



HOW TO PICK YOUR ULTRASOUND

- A guide to your next system

LBN Medical 
A DirectMed Company

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Ultrasound Machine Applications

Ultrasound systems can be dedicated to certain examinations and in some cases, they are highly specialized with advanced options and features.

So while a general imaging system is good for different examinations an advanced cardiac system is not optimal for OB/GYN. Therefore, the examinations you do, need to guide the decision on which system to get.

This first chapter will give an overview of the most common applications.



Cardiac

Cardiac ultrasounds are systems that are specialized for examinations of the heart, and often also the vascular system.

A cardiac ultrasound is used to look at the size, shape, and motion of the heart and to examine associated vessels. Many ultrasounds are dedicated to cardiac and come with options that optimize examinations and allow for better imaging and analysis of data.

Cardiovascular systems are also specialized for imaging vessels. This includes blood flow measurements, for instance, Doppler ultrasounds.

For cardiac applications, you typically need phased array probes and in some cases a TEE probe, the latter is a type of dedicated specialized cardiac probe for insertion in the esophagus.

Furthermore, pencil probes are good for capturing blood movement.

OB/GYN

OB/GYN is short for obstetrics and gynecology. Within obstetrics, ultrasounds confirm pregnancy, determine the gestational age, locate the placenta, and diagnose fetal malformations.

In gynecology, it performs imaging of the organs of the female pelvis, including uterus and ovaries. To assess the size, and position of the organs, the thickness of the tissues, and to look for masses, or other abnormalities.

Generally, you need convex probes and endocavity probes for OB/GYN applications.



General Imaging

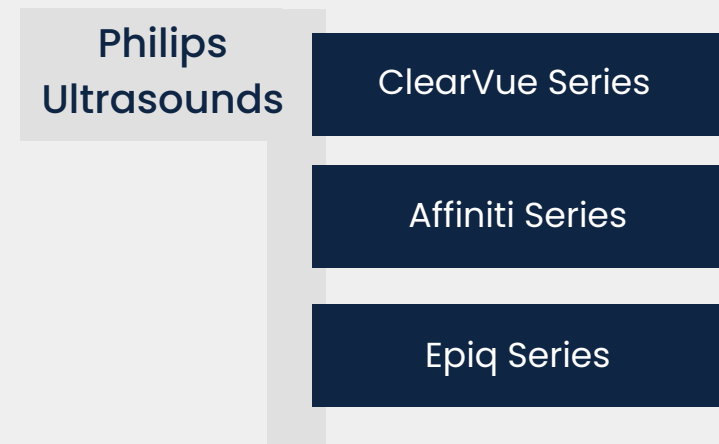
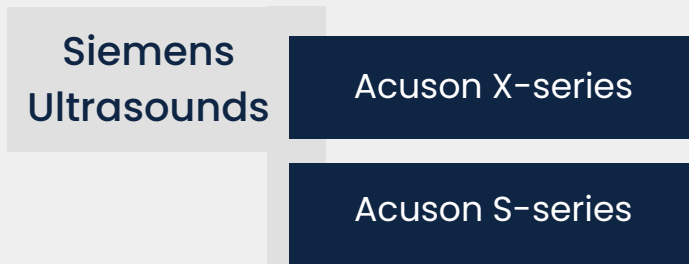
General imaging is a term for ultrasounds that have a wider range of applications. Therefore, they cover abdominal, musculoskeletal, small parts, urological, and vascular. But also OB/GYN.

General imaging is also linked to shared service, the difference is that a shared service system will also have options for cardiology examinations.

The probes you need for general imaging depend on the type of examinations you will use it for. A convex probe is for instance used for abdominal exams but might not be useful for all other applications within general imaging.

Ultrasound **Brand** and Series Overview

This chapter gives an overview of the different series within each brand and hopefully an idea of which series you can choose from based on the examinations you do. It focuses on the series that we see the most on the used market.



GE Ultrasound Series

GE is a popular manufacturer and they have been strong in the ultrasound market for years. Their series are divided by applications. The main ones are Voluson, Vivid, and Logiq. Each of these series is further divided into subseries.

For Voluson and Logiq, the subseries are E, which is their high-end models, S that is mid-range, and P is their entry-level models. For the Vivids, it is E, S, and T, where T is their entry-level.

The Voluson Series

This series is for OB/GYN and women's health.

Models in this series include the Voluson S6, E6, E8, and E10, and portable ultrasounds such as Voluson E.

The Logiq Series

This is for general imaging. Hereby, it is good for radiology, breast, interventional, and more.

The series has several models including Logiq E9, P7, and the portable Logiq E.

The Vivid Series

Dedicated to cardiovascular imaging.

Includes models as Vivid E95, Vivid T8, Vivid S5, and the portable Vivid I and Q.

GE has also created the Venue series for point-of-care ultrasound machines and the Versana ultrasound series for dedicated urology care.



GE-Vivid T8

Siemens

Ultrasound Series

The Acuson X-series

This ultrasound series covers the mid and entry-level segments and includes models such as X300, X700, and more.

All systems are for General Imaging and can perform a range of examinations. However, all of them can be upgraded to Shared Service, which requires a cardiac option.

Siemens ultrasound machines are generally versatile. Their series are not split per application as for GE. Instead, they have split them a bit per performance. We have done our best do describe the series here.

Acuson S-series

The Siemens S series ultrasound models cover the mid and high segments. These are also versatile and are recommended for General Imaging and OB/GYN.

This series contains the models Acuson S1000, S2000, and S3000, also including the new HELX and HELX touch versions, that offer improved image quality. Moreover, Siemens does have a dedicated cardiac system, the Acuson SC2000.

Furthermore, they have newer series that include Sequoia, Redwood, and Juniper. These are advanced systems also focused on Shared Service and General Imaging.



Acuson S2000 HELX Touch

Philips Ultrasound Series

Philips base their ultrasound series on performance, like Siemens, rather than per application, but still offer ultrasounds for all types of applications by offering general imaging systems.

ClearVue Series

Entry-level ultrasounds consist of models such as 350, 550, and 650.

Affiniti Series

Mid-range ultrasounds such as Affiniti 30, 50, and 70.

Epiq Series

The high-end ultrasounds series from Philips contains models such as Epiq 5 and 7.

Philips also offers the CX50, a portable ultrasound also for general imaging.

Canon Ultrasound Series



Aplio 500

Canon, former Toshiba, has two lines of ultrasounds common on the used market. Both are general imaging ultrasounds.

Xario Series

Entry-level systems such as 200g and 100MX

Aplio Series

Consist of mid-line models as Aplio 300, 400, and 500.

And more recent models such as the i600, i700, and more.

Canon also has general imaging portable ultrasound: Viamo c100.



Pricing

In general, ultrasound systems on the used market are 4-7 years old. As seen from the matrix on page 8, the upside of buying used or refurbished is that you can get a more advanced system at the same price, compared to when you buy new.

Furthermore, the use of the equipment for as long as possible makes the medical imaging industry more sustainable.

Be aware that prices below are an indication for “box only” meaning that you only purchase the ultrasound machine. Probes and other accessories such as printers, might add to the price.

The prices of used probes depend mostly on the type of probe. A general rule of thumb is that:

- 2D probes cost 1000 –2000 euros
- 3D/4D probes cost 2000 – 3000 euros
- TEE probes cost 5000 – 10000 euros

2D probes can be linear, convex, micro convex, cardio, and endo probes.

3D/4D probes can also be linear, convex, cardio, and endo as well.

Read Chapter 6 for more information on probes.

On the next page you will also find information on demo systems and more examples of models within each category.

How Much Does an Ultrasound Cost?

The prices of used ultrasounds vary a lot and depends on several factors like age, condition, features, and model.

At LBN Medical, for instance, you will find ultrasounds from 5.000 to 80.000 euros.

The matrix below is a simple overview of ultrasound prices from main brands. The cost is determined per condition and the type of ultrasound system.

Condition is split into new, refurbished, and used. You can see a further definition of these terms in Chapter 4.

Type is defined as entry-level, mid-range, or high-tier.

	NEW	REFURBISHED	USED	EXAMPLES
ENTRY-LEVEL	15-25	-	5-15	GE Logiq F7/P9, Philips ClearVue series, Canon Xario 100/200, Siemens NX2/3
MID-RANGE	30-50	25-35	15-25	GE Logiq S7/S8, Philips Affiniti 50/70, Canon A450/550, Siemens Juniper
HIGH-TIER	60-100+	40-50	35-60	GE Voluson E10, Philips EPIQ ELITE/CVx, Canon i series, Siemens Sequoia

Prices are in thousand euros



Used Ultrasounds

Used equipment is a broad category. Can be “as is”, with the same options and configurations as the previous owner. They will be cheaper, but also come with slightly more risk.

Other companies, clean and test the used ultrasound machines before they are sold. Basically, high quality is ensured, and this is where you will typically find a bit more security, at a slightly higher price.



Refurbished Ultrasounds

This contains more types. You can get refurbished as defined by the seller, ISO refurbished, and OEM refurbished.

With refurbishment the seller has put the system through a process, that may have cosmetic and functional aspects. For instance, cleaning and painting, parts replacement, and installing options. However, it might not contain much. Therefore, remember to ask.

ISO certified or OEM refurbishment follows more strictly defined processes. And of course increase the level of quality and security, but also the price.



New Ultrasounds

New is of course new, a factory-fresh ultrasound.

Sometimes you can also find demo systems, which have only been used for trade shows or similar events. These are in between refurbished and new, both category and price-wise.

Used Refurbished or New

Other Ultrasound Specifications



Hopefully, you are now more aware of what kind of ultrasound you need and which price range you are within.

If not – feel free to reach out, we have been helping customers for almost 20 years, and we are sure we can help you too.

But first, let us talk about some extra aspects you need to consider to get a system just right.

LICENSES

ULTRASOUND PROBES

YEAR OF MANUFACTURE

POWER COMPATIBILITY

USER LANGUAGE

CONDITION OF USED MACHINE

ULTRASOUND PERIPHERALS



Licenses

Most ultrasounds come with the general options that is good for standard exams, but if you have more specialized examinations, you typically need to add those specific options.

Licenses are used to open for those extra functionalities. It can be for certain obstetric or cardiac ultrasound examinations, for instance, 4D. So, check the licenses and options and make sure that you have what you need.

Ultrasound Ports

The port is where the ultrasound probes are plugged into your system. Not all probes have the same connector type, so ultrasound and probe must be compatible.

Furthermore, if you do several types of examinations you also need more probes, and it often eases workflows that there are enough ports that they can all remain plugged. As number of ports differ per model, make sure you check that you have enough for the probes you need.

Year of Manufacture

The age of ultrasound equipment is not necessarily important. However, it can be, if your country has restrictions for import, or if you need state-of-the-art options that simply do not exist on older models.

Make sure that you get what you need, but also that you do not pay for more than you need.

Year of manufacture is also linked to software and hardware version which is again linked to the options and probes. However, if you need something specific, both software and hardware are sometimes upgradable.

Power Compatibility

Ultrasounds differ in what power they need. They can be compatible with either 110V or 220V.

What you have access to in your country should determine the power supply of the ultrasounds or if you should get a transformer.



User language

The user language of the system depends on where it was bought from.

If you specifically want English or another language, make sure that you state this. Then there will be no surprises when you turn on your system for the first time.

Accessories

You might need some accessories or peripherals when you purchase a used ultrasound. It could be things like biopsy kits, printers and probes.

Condition

In some cases, condition matter more than age.

The condition of used ultrasounds vary, even of systems of the same age. It depends on service and the general wear and tear.

If it is only the cosmetic condition that is not good, you can often have it painted by the reseller.

Then you can look forward to an ultrasound that looks as good as new.



What Probes Do You Need?

To send and receive the signal and to actually use your ultrasound system, you need probes, also called transducers.

First of all, not all probes are compatible with all ultrasounds, so make sure you get the right one.

Secondly, the different probes are good for different types of examinations. Like convex for an abdominal and phased array for cardiac.

Generally, the types differ in footprint, frequency, and piezoelectric crystal arrangement.

Footprint, Frequency and Piezoelectric Crystal Arrangement

Let us go through those one at a time.

Footprint is the part that is in contact with the surface of the body and comes in different shapes and sizes.

Shape and size is determined by the piezoelectric crystal arrangement, hereby defining it as a linear or a convex probe etc. . The piezoelectric crystal arrangement is the part that obtains the image. Therefore, it also determines the shape of the ultrasound beam.

Frequency means the frequency of the sound waves emitted from the probe. Generally, higher frequencies offer better image quality, but less deep penetration compared to lower frequencies.

Get an overview of the different probe types below.

Linear Probes

The shape of the ultrasound beam is rectangular. The footprint is relatively large and the frequency high (7 – 18MHz). Therefore, the near field resolution is good.

Hereby, clinicians typically use it for superficial examinations of vascular, small parts, nerve, musculoskeletal, and breast.



Convex Probes

Convex probes or curved probes have a large footprint and a low frequency (2.5 – 5MHz). The beam shape is convex. It is a good probe for in-depth examinations. Therefore, it is a good probe for abdominal, vascular, nerve, MSK, and OB/GYN examinations.

Additionally, there is a subtype called micro convex with a much smaller footprint, which is typically used in neonatal and pediatrics.



Phased Array Probes

Phased arrays are also called sector probes. They come with a quite small footprint and emit low-frequency ultrasounds (2 – 8Mhz). Therefore, they offer a lower resolution.

Phased array probes have narrow and almost triangular beam points, but they can expand depending on the frequency applied. They are typically used for imaging through the acoustic windows in the skull or intercostal spaces.

Specialized Probes

On top of these standard probes, there is a range of more specialized probes.

They include endocavity probes, designed for specific bodily orifices. Therefore, they have very small footprints.

Transoesophageal (TEE) probes produce images of the heart through the oesophagus.

And pencil probes, also called CW Doppler probes, used for measuring blood movement and sound.

Additionally, there is a number of probes that are designed for surgical use, like laparoscopic probes, that we will not cover.



Ultrasound Maintenance Checklist

5 Important Points

Once you have purchased a used ultrasound system, you might as well take good care of it, to make sure it lasts and provides accurate imaging.

We provide you with 5 points for good maintenance of your new ultrasound machine.

1 Daily Checks of the Ultrasound Machine

At the start of your day, check that all connections are properly plugged. Check the cables and make sure that they are not being run over by the ultrasound or worn in any other way.

3 End of Shift Prevention

At the end of the day, wipe the ultrasound machine thoroughly. Note if you had any issues during the day and remember to report any serious problems to your service representative right away.

5 Preventive Maintenance

The performance of an ultrasound machine will decrease slightly over time. Preventive maintenance is an option to try and slow this process down. It checks the system to make sure that it is still up for running at full speed.

2 Pay Attention to Your Ultrasound Transducers

Ultrasound transducers are crucial. Check for cracks and cuts and make sure that cables are not being run over, getting stuck, or twisted before use. Be careful not to drop them and secure them safely. And do not dismiss cleaning protocols.

4 Full System Backup

As for many other devices, it is good practice to do regular back-up. This is to reduce downtime if the system should fail due to software or hardware issues. In a back-up, you save your presets, network data, options, and other user preferences.

Sum Up

What You Need to Know ?



What type of studies will you perform?

Most ultrasounds are specialized for certain applications.

Therefore, this is important information to provide to your supplier as this will guide the decision of which model to pick.

Certain brands dedicate series to certain applications and others aim for general imaging and shared service systems that can be customized to a range of applications.

What ultrasound brands are the best?

The most popular on the market are the major brands such as GE, Siemens, Philips, Canon (former Toshiba).

As high-quality brands, they are excellent systems that offer great value for money as used systems.

Which to pick is really only about access to service providers in your region, and your personal preference. And not about one brand being better than the other.

How much does an ultrasound cost?

Used and refurbished ultrasounds range from 5.000 - 60.000 euros.

Demo systems or very recent models can be a bit more expensive, and specific probes and accessories also affect the price.

Prices of used systems are often around half the price of new ones.

What probes do I need?

Probe choice is also determined by the exams you perform, and of course which probes are compatible with the model you chose.

Generally, you need phased array and maybe a TEE probe for cardiac and convex and endocavity for OB/GYN.

How do I maintain my ultrasound and my probes?

Check it daily and do back-ups of the system.

For probes, it is particularly important that you keep their cables off the floor to avoid stepping on them or running them over with the ultrasound.

And that you clean them with the recommended cleaning agents to not dry out the lenses.

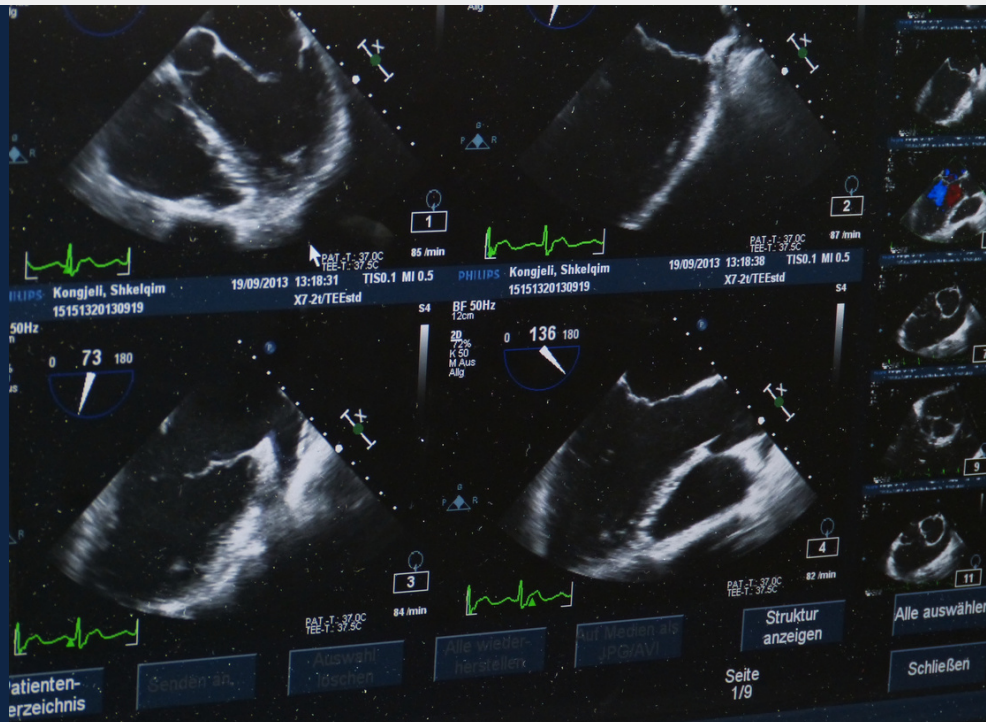
Should I buy used, refurbished or new?

This depends on your preference and your budget.

As used systems are cheaper, you can get a more advanced used ultrasound for your budget than if you buy new.

You could get a refurbished high-end system rather than a new mid-range one.

Of course, brand new systems can come with state-of-the-art software, but this is mainly important for very specialized examinations.



Thank you for reading this far.
If you still have **questions**,
please reach out.

You can email us at sales@lbnmedical.com

Or visit our website lbnmedical.com



"The ultrasound machine is really satisfying, I can complete my daily tasks with no obstacles. It came with the features and software I needed, even more. The quality of the image and the speed are excellent."

Dr Shterev from Bulgaria

"The ultrasound scan quality is comparable to some new machines I have used before. I got value for my money. Also, for all challenges I had in setting up the machine, I got good assistance from LBN".

Dr Pedzisai from Zimbabwe

