SONICATOR®





Ultrasonic Liquid Processors

QSONICA
SONICATORS


1000 mL
±5%
900

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How Does a Sonicator Work?







Generator → **Converter** → **Probe/Horn**

A Sonicator system is comprised of 3 major components: Generator, Converter and Horn (also known as a probe).

The ultrasonic electronic **Generator** transforms AC line power to high frequency electrical energy. The generator features a keypad or buttons which allow the user to control the sonication parameters.

The generator provides high voltage pulses of energy at a frequency of 20kHz that drives a piezoelectric **Converter**. The converter is a cylindrical device which is connected to the generator by a high voltage cable. The converter transforms electrical energy to mechanical vibration due to the characteristics of the internal piezoelectric crystals.

The vibration is amplified and transmitted down the length of the **Probe/Horn**. Probes have threaded ends and attach to the converter. During operation, the probe's tip longitudinally expands and contracts. Amplitude is the distance the tip travels and is dependent on the amplitude setting selected by the user.

In liquid, the rapid vibration of the tip causes cavitation, the formation and violent collapse of microscopic bubbles. The collapse of thousands of cavitation bubbles releases tremendous energy in the cavitation field. Objects and surfaces within the cavitation field are "processed." By increasing the amplitude setting, cavitation intensity within the sample is also increased.

The ultrasonic frequency is fixed at 20 kHz and does not fluctuate during sonication. The Sonicator continuously calibrates itself to ensure consistent output. Processing time and amplitude (intensity) are adjustable. Sonication generates heat so the system can be pulsed on/off to reduce this effect. If heating of the sample is not an issue, the continuous sonication option can be selected.

To ensure a positive outcome, it is important to select the appropriate generator and probe to match the volume, viscosity and other parameters of each particular application. Please consult with a Sonicator product specialist for help making the optimum choices.

Direct vs. Indirect Sonication Methods

DIRECT Sonication (inserting a probe directly into a sample vessel) is the most common way to process a sample. Energy is transmitted from the probe directly into the sample with high intensity and the sample is processed quickly.

The diameter of the probe's tip dictates the liquid volume that can be effectively processed. Smaller tip diameters (Microtip probes) deliver high intensity sonication and the energy is focused within a small, concentrated area. Larger tip diameters can process larger volumes, but offer lower intensity. Boosters and High Gain horns can be used to increase the output of large diameter probes. Probes are offered with either replaceable or solid tips and are made from titanium.



INDIRECT Sonication eliminates the need for a probe to come in contact with your sample. This technique is often described as a high intensity ultrasonic bath. The ultrasonic energy is transmitted from the horn, up through the water and into a vessel or multiple sample tubes.

Indirect sonication is most effective for very small samples because foaming and sample loss are eliminated. Pathogenic or sterile samples are ideal for this method because aerosols and cross contamination are prevented. The Cup Horn and Microplate Horn deliver indirect sonication and are ideal for many high throughput applications.



Q700 Sonicator

The new Q700 is the most technologically advanced sonicator available today. A state-of-the-art touch screen interface offers intuitive control and provides a user-friendly experience. The most important feature of a Sonicator is reproducibility. Improved internal circuitry guarantees more efficient operation, sample-to-sample consistency and most importantly, a reliable end result.

The Q700 is the only sonicator on the market that offers full amplitude control from 1-100%. This enables greater control of the probe's intensity, helping to pinpoint the optimum settings for efficient sample processing. We have increased maximum power output to 700 watts making the system more durable and capable of handling even larger samples if necessary. Our new display, design improvements and added accessories make this the most sophisticated and versatile Sonicator available today.



Stand sold separately.

FEATURES:

FULL AMPLITUDE CONTROL
Amplitude (intensity) is controlled from 1-100% giving a greater degree of resolution and the ability to pinpoint the amplitude needed to effectively process your sample.

PROGRAMMABILITY
Parameters including processing times, pulse on/off and amplitude can be saved to memory and run by the touch of a button.

PULSE MODE
Adjustable pulse On and Off times to reduce the heat gain in temperature sensitive samples.

TEMPERATURE MONITORING
An optional temperature probe is available for those customers who wish to monitor the temperature of their sample. If the temperature limit is reached, sonication shuts down to prevent overheating.

RoHS COMPLIANT
All Qsonica equipment is built lead free.

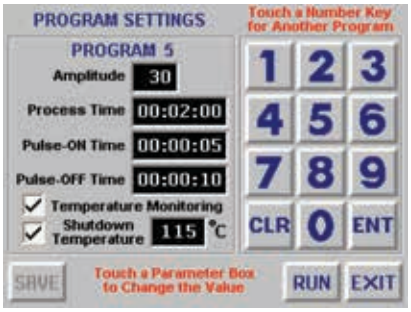
RUN MULTIPLE PROGRAMS IN SEQUENCE
Multiple programs can be run in sequence. For example, the unit can be programmed to sonicate at 50% amplitude for 5 minutes, shut off for 2 minutes and re-start at 25% amplitude for 10 minutes. Up to 5 programs can be run in succession.

TOTAL ENERGY OUTPUT DISPLAY
Energy delivered to the probe is displayed in both Watts and Joules.

AUTO TUNING
The Sonicator digitally tracks frequency changes in the converter / tip assembly caused by load and temperature changes and maintains electrical efficiency at all times. Manual tuning is unnecessary.

OVERLOAD PROTECTION
The unit is equipped with fault detection circuitry to shut down sonication in the event that a fault occurs.

TOUCH SCREEN CONTROL
A large, color LCD screen clearly displays all operating parameters and options. Intuitively and quickly access any of the sonicator's functions with a simple touch.





PART NO. Q700 INCLUDES:

- Generator
- Converter
- 1/2" (13mm) diameter probe
- Power cable
- Converter cable
- Wrench set

TECHNICAL SPECIFICATIONS:	
Power Rating:	700 watts
Frequency:	20kHz
Programmability:	10 memories plus sequencing
Programmable Timer:	72 hours
Adjustable Pulse On/Off:	1 second to 24 hours
Dimensions (W x L x H):	8 x 15.25 x 8.5 in. (203 x 387 x 216 mm)
Voltage:	110V, 50/60Hz

Specify desired voltage for export.

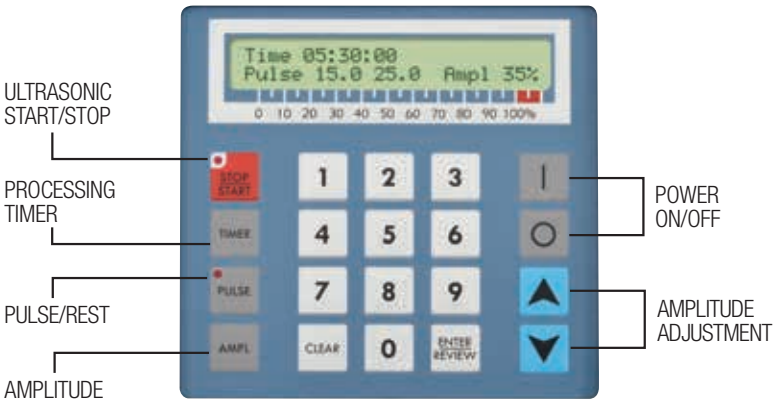
Q500 Sonicator

The Q500 is a powerful ultrasonic processor featuring programmable operation and a digital display of operating parameters. Popular applications include nanoparticle dispersion, creating emulsions, cell lysis and homogenization.

Adjustable pulse On and Off times can be programmed from 1 second to 1 minute. Total programming has a maximum setting of 10 hours. A wide variety of probes and accessories are available to handle virtually any application.



Stand sold separately.



FEATURES:

Programmable operation
Set time and amplitude for hands free operation

Pulse mode
Prevent heat buildup in temperature sensitive samples

Digital amplitude / intensity control
Output intensity can be set from 20-100%

Elapsed time indicator
Displays duration of sonication

Display of wattage and joules
Real-time energy monitoring

Overload protection
Prevents damage to circuitry if a fault occurs

RoHS compliant
Uses lead free components

PART NO. Q500 INCLUDES:

- Generator
- Converter
- 1/2" (13mm) diameter probe
- Power cable
- Converter cable
- Wrench set

TECHNICAL SPECIFICATIONS:

Power Rating:	500 watts
Frequency:	20kHz
Programmable Timer:	10 hours
Adjustable Pulse On/Off:	1 second to 1 minute
Dimensions (W x L x H):	8 x 5.25 x 8.5 in. (203 x 387 x 216 mm)
Voltage:	110V, 50/60Hz

Specify desired voltage for export.

Horns (also known as probes) are made from titanium and machined to specific sizes and shapes. When driven at their resonant frequency, they expand and contract longitudinally. This mechanical vibration is amplified and transmitted down the length of the probe. In liquid, the probe causes cavitation which constitutes the main mechanism for sample processing.

Choosing the appropriate horn is extremely important. The sample volume to be processed is directly related to the tip diameter. Smaller tip diameters (Microtip probes) deliver high intensity sonication, but the energy is focused within a small, concentrated area. Larger tip diameters can process larger volumes, but offer lower intensity. Probes are offered with replaceable or solid tips.

Probe tips will pit or erode over time and require replacement. Replaceable tip probes are used with aqueous samples only. In addition to aqueous samples, Solid probes can be used with organic solvents, alcohols and low surface tension liquids. Contact Qsonica with questions regarding proper tip selection.



Standard Probes



Replaceable Solid

Part #	Type of Tip	Processing Volume	Tip Diameter	Amplitude (microns)
4220	Replaceable Tip	20-250mL	1/2" (13mm)	120µm
4219	Solid Tip	20-250mL	1/2" (13mm)	120µm
4207	Replaceable Tip	50-500mL	3/4" (19mm)	60µm
4208	Solid Tip	50-500mL	3/4" (19mm)	60µm
4210	Replaceable Tip	100-1,000mL	1" (25mm)	30µm
4209	Solid Tip	100-1,000mL	1" (25mm)	30µm

Note: All amplitude values are measured at 100% output.

Replacement Tips for Standard Probes

Standard ½", ¾" and 1" horns have replaceable tips. During normal use, tips erode and become less effective over time. These worn tips can be easily removed and replaced.



Part #	Tip Diameter	For Use With
4406	1/2" (13mm)	#4220
4407	3/4" (19mm)	#4207
4408	1" (25mm)	#4210



New Tip



Worn Tip

Microtip Probes

Microtips are thin, high intensity probes which are designed for processing small sample volumes. Microtips screw into the threaded end of the standard ½" probe (#4220).



Part #	Processing Volume*	Tip Diameter	Amplitude (microns)
4417	0.2-5mL	1/16" (2mm)	320µm
4418	1-15mL	1/8" (3mm)	380µm
4420	10-50mL	1/4" (6mm)	200µm

* The recommended processing volume range is application specific. For example, samples containing surfactants foam easily and may require larger volumes for effective sonication. Contact Qsonica for application assistance.



Coupler with Stepped Microtip

The stepped microtip and coupler assembly is a low intensity option which can be used to process small volumes that do not require high power. The probe tip remains 1/8" diameter for 48mm. This 2-piece assembly attaches directly to the converter.



#4421



#4422

Part #	Processing Volume	Tip Diameter	Amplitude (microns)
4422*	0.5-15mL	1/8" (3mm)	200µm
4421	Coupler - *required for use of a Stepped Microtip		

Extenders



Standard probes may not be long enough to fit down into certain long necked vessels. Extender probes attach to standard horns of the same tip diameter and extend the length of the horn assembly. Extenders are available in 5" and 10" lengths with either solid, or replaceable tips.

Extenders offer the same processing volume and amplitude of their corresponding standard horn.

Part #	Type of Tip	Length	Tip Diameter
406HW	Solid Tip	5"	1/2" (13mm)
406HWT	Replaceable Tip	5"	1/2" (13mm)
407HW	Solid Tip	5"	3/4" (19mm)
407HWT	Replaceable Tip	5"	3/4" (19mm)
408HW	Solid Tip	5"	1" (25mm)
408HWT	Replaceable Tip	5"	1" (25mm)
407FW	Solid Tip	10"	3/4" (19mm)
407FWT	Replaceable Tip	10"	3/4" (19mm)
408FW	Solid Tip	10"	1" (25mm)
408FWT	Replaceable Tip	10"	1" (25mm)

Boosters



Booster horns increase the intensity of standard ¾" and 1" horns. Boosters attach between the converter and horn to increase amplitude by the gain ratio indicated below.

Part #	For Use With	Gain Ratio
4121	3/4" (19mm) and 1" (25mm) Probes	2 to 1

High Gain Horns



High gain horns (also known as high intensity horns) offer double the amplitude of standard ¾" and 1" horns. High gain horns attach directly to the converter.

Part #	Type of Tip	Processing Volume	Tip Diameter	Amplitude (microns)
4305	Replaceable Tip	50-500mL	3/4" (19mm)	120µm
4306	Solid Tip	50-500mL	3/4" (19mm)	120µm
4310	Solid Tip	100-1,000mL	1" (25mm)	60µm
4311	Replaceable Tip	100-1,000mL	1" (25mm)	60µm

4 Tip Horns

The 4 Tip Horn enables 4 samples to be processed simultaneously. This horn is effective for cell disruption, mixing, homogenization and many other applications. This horn is available with either 1/8" or 1/4" tip diameters.

#4659 is a 4 Tip Horn with 1/8" tips. It is recommended for 1-15ml volumes and fits into both 1.5ml and 15ml tubes. The space between each tip is 1.05". The #504 and #510 Coolracks are compatible with #4659.

#4674 is a 4 Tip Horn with 1/4" tips. It is recommended for 10-50ml volumes and is used with 15 and 50ml tubes. The space between each tip is 1.6". The #511 Coolrack is compatible with the #4674.



#4659 **#4674**



The #4130 Stand with Lab Jack is recommended for use with all high throughput horns. This stand holds the horn stable and level to ensure consistent results.

24 Tip Horn

The 24 Tip Horn processes each well of a 24 well plate at the same time. This horn is effective for cell disruption, mixing, dissolution and many other applications. The distance between each tip is .708".



#4597

Dual Horn

The Dual Horn allows a single Sonicator unit to process two samples simultaneously. Two standard probes are attached to a rectangular shaped horn. The distance from center to center of each probe is 4.5". 3/4" solid tip probes are included with the Dual Horn but 1/2" or 1" probes can also be substituted.



#4525



#432B2
(Probe sold separately.)

Sound Enclosure

Sonicators are extremely loud devices and will cause discomfort to the user and anyone nearby. The Sound Enclosure reduces noise by approximately 20 dBa and is made to work with all accessories (excluding the Microplate Horn which has its own dedicated enclosure).

In addition to reducing noise, the Sound Enclosure has an internal support rod and converter mounting system. Any Qsonica probe or horn will be held safely and securely inside the unit.

Two ports are located on either side of the enclosure for coolant tubing or a temperature monitoring probe. The interior walls are lined with acoustical foam and the door has a window so experiments can be visually monitored.



#432B2
(Cup horn sold separately.)

Part #	Description
432B2	Sound Enclosure with Converter Holder, Exterior Dimensions (W x H x D) 13.5 x 30.5 x 13 in. (343 x 775 x 330 mm)

Low Volume Flocells

The Low Volume Flocell (LVF) is available for use with either the Q500 or Q700 system. The Flocell (#4650) is equipped with ¼" (6mm) hose barb fittings and does not include a probe. A ½" (12mm) replaceable tip probe (#4643) or ½" (13mm) solid probe (#4644) must be ordered separately. These probes feature a flange for proper mounting with the LVF. The replaceable tip probe is for use with aqueous samples only. Solid tip probes can be used with all types of solvents or low surface tension liquids.

Sonication generates heat so a Water Jacket (#4655) is available if the process requires cooling. The water jacket slides over the LVF and is used to recirculate cold water around the exterior of the flocell body. The water jacket includes ¼" (6mm) hose barb fittings.

The LVF is recommended for processing sample volumes above 1L. Routine applications include cell lysis, mixing, solubilizing and deagglomerating/ dispersing nanoparticles.



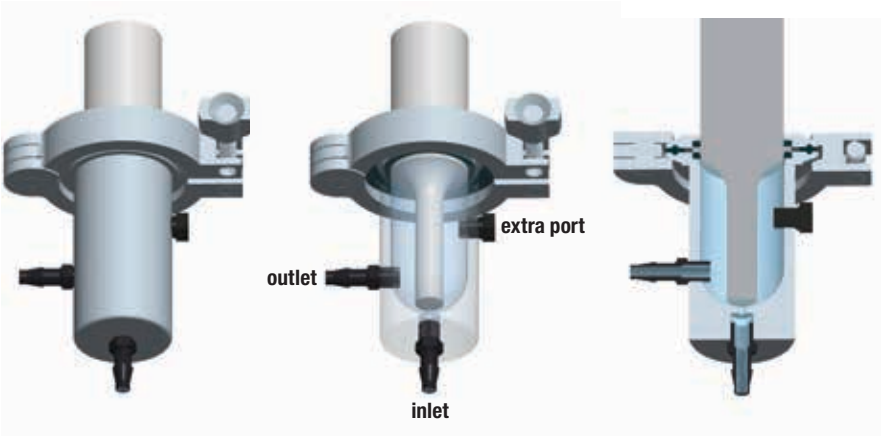
LVF Assembly with Probe



Flocell Assembly with Water Jacket



Probe



Part #	Description
4650	**Low Volume Flocell** • Material: 316L Stainless Steel • Operating pressure: 40-100 psi max. • Internal volume: 65mL • Maximum flow rate: 0.5L/min • Hose barb fittings for ¼" (6mm) ID tubing • Dimensions (H x D): 9.1 x 3.5 in. 228 x 89 mm) — dimensions include probe and clamp
4643	**½" (13mm) Replaceable tip probe with flange for #4650**
4644	**½" (13mm) Solid tip probe with flange for #4650**
4655	**Water Jacket for #4650**

How Flocells Work

Flocells offer inline or continuous, large volume, batch sample processing. Flocells are ideal for mixing and dispersing applications. Batch volumes can be re-circulated through the system multiple times if increased sonication time is needed. Multiple units can be used in series to reduce processing time and/or maintain an even higher flow rate.

The liquid sample is pumped into the Flocell through the inlet at the bottom of the unit. As the sample passes through the cavitation field, it is processed. The processed liquid exits the unit through an outlet port. The degree of processing can be controlled by adjusting the intensity of sonication as well as flow rate.

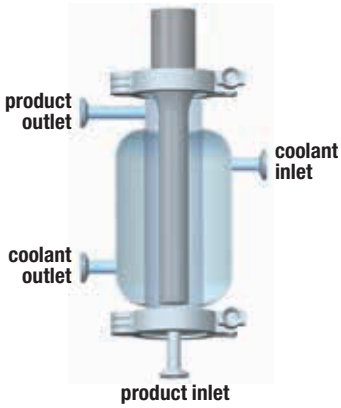
High Volume Flocells

The High Volume Flocell (HVF) is available for use with either the Q700 or Q1375 System. The Flocell (#4549) is equipped with ½" (13mm) sanitary connections, a water jacket and 1" (25mm) Diameter probe (#4625). The water jacket can be used to recirculate cold water around the exterior of the flocell body. This helps reduce the heat generated during ultrasonic processing.

The HVF is recommended for processing batch volumes of 5L or more. Routine applications include cell lysis, mixing, solubilizing and deagglomerating/ dispersing nanoparticles.









Part #	Description
4549	**High Volume Flocell** • Dimensions (H x D): 17 x 16 in. (431 x 406 mm) • Includes #4625 Probe • Material: 316L Stainless Steel • Operating pressure: up to 100psi • ½" (13mm) Sanitary connections • Internal volume: 400mL • Maximum flow rate: 20L/min • Water jacketed for cooling
4625	**1" (25mm) Diameter Flocell Probe**

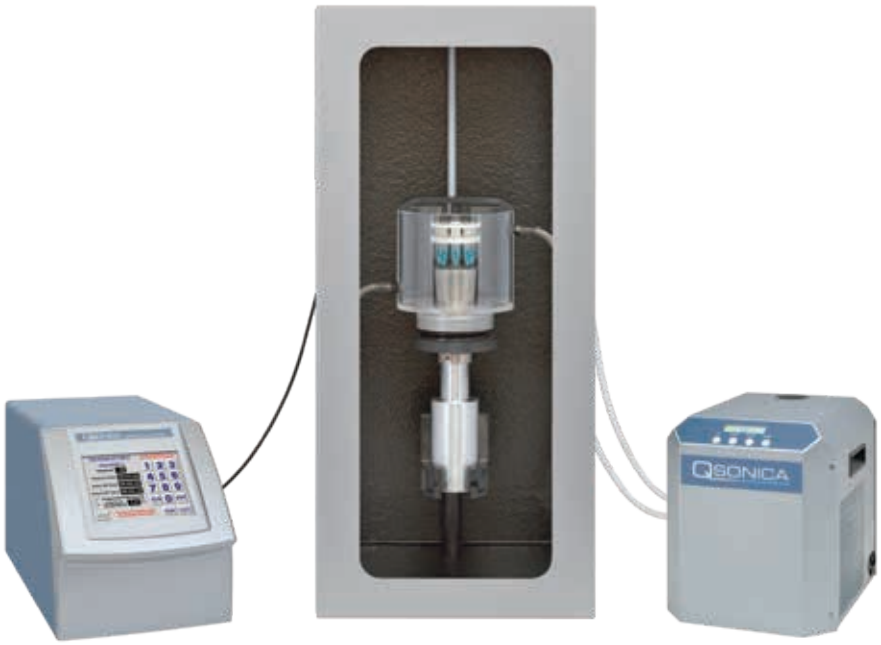
Cup Horn

A Cup Horn offers indirect sonication and functions as a high intensity ultrasonic water bath. Multiple samples can be processed in sealed tubes eliminating cross contamination or aerosol issues.

The horn is mounted within an acrylic cup and the cup is filled with water. Sample tubes are placed in a rack at a fixed distance above the ultrasonic horn. Cavitation is produced in the water, processing the samples within the tubes. The #440 tube rack is included with the Cup Horn. This rack is made for 1.5mL polystyrene tubes which are proven to process samples more efficiently than 1.5mL polypropylene tubes.

Sonication generates heat so ports for cooling are located on each side of the cup. The #4905 Chiller is recommended for maintaining both the water temperature and water level within the Cup Horn.

The Sound Enclosure is highly recommended for all Cup Horn users. In addition to reducing sonication noise to safe levels, it securely holds the Cup Horn in place. Custom tube racks are available. Contact Qsonica for application assistance.





#431C2

Optional Tube Racks



#440



#451



#449



#445



#455



#454

Part #	Tube Holder Description
440	8 x 1.5mL Polystyrene tubes
451	8 x 1.5mL Polypropylene tubes
449	12 x 600µl PCR tubes
445	24 x 300µl PCR tubes
455	1 x 50mL tube
454	1 x 15mL tube

Microplate Horn

(Only for use with Q700)

Similar to a Cup Horn, but larger, the Microplate Horn is an indirect sonication device capable of processing an entire 96 well microtiter plate or many microtubes at one time.

Simply place your samples within the water-filled reservoir and the sonic energy is transferred into each individual well or tube.



#Q700MPX
(with Chillerand tubing set)

The Horn is equipped with a clear acrylic collar to contain the liquid media within the reservoir. This allows the user to process deep well microplates or other tall vessels. Standard microtiter plates or PCR tubes require a smaller volume of liquid for sonication. For these applications, the clear acrylic collar may be removed and the lower, gray collar will allow for easier access to the samples.



#431MPX



#431MPXH

Part #	Description
Q700MPX	Q700 (Without Standard Probe), and the 431MPX
431MPX	Microplate Horn, Pinch Clamps, Tubing and Sound Enclosure
431MPXH	Microplate Horn Only
432MP	Sound Enclosure for Microplate Horn
444	300µl Microcentrifuge Tube Holder/Cover

Exterior dimensions of the Sound Enclosure are (W x D x H): 10 x 10 x 17 in. (254 x 245 x 432 mm).



#444

The Microplate Horn is commonly used in PMCA research. A microcentrifuge tube holder and cover (#444) are available and often used for this application.

Recirculating Chillers

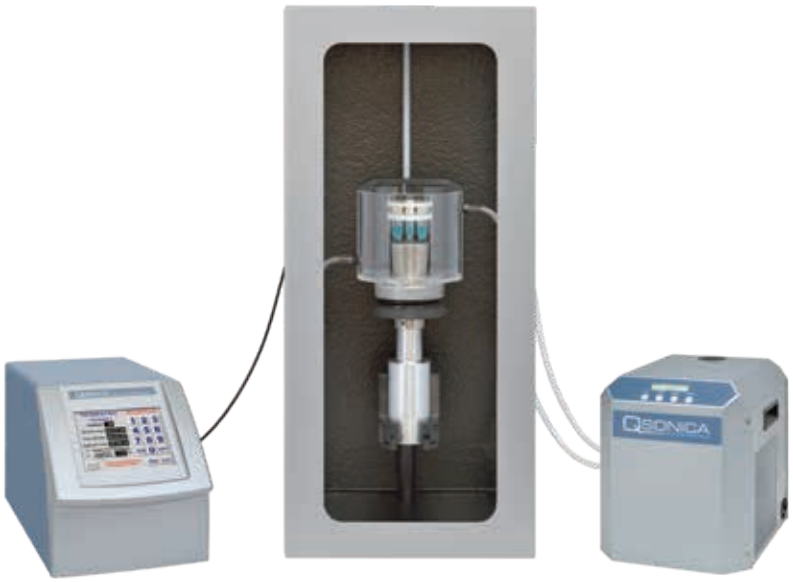
Sonication generates heat which may be detrimental to some applications. Attempting to control temperature with ice and/or repeatedly changing out water is tedious and no longer necessary. Qsonica now offers 2 chiller options for automating the sample cooling process.

Quick-connect tubing and fittings (ordered separately) attach the chiller to the ports on the cup horn or microplate horn. When used in conjunction with the pulsed sonication mode, your desired water temperature will be maintained. Older model cup horns may require special fittings so please contact us for ordering assistance.



#4900 #4905

Part #	Description
4900	Compact Recirculating Chiller
4910	Tubing and Connector Set for Cup Horn for #4900
4915	Tubing and Connector Set for Microplate Horn for #4900
4905	High-Capacity Recirculating Chiller
4911	Tubing/Connector Set for Cup Horn for #4905
4916	Tubing/Connector Set for Microplate Horn for #4905



Chiller shown with Sonicator, tubing set, cup horn and sound enclosure (sold separately).

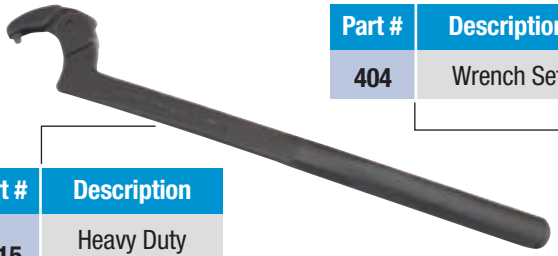
TECHNICAL SPECIFICATIONS:	Part No. 4900	Part No. 4905
Cooling Capacity:	200 watts	400 watts
Temperature Range:	2-45° C	2-45° C
Dimensions:	7.5 x 5 x 7 in. (19 x 13 x 18 cm)	13 x 11 x 13 in. (32 x 28 x 32 cm)
Weight:	8 lbs. (3.6kg.)	28 lbs. (12.7kg.)
Voltage:	115-230 VAC, 50/60 Hz	115-230 VAC, 50/60 Hz

Replacement Converter



Part #	Description
CL334	Replacement Converter

Replacement Wrenches



Part #	Description
404	Wrench Set

Part #	Description
4015	Heavy Duty Pin Spanner



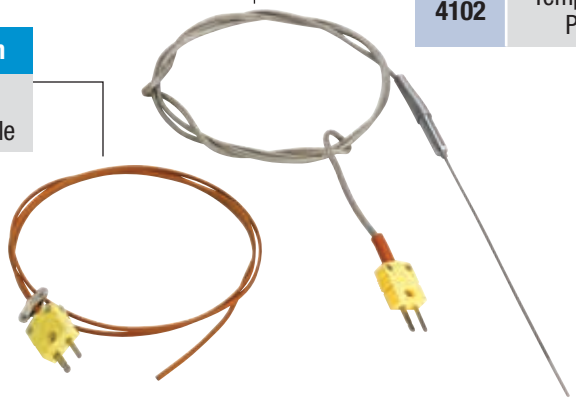
Temperature Monitoring Options

(Q700 only)

Part #	Description
4102	Temperature Probe

Part #	Description
4103	Flexible Thermocouple

2 types of temperature probes are available for use with the Q700 Sonicator



Replacement Converter Cable



Part #	Description
K4	6 ft. Long
K4-10	10 ft. Long

Footswitch



Enables hands free operation

Part #	Description
FS-3	For Use with Q700
4004	For Use with Q500

Heavy Duty Stand

Part #	Description
4130	Heavy Duty Stand

The stand securely holds horns in place and ensures all tips are level. An adjustable jack stand to raise and lower samples is included



Large Clamp Stand

Part #	Description
459	Stand with ½" Diameter Support Rod and Converter Clamp



Jack Stand



Raises and lowers sample vessels to a stationary probe as needed.

Part #	Description
357	Jack Stand

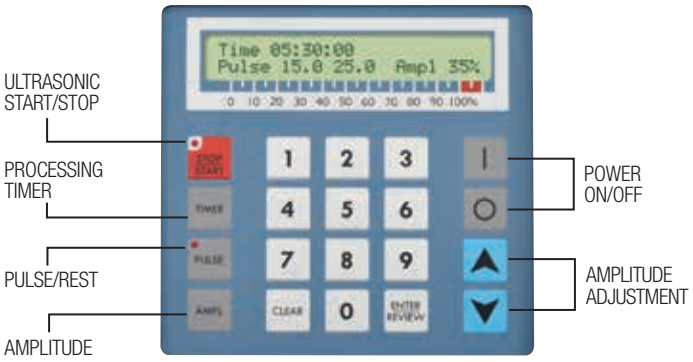
Q125 Sonicator



Stand sold separately.

The Q125 is a microprocessor based, programmable ultrasonic processor. Features include pulse mode and a digital display of both wattage and joules.

The unit is effective for standard cell disruption, DNA/RNA shearing, homogenization and many other applications. The Q125 is ideal for small samples and for customers that do not plan to scale up to larger volumes in the future. This model offers the same programming and display features as the Q500 unit.



FEATURES:

Programmable operation
Set time and amplitude for hands free operation

Pulse mode
Prevent heat buildup in temperature sensitive samples

Digital amplitude / intensity control
Output intensity can be set from 20-100%

Elapsed time indicator
Displays duration of sonication

Display of wattage and joules
Real-time energy monitoring

Overload protection
Prevents damage to circuitry if a fault occurs

RoHS compliant
Uses lead free components

Compact design
Takes up less space than competitive units

PART NO. Q125 INCLUDES:

- Generator
- Converter
- 1/8" (3mm) diameter probe
- Power cable
- Converter cable
- Wrench set

TECHNICAL SPECIFICATIONS:	
Power Rating:	125 watts
Frequency:	20kHz
Programmable Timer:	10 hours
Adjustable Pulse On/Off:	1 second to 1 minute
Dimensions (W x L x H):	8 x 13.75 x 5.75 in. (203 x 349 x 146 mm)
Voltage:	110V, 50/60 Hz

Specify desired voltage for export.

Probes



Probes	Part # 4423	Part # 4422	Part #4435
Processing Volume*	200µl - 5mL	500µl - 15mL	10mL - 50mL
Tip Diameter	5/64" (2mm)	1/8" (3mm)	1/4" (6mm)
Amplitude (µm)	200	180	120

Sound Enclosure



Part #	Description
432A	Sound Enclosure with Converter Holder, Exterior Dimensions (W x H x D) 20 x 12 x 12 in. (508 x 254 x 254 mm)

Support Stand

Part #	Description
460	Support Stand with Converter Holder



Converter

Part #	Description
CL18	Replacement Converter



8 Tip Horn

Part # 4602
Tip Diameter 1/8" (3mm)
Distance Between Tips 0.35" (9mm) center to center



Cup Horn



Part # 4608
Horn Diameter 25/32" (20mm)
Cup ID* 1.5" (38mm)

*Accommodates (two) 1.5mL microtubes or (one) 15mL Falcon tube.

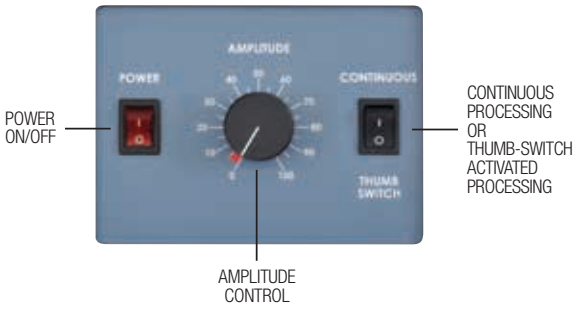
Q55 Sonicator

The Q55 is a compact and cost effective ultrasonic processor that will occupy less bench space than any unit on the market.

This model is effective for standard cell disruption and many other small volume applications. Probes are available in three different sizes.

FEATURES:

- Smallest unit available
- Thumb-switch or continuous operation
- Simple and effective operation





Stand sold separately.



Probes	Part # 4423	Part # 4422	Part # 4435
Processing Volume*	200µl - 5mL	500µl - 15mL	10mL - 50mL
Tip Diameter	5/64" (2mm)	1/8" (3mm)	1/4" (6mm)
Amplitude (µm)	200	180	120

PART NO. Q55 INCLUDES:

- Generator
- Converter
- 1/8" (3mm) dia. probe
- Power cable
- Converter cable
- Wrench set

TECHNICAL SPECIFICATIONS:

Power Rating:	55 watts
Frequency:	20kHz
Dimensions (W x L x H):	8 x 7.5 x 5.75 in. (203 x 190 x 146 mm)
Voltage:	110V, 50/60 Hz

Specify desired voltage for export.



#CL188



#460



#432A

Optional Accessories

Part #	Description
460	Support Stand with Converter Holder
432A	Sound Enclosure with Converter Holder Exterior Dimensions (W x H x D) 20 x 12 x 12 in. (508 x 254 x 254 mm)
CL188	Replacement Converter

CoolRacks

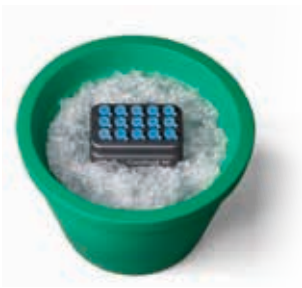
Tube Chilling Modules - Secure sample tubes and standardize temperature during sonication.

CoolRack® thermo-conductive tube modules eliminate inconsistencies which occur due to inserting tubes directly into ice, dry ice, alcohol baths, water baths and other common temperature sources. Place the module directly onto the temperature source and it will rapidly adapt to that temperature (from -196°C to +100°C). CoolRack modules ensure temperature standardization of all tubes when cooling, (snap) freezing or heating/thawing samples (within +/- 0.1°C) and reproducible temperature-sensitive procedures.





PROBLEM
- Shifting Tubes
- Overheating Samples
- Inconsistent Tip Depth



SOLUTION
- Fixed Tube Position
- Stable Temperature
- Reproducible Results



1.5mL Tubes



15mL Tubes



50mL Tubes

FEATURES:
- Keep tubes at desired temperature
- Prevent contamination from ice/water
- Organize and keep tubes upright
- Resistant to rust and corrosion
- Compatible with detergents and sterilizable



#504
(shown with 4 tip horn)

Part #	Description	For Use With
501	6 Tube Rack	1.5 and 2 mL Tubes
502	15 Tube Rack	1.5 and 2 mL Tubes
504	4 Tube Rack	1.5 and 2 mL Tubes
510	9 Tube Rack	15mL Centriuge Tubes
511	4 Tube Rack	50mL Centriuge Tubes
503	1L Square Ice Pan	#501, 502 or 504 CoolRacks
512	4L Rectangular Ice Pan	#510 or 511 CoolRacks
513	2.5L Round Ice Pan	#510 or 511 CoolRacks

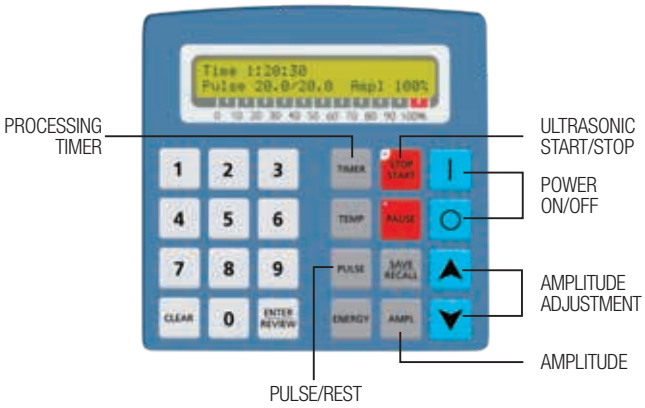
Q2000 Sonicator

The Q2000 offers the ability to process large volumes in individual batches or flow through applications. This model includes a high amplitude, 1.5" diameter, 10" long probe and booster. The Q2000 is powerful, durable and customizable.



Stand sold separately.

The Q2000 Sonicator allows the user to program processing times and a full range of intensity settings. Processing time can be set from 1 second to 10 hours. A pulsing feature is also included. Pulsing can reduce the amount of heat generated by sonication when processing temperature sensitive samples. A temperature monitoring probe option is also available.



FEATURES:

Programmable operation
Set time and amplitude for hands free operation

Pulse mode
Prevent heat buildup in temperature sensitive samples

Digital amplitude / intensity control
Output intensity can be set from 20-100%

Elapsed time indicator
Displays duration of sonication

Display of wattage and joules
Real-time energy monitoring

Overload protection
Prevents damage to circuitry if a fault occurs

Temperature protection
Prevents overheating of samples

PART NO. Q2000 INCLUDES:

- Generator
- Converter
- Booster
- Converter cable
- Power cable
- Wrench set
- #4777

TECHNICAL SPECIFICATIONS:	
Power Rating:	2,000 watts
Frequency:	20kHz
Programmable Timer:	10 hours
Adjustable Pulse On/Off:	1 second to 1 minute
Dimensions (H x W x D):	7 x 15 x 18.25 in. (178 x 380 x 463 mm)
Voltage:	230V, 50/60 Hz

High Volume Batch Processing

The powerful 2,000 watt generator delivers high amplitude sonication to a wide variety of sample types. High viscosity samples (such as oils, slurries, emulsions, etc.) require more power than traditional sonicators are capable of supplying. The Q2000 is a reliable solution for many applications.



Replacement Probes



#4777 #4697 #4776

The #4777 comes standard with the Q2000 System. The two additional probes are available as options to accommodate other sample volumes.

Part #	Tip Diameter	Processing Volume	Amplitude
4777	1.5" (38mm)	5 - 20L	100µm
4697	1" (25mm)	1 - 5L	100µm
4776	0.5" (12mm)	50 - 400ml	100µm

Note: Processing volumes are application specific. There are many variables (viscosity, concentration, etc.) that can affect the min/max processing volumes and processing times. Stirring may be beneficial to viscous samples. Contact us for assistance.

Optional Accessories



#4474



#461



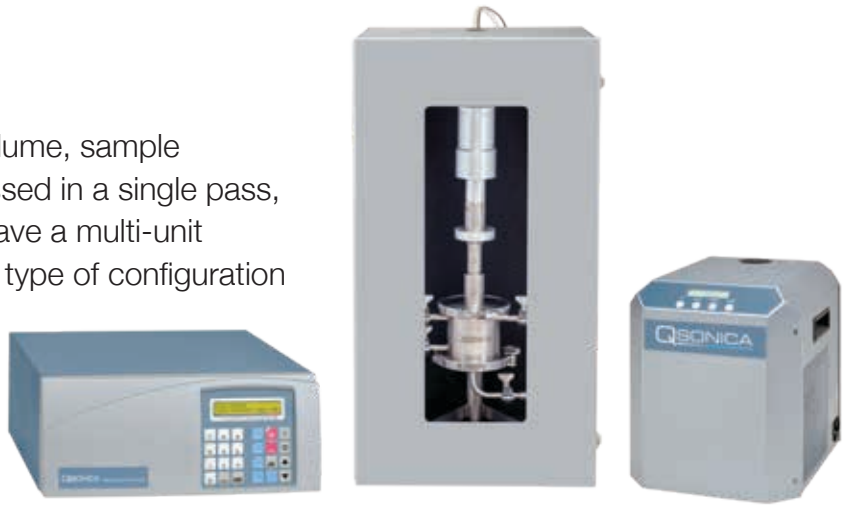
#4060

Part #	Description
4474	Sound Enclosure (H x W x D) 36 x 16 x 16 in. (914 x 406 x 406 mm)
461	Support Stand and Converter Clamp
4060	Temperature Probe

**Stand and clamp can be used inside of enclosure.*

High Volume In-Line Processing

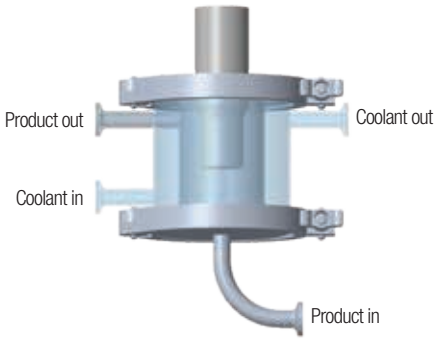
Flocells offer inline/continuous, large volume, sample processing. The sample may be processed in a single pass, recirculated through multiple times or have a multi-unit configuration for faster processing. The type of configuration and actual flow rate are dependent on the individual application, sample type and desired end result.

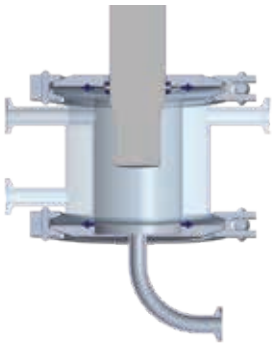


Sound enclosure and chiller sold separately.

The liquid sample is pumped into the Flocell through the inlet at the bottom of the unit. As the sample passes through the cavitation field, it is processed. The processed liquid exits the unit through an outlet port. The degree of processing can be controlled by adjusting the intensity of sonication as well as flow rate.







The unit is recommended for processing volumes of 10L or larger. Routine applications include emulsification, cell lysis, degassing, homogenization, solubilizing, deagglomerating and dispersing.

The Flocell is compatible with the Q2000 system. It is equipped with 1/2" sanitary connections and includes the #4676 probe. An integral water jacket is used to regulate both the system and the sample temperature for efficient operation. An optional recirculating chiller (#4906) is available to cool the Flocell's water jacket. Use of a sound enclosure (#4475) is always recommended.

Part #	Description
Q2000F	**Q2000** (without standard probe) Including **High Volume Flocell (#4678)**
4678	**High Volume Flocell** • Includes #4676 Probe • Material: 316L Stainless Steel • 1/2" (13mm) Sanitary connections • Internal volume: 250mL • Water jacketed for cooling • Maximum flow rate: 20L/min.
4676	**Flocell Probe** 1.5" (38mm) diameter
4475	**Sound Enclosure** 16.5 x 31 x 14 in. (419 x 787 x 356 mm)
4906	**Recirculating Chiller** 13 x 11 x 13 in. (320 x 344 x 234 mm)

Note: Pump system and compressed air source are not included.

Frequently Asked Questions

Relationship between Sample Volume and Probe Size

Selecting the proper size probe is extremely important. Each probe has a recommended sample volume range.

Small volumes require a small tip to fit inside the sample tube. Small tips (microtips) are recommended for processing samples inside small, thin vessels and never samples larger than 50mL.

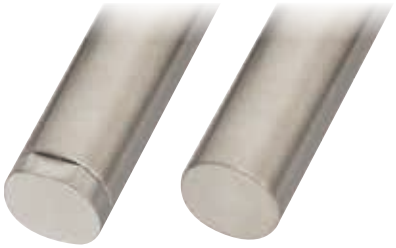
Larger volumes require a larger probe for effective processing. For example, a 1" probe will process 1 liter more quickly than a ¾" probe.

Tip Diameter	Processing Volume Range
1/16" (2mm)	200ul - 2mL
1/8" (3mm)	1mL - 15mL
1/4" (6mm)	10mL - 50mL
1/2" (12mm)	20mL - 250mL
3/4" (19mm)	50mL - 500mL
1" (25mm)	100mL - 1,000mL
1" with booster	500mL - 1,500mL
Flocell	Continuous flow

Replaceable vs. Solid Tips

Replaceable tip probes are used with aqueous samples. Replaceable tip probes have threaded ends and when the tip is worn out it can be unscrewed and replaced.

If you are processing a sample containing solvents or low surface tension liquids you must use a solid tip probe. Solid tip probes can be used for any type of sample.

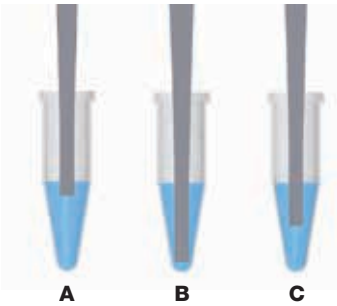


Replacable **Solid**

Tip Depth

Probes/tips must be submerged properly. If the tip is not submerged enough the sample will foam or bubble. If the tip is too deep it will not circulate the sample effectively.

Figure **C** indicates the correct set up and will achieve good results in the shortest processing time.



A **B** **C**

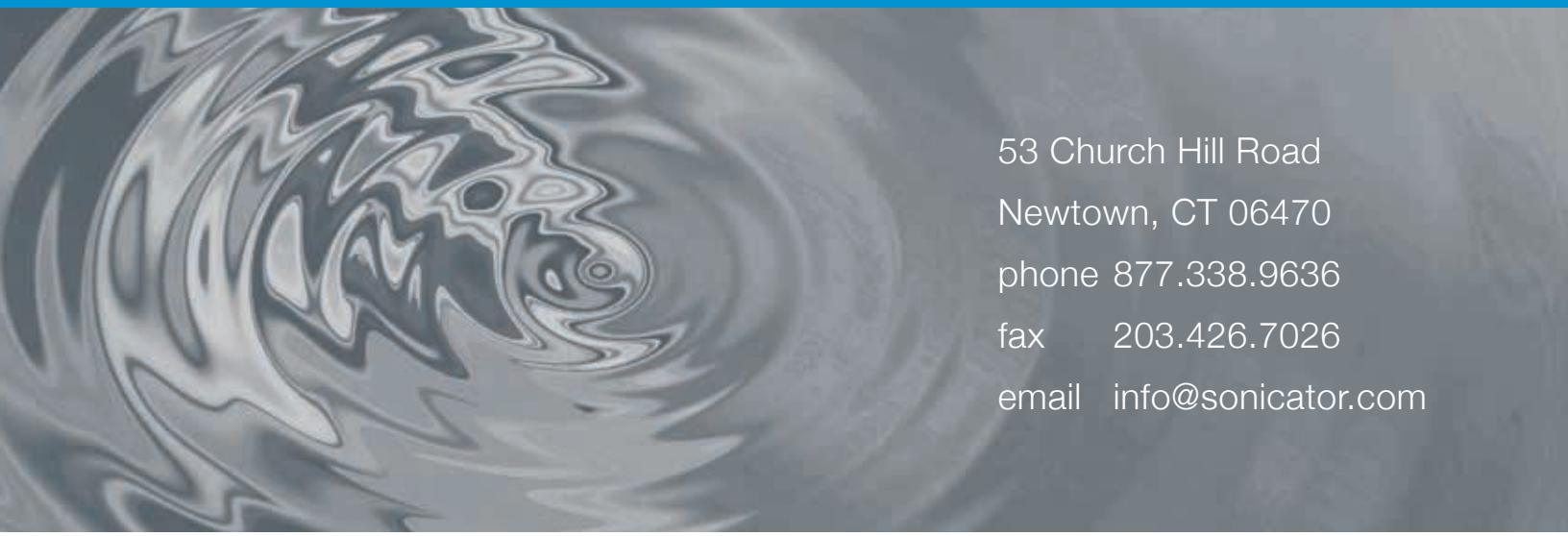
For more detailed information on the above topics, as well as the topics below, visit the Literature section of www.Sonicator.com.

- Nanomaterials and Probe Size
- Vessel Shape and Size
- Amplitude and Time Settings
- Controlling Temperature
- Cooling the Converter
- Booster Horn
- Power vs. Intensity
- How to Determine Energy Delivered

In addition, you will also find example protocols, publications, product manuals and warranty information on the site.



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