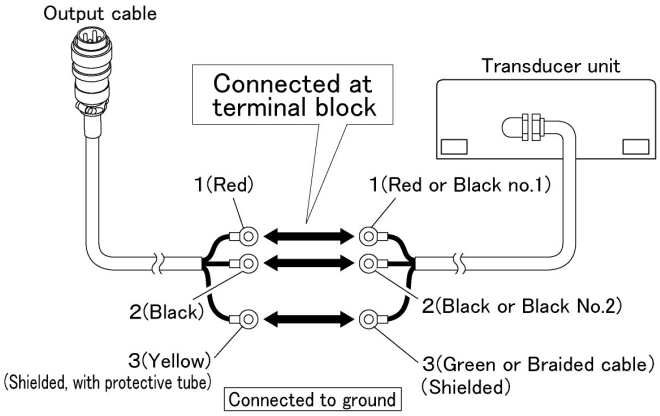
6-3. Connecting the Transducer cable

■ Connecting the transducer cable and the wire lead of the transducer unit

* For safety, shut down the power supply to the generator before connecting the cable.

The following describes the connection polarity of the transducer cable.

Transducer cable (provided)	Connected to:
Red wire (Terminal No. 1)	Transducer unit (+) red or black No.1 wire (terminal No. 1)
Black wire (Terminal No. 2)	Transducer unit (-) black or black No.2 wire (terminal No. 2)
Yellow wire with protection tube (Terminal No. 3)	Transducer unit (shielded) [Connected to ground]



Cautions when connecting the transducer cable

- Connect (relay-connection) the transducer cable and the wire lead from the transducer unit on the screw terminal board. The screw terminal board for each unit must have a rated voltage of 600V or more and a rated current of 20A or more.

* High-frequency voltage and high current are used. If the electrical contact is incomplete, a malfunction or fire may occur.

- Make sure to correctly connect the cable and wires according to the connection polarities.
- Place the connected part of transducer cable and the wire lead from the transducer unit in the relay box so that no one can easily touch the connection.

* Use a relay box that is made of flame resistant material (Flame resistance (V-0) or higher) and is a structure that can only be opened with the specified tool.

■ Connecting the transducer cable to the generator

1. Insert the transducer plug to the transducer output connector at the rear of the generator. Make sure to fully insert the transducer plug into the transducer output connector until the securing ring is locked.

* Connect the transducer unit (with the same ID as the ID label attached at the rear of the generator) to the generator. If you connect the incorrect transducer unit, a malfunction or failure occurs.

2. Attach the power connector clamp to the securing ring and lock the securing ring and the clamp with the screw.

* If you embed this device in another device, you don't need to install the power connector clamp.

7. Operation

This chapter describes the basic operation method, assuming that the device has been installed and connected as described in earlier chapters.

7-1. Preparation

① Pour the cleaning solution into the cleaning tank.

- Use with a solution depth that is at least 100 mm above the transducer radiating surface.
- The temperature of the cleaning solution for the transducer unit is as follows:
  Immersible type: 5 - 80 ºC
  Vibration plate/Tank type: 5 - 100ºC

② Place the object to be cleaned in the cleaning tank.

- The position of the object to be cleaned must stay 50mm or above the ultrasonic vibration surface.
- Place the objects to be cleaned so that they are aligned evenly against the ultrasonic vibration surface.
- Use the cleaning basket so that the object does not come in direct contact with the ultrasonic vibration surface.

* A cleaning basket for the tank-type cleaning unit is available. For more details, contact your dealer.

③ Make sure that the power switch at the rear of the generator is turned OFF. Turn ON the breaker that supplies power to the generator.
④ Turn OFF the REMOTE Set switch at the rear of the generator to disable the REMOTE CONTROL function.

- To enable the REMOTE CONTROL function, first make sure that the device is functioning correctly and then turn on the REMOTE Set switch.

7-2. Basic Operation Method - Generator

① Turn ON the POWER switch at the rear of the generator. The initial screen (front panel) will be displayed for a few seconds.

② Press the START/STOP switch to start the cleaning operation.

③ Adjust the Ultrasonic Wave Output (W) by turning the POWER Set knob. Turning the knob to the right increases the ultrasonic wave output, to the left decreases the output. The display screen displays the current output power [W]. You can set the output power in the range of [0W - Max. Power]

④ Set the DM modulation and set the Sweep function (additional) as needed. For details on these adjustment and setting change methods, see the description below.

⑤ Press the START/STOP switch to stop the cleaning operation.

⑥ Turn OFF the POWER switch at the rear of the generator after ultrasonic cleaning.

⑦ Turn OFF the power supply breaker to shut down the primary power supply.

Adjusting the DM modulation

Adjust the DM modulation by pressing the [D.M. UP] key (▲) or the [D.M. DOWN] key (▼). Pressing the ▲ key once increments the DM value 1%. Pressing the ▼ key decrements the DM value 1%. Pressing either key for 1 second or longer accelerates changing the DM value.

The display screen displays the current DM modulation [%]. You can set the DM modulation in the range [0 - 100%].

* For details on the DM method and DM modulation, see "Chapter 3" (Page 8).

DM modulation value and cleaning capability

DM modulation - 0%: Gentle cleaning - Minimizes damage to the object being cleaned because of the frequency component power ratio (28kHz: 0% / 75kHz: 100%).

DM modulation - 100%: Enhanced cleaning - Maximizing the cleaning capability because of the frequency component power ratio (28kHz: 5% / 75kHz :50%) instead of controlling the damage to the object being cleaned.

Setting the Sweep function

Pressing the [D.M. UP] key (▲) and the [D.M. DOWN] key (▼) simultaneously for 2 seconds or longer enables the [DM+Sweep] mode in which the Sweep function is added to DM oscillation. The display screen displays "Sweep".

Pressing the [D.M. UP] key (▲) and the [D.M. DOWN] key (▼) simultaneously again for 2 seconds or longer returns to the normal DM oscillation mode. "Sweep" is erased from the display screen.

8. I/O Function

This chapter describes the I/O function to remotely control the ultrasonic wave output (ON/OFF) or to use the alarm output function to monitor the device.

8-1. Remote Control function

① Connect the remote control signal wire to the REM and COM terminals on the I/O terminal block at the rear of the generator. Install a crimp-type terminal on the signal wire and lock the signal wire onto the terminal board with an M4 screw.
② Turn on the [REMOTE Set] switch at the rear of the generator to enable the REMOTE CONTROL function.
③ Short/Open the REM - COM terminals with the external contact (non-voltage contact) as follows to start/stop the ultrasonic wave output.

REM-COM terminals	Ultrasonic wave output	Signal wire connected
Open	Stop	Signal wire for remote control (2-cores) *Shielded cable
Short	Start	

<<Caution>>

Use the non-voltage contact (e.g., switch or relay contact, etc.) with contact rating DC12V/0.1A or more for the external contact signal connected between REM - COM terminals.

8-2. Alarm output function

① Connect the alarm detection signal wire to the AL0 and AL1 terminals on the I/O terminal board at the rear of the generator. Install a crimp-type terminal on the signal wire and lock it with the M4 screw on the terminal board.
② By checking the contact state (Open/Short) between the AL0 and AL1 terminals, you can monitor the generator state. (AL0-AL1 terminals indicate the relay-contact output.)

The following table shows the relationship between the contact state and generator state.

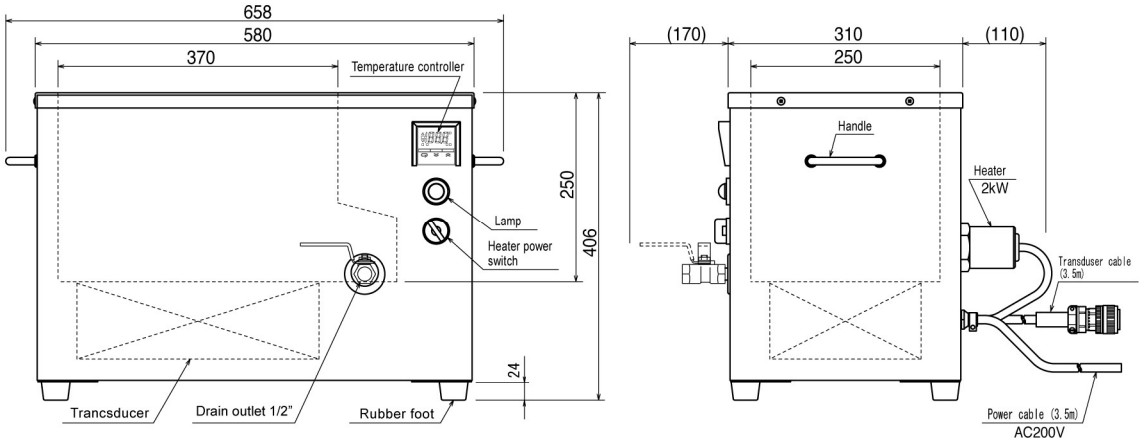
AL0 - AL1 terminals (Relay contact output state)	**Generator state**	Signal wire connected
Short	Normal	Signal wire to detect an alarm (2-cores): Shielded cable
Open	Abnormal or POWER OFF	

<<Caution>>
The relay contact rating between AL0 - AL1 terminals is DC30V/0.5A. Do not use a voltage or current that exceeds the rating. Doing so may cause a malfunction.
<<Caution for both functions>>

- Use a shielded cable that is 10m or less for the signal wire to prevent a malfunction caused by noise.
- To connect the alarm detection signal wire and remote control signal wire in the same cable, use a shielded cable with 4-cores.
- Connect the signal wires by separating them from the power cable, transducer cable and other power cables to control the noise induction.

9. Tank type with Heater

This chapter describes how to handle the cleaning tank with a heater and lists specific cautions.



(1) Connect the heater power cable (3-cores).

Connect the GREEN line to the GROUND. Connect the other 2 lines to single-phase AC 200V.

(2) Power the cleaning solution in the cleaning tank. Make sure to keep the cleaning solution level at 70% or more of the whole volume to prevent dry heating in the heater.

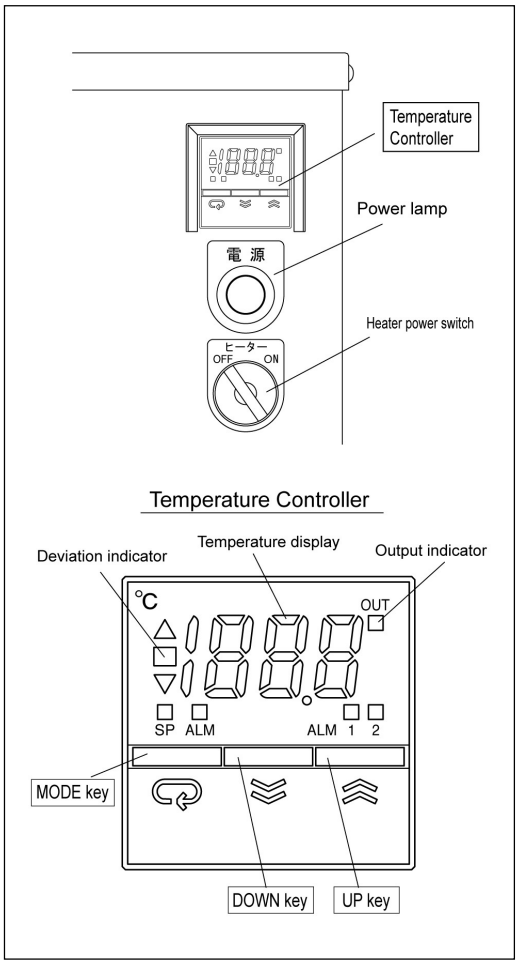
(3) Turn ON the heater power switch. The power lamp turns on.

(4) Press the [MODE] key (Temperature controller) to enable the TEMPERATURE SET mode. Press the UP key or the DOWN key to set the temperature.

(5) After setting the temperature, press the [MODE] key to return to the current liquid temperature display.

(6) When the temperature is raised to the set temperature, the device automatically stops the heater operation. The ■ green lamp in the center of the deviation indicator lamp turns on.

(7) To change the temperature during the operation, repeat steps (3) and (4).



・ The deviation indicator lamp turns on the ▲lamp when the solution temperature is higher than the set temperature. It turns on the ▼ lamp when the solution temperature is lower than the set temperature. If the temperature changes to the set temperature, both lamps are turned off and the ■ green lamp in the center turns on.

Warning

The tank with the heater is very hot. Do not touch the tank or put your hands into the cleaning solution. Doing so may result in burns.

Caution

- Do not open the front door of the Temperature Controller and do not change the setting of the internal switches. Doing so may cause a malfunction to occur.
- Make sure that the heater electrode cover, cable outlet joint, temperature controller or voltage switch are not subject to liquids.

- Set the temperature in the range [5 - 80°C] for safety even though the temperature can be set in a range [0 - 100°C].
- The heater flange part may start to rust while the device is being operated. Cleaning performance may degrade if the object being cleaned is susceptible to rust.
- If you want to use the device under a constant temperature, you will need a cooling device.
-

Do not disassembly

- Do not remove the heater electrode cover. Doing so may result in electrocution.

10. Troubleshooting

This chapter describes the troubleshooting methods for the errors and malfunctions.

10-1. Alarm display function

The device has a function that detects and displays the alarms and automatically stops emitting ultrasonic waves. If an alarm occurs, check the error message displayed and troubleshoot according to the [Troubleshooting] column in the table below.

<<Caution>>

This function displaying the alarms is reset when the POWER switch is turned OFF. Make sure to check the alarm display before turning OFF the POWER switch.

Error message displayed	Alarm type	Cause	Troubleshooting
Short Load	Short load	There is a short somewhere in the wiring passage between the generator and the transducer unit.	Check if the wiring passage of the transducer cable has shorted.
		The transducer or the terminal connection part is wet because of condensation or liquid leakage and the insulation resistance has degraded.	Check if the vibration element of the transducer unit or the terminal connection part are wet. Troubleshoot the problem (i.e., liquid leakage). Use the device in an environment with low humidity.
		The transducer element has failed ([Shorted] mode).	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
Open Load	Open Load	There has been a disconnection or no connection somewhere in the wiring passage between the generator and the transducer unit.	Check if the wiring passage in transducer cable has disconnected or was not connected.
		The transducer cable connector is not connected to the generator.	Connect the transducer cable connector to the generator.

Note) Contact your dealer.

Error message displayed	Alarm type	Cause	Troubleshooting
Overpower	Overpower	A transducer unit with a different ID from the ID on the generator ID label.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
		The transducer has degraded or failed.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
Overcurrent	Overcurrent	The transducer unit with a different ID as the ID on the generator ID label.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
		The transducer has degraded or failed.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
Overvoltage	Overvoltage	The transducer unit with a different ID as the ID on the generator ID label.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
		The transducer has degraded or failed.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
Temperature AL	Temperature	The ambient temperature around the generator is higher than 40°C.	Install and use the device in an environment where the ambient temperature is 40°C or lower.
		There is not enough ventilation to cool the generator.	Install the generator where there is sufficient space in front of and behind the generator to provide sufficient ventilation.
		The FAN ventilation is clogged by dust, oil, etc.	Regularly clean the ventilation (front panel or rear panel of the generator). Do not use a generator in an environment where there are large amounts of dust or oil.
		The DC fan has failed.	Contact your dealer.
		The transducer unit with has a different ID from the ID on the generator ID label.	Replace the transducer unit with the same ID as the ID on the generator ID label. See Note.
Circuit AL	Circuit	A component in the generator has failed.	Contact your dealer.

Note) Contact your dealer.

10-2. Troubleshooting for other errors

Symptom	Cause	Troubleshooting
The generator does not emit any ultrasonic waves. →Nothing is displayed on the display screen.	POWER switch at the rear of the generator is turned OFF.	Turn ON the POWER switch at the rear of the generator.
	The primary power line has not been correctly connected.	See "6-1 Installing the Generator and Connecting the Power Cable". Supply the power voltage to the generator.
	A component in the generator has failed.	Contact your dealer.
The generator does not emit any ultrasonic waves. →ALARM lamp is turned on	The generator does not generate ultrasonic waves because of an error.	See "Alarm display function" and troubleshoot the problem.
The generator does not emit any ultrasonic waves. →The START/STOP switch does not start/stop emitting ultrasonic waves.	The REMOTE CONTROL function is enabled (REMOTE lamp is turned on).	Turn off the [REMOTE Set] switch at the rear of the generator to disable the REMOTE CONTROL function (REMOTE lamp turns off).
The generator does not emit any ultrasonic waves. →The REMOTE CONTROL function does not start/stop emitting ultrasonic waves.	The REMOTE CONTROL function is disabled (REMOTE lamp is turned off).	Turn on [REMOTE Set] switch in the rear of the generator to enable the REMOTE CONTROL function (REMOTE lamp turns on).
	REMOTE cable is disconnected or is incorrectly connected.	Check if the REMOTE cable has been correctly connected to the REM/COM terminal (I/O terminal board at the rear of the generator) and check if the REMOTE cable has been correctly connected to your controller.
The ultrasonic wave output is low.	POWER setting is set to "MIN".	Increase the output by turning the POWER Set knob to the right.
	The power voltage is not correct.	Supply Rated Voltage [Single-phase 200V - 240V] for the generator.

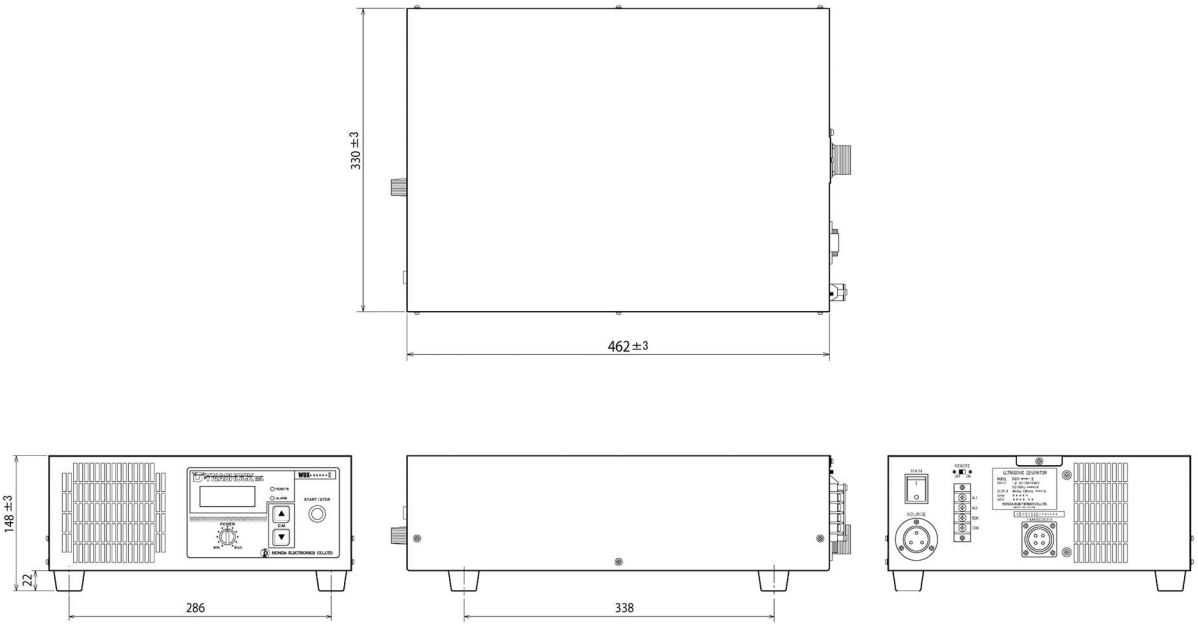
- If the troubleshooting described above does not solve the problem and if the device does not function correctly, immediately stop operating the device and contact your dealer.

11. Specifications

■ Generator

Model		WDX-600-II
Power input		AC200V - 240V±10% / Single-phase 50/60Hz
		1.45kVA
Rated output power		600W
Output adjustment range		0 - 100%
Nominal oscillation frequency		40kHz, 120kHz
Oscillation method		Power ratio modulation type Two frequency simultaneous oscillation method (DM method)
Oscillation function		DM modulation: 0 - 100% Sweep: Yes/No
Display function		Output power [W]、DM modulation [%], Error message
I/O function	REMOTE CONTROL function	・REM - COM: Shorted - Emit ultrasonic waves ・REM - COM: Open - Stop emitting ultrasonic waves
	Alarm output function	・Normal - AL1 -AL0: Shorted ・Alarm / POWER OFF - AL1 - AL0: Open (Contact rating: DC30V, 0.5A)
Ambient environment		Temperature: 5 - 40ºC Relative humidity: 5 - 80%RH (No condensation) Indoor usage, Altitude: 2000m or lower (Pollution level:2 / Overvoltage category: II)
External dimensions [mm] (W×D×H)		330×462×148 (D: Excluding the protrusions / H: Including rubber feet)
Weight		About 11kg

■ WDX-600-II

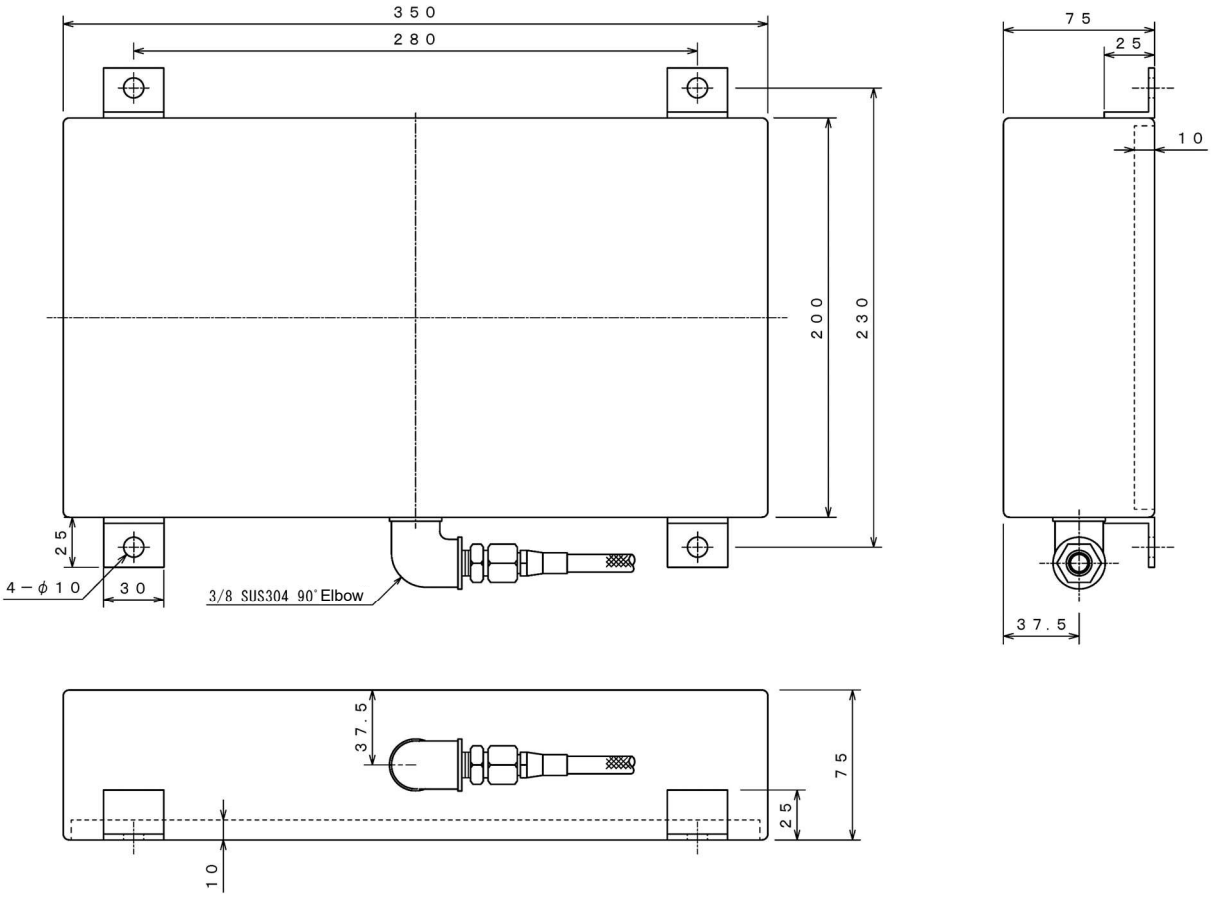


■ **Transducer unit**

Immersible type transducer unit - Standard specifications

Model	N06-DX2
Allowable input voltage	600W
Nominal resonant frequency	40kHz、120kHz
Transducer	Bolt clamped Langevin type transducer
Liquid temperature	5ºC - 80ºC
Vibration plate material	Stainless steel SUS304 (Custom order: Compatible with SUS316)
Vibration emitting surface process	Hard chromium plating
Dimensions [mm] (W×D×H)	350×200×75
Weight	About 11kg
Transducer cable	2.5m (Blade: 2m) + Output cable 3.5m

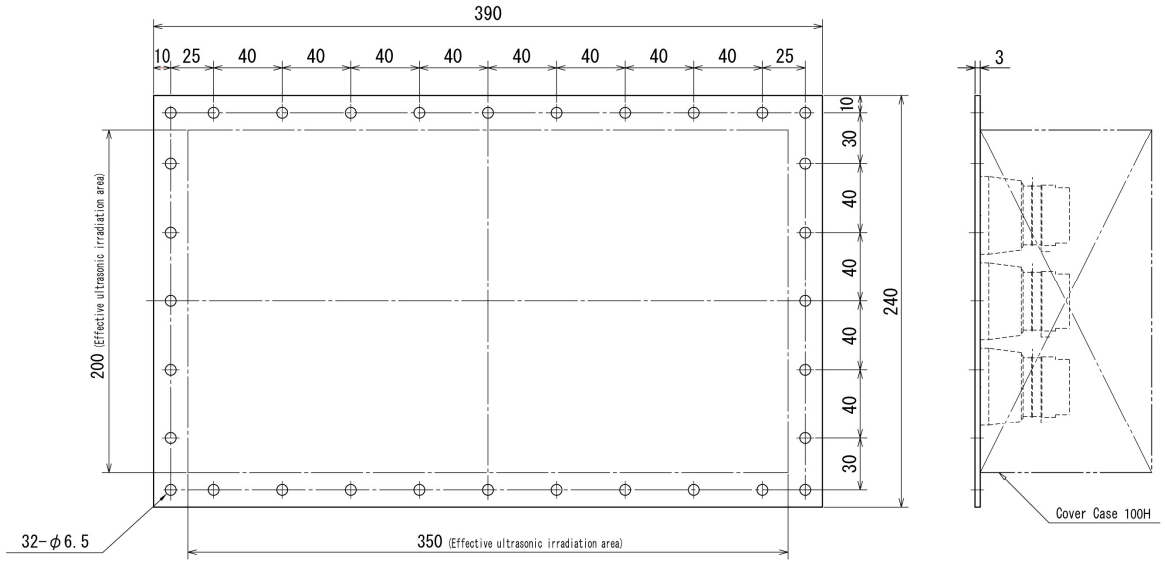
■ N06-DX2



Vibration plate type transducer unit - Standard specifications

Model	F06-DX2
Allowable input voltage	600W
Nominal resonant frequency	40kHz, 120kHz
Transducer	Bolt clamped Langevin type transducer
Liquid temperature	5ºC - 100ºC
Vibration plate material	Stainless steel SUS304 (Custom order: Compatible with SUS316)
Vibration emitting surface process	Hard chromium plating
Dimensions [mm] (W×D×H)	390×240×56.5
Weight	About 8kg
Transducer cable	3.5m + Output cable 3.5m
Packing material	EPDM　t = 3mm (Custom order: Compatible with Viton, etc.)

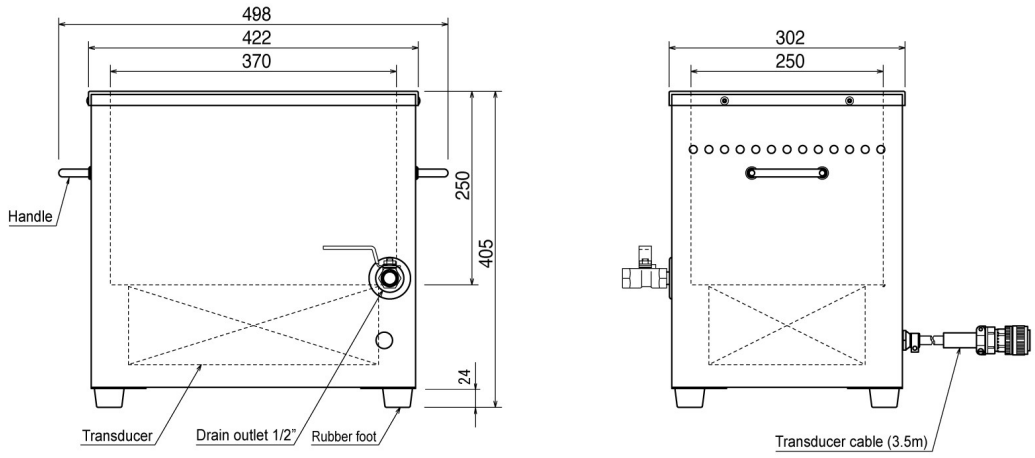
■ F06-DX2



Tank type

Model	S06-DX2
Allowable input voltage	600W
Nominal resonant frequency	40kHz, 120kHz
Transducer	Bolt clamped Langevin type transducer
Liquid temperature	5ºC - 100ºC
Tank material	Stainless steel SUS304 (Custom order: Compatible with SUS316)
Inner tank Dimensions [mm] (W×D×H)	366×246×248 (23L)
External dimensions [mm] (W×D×H)	422×302×405 (Including rubber feet)
Weight	About 19kg
Transducer cable	3.5m

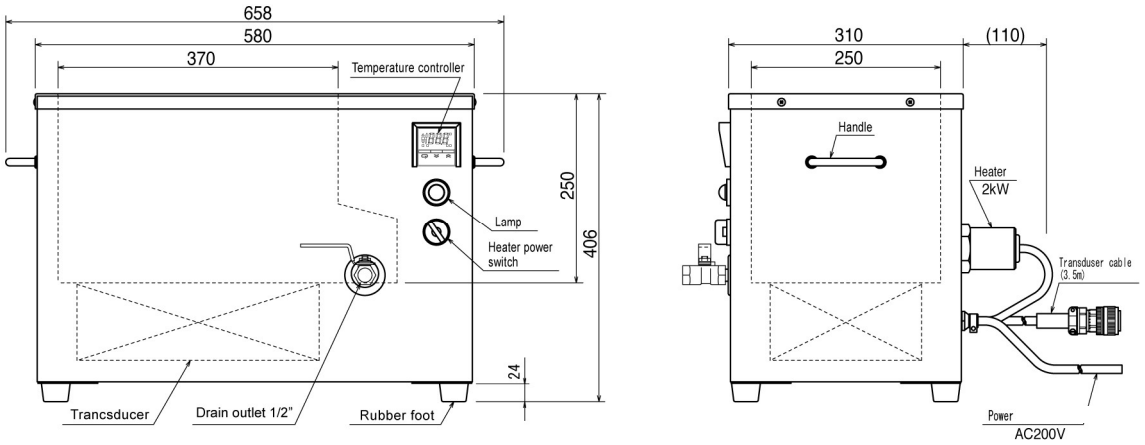
■ S06-DX2



Tank type with heater

Model	SH06-DX2
Allowable input voltage	600W
Nominal resonant frequency	40kHz、120kHz
Transducer	Bolt clamped Langevin type transducer
Liquid temperature	5ºC - 100ºC
Tank material	Stainless steel SUS304 (Custom order: Compatible with SUS316)
Inner tank Dimensions [mm] (W×D×H)	370×250×250 (23L)
External dimensions [mm] (W×D×H)	580×310×406 (Including rubber feet)
Weight	About 25kg
Transducer cable	3.5m
Heater capacity	2kW
Heater power voltage	AC200V / Single-phase 50/60Hz

■ SH06-DX2



◆ After sales service

When the after service such as the repair is required, please contact the dealer with the detailed information about the malfunction.

Do Not Duplicate

WDX-600- II

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- **This instruction manual is as of April , 2021.**
- **The specifications for the product may be changed without prior notice to improve the product.**

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