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User Guide
Type 8818

Biplane and Endfire Transducer



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For Professional Users Only

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Introduction

This is the user guide for Type 8818 and must be used together with *Care and Cleaning* which contains important safety information.

Indications for Use

Biplane and Endfire Transducer Type 8818 combines simultaneous biplane imaging and endfire imaging in a single transducer. Type 8818 is designed for transrectal procedures.

WARNING

The tip of the 8818 transducer (the part containing the arrays) is very delicate. Handle the transducer gently, especially when you put it down on a hard surface, for example. Also be very careful not to bump the tip.

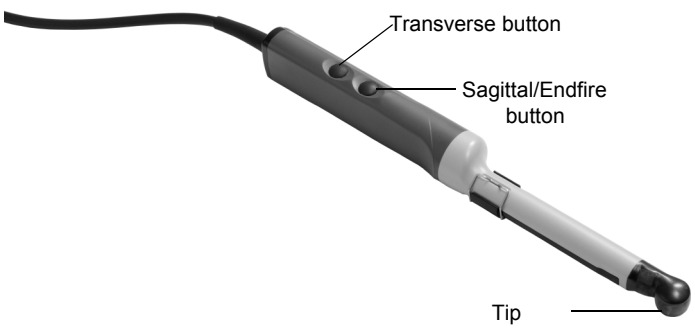


Figure 1. Type 8818.

Imaging Plane

8818 contains two convex arrays — one for transverse imaging, and one for sagittal and endfire imaging. The sagittal array of the 8818 has a total arc of 210°. In both simultaneous biplane imaging and endfire imaging, the imaging plane uses a 140° section of the arc. It is important to note that simultaneous biplane imaging and endfire imaging use different sections of the sagittal array. Figure 2 illustrates which section of the array simultaneous biplane and endfire use.

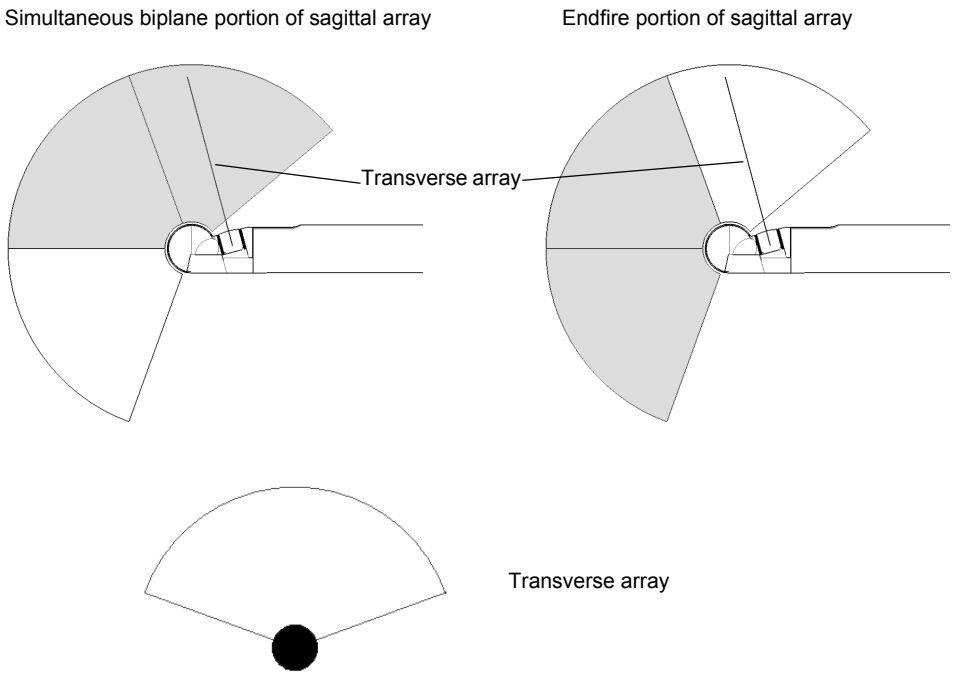


Figure 2. Imaging plane for Type 8818.

General Information

Product specifications for this transducer can be found in the Product Data sheet that accompanies this user guide.

Acoustic output data and data about EMC (electromagnetic compatibility) for this transducer are in Technical Data (BZ2100) that accompanies this user guide. A full explanation of acoustic output data is given in your system user guide.

WARNING

If at any time the system malfunctions, or the image is severely distorted or degraded, or you suspect in any way that the system is not functioning correctly:

- Remove all transducers from contact with the patient.
- Turn off the system. Unplug the system from the wall and make sure it cannot be used until it has been checked.
- Do not remove the system cover.
- Contact your BK Medical representative or hospital technician.

WARNING

Always keep the exposure level (the acoustic output level and the exposure time) as low as possible.

Service and Repair

WARNING

Service and repair of BK Medical electromedical equipment must be carried out only by the manufacturer or its authorized representatives. BK Medical reserves the right to disclaim all responsibility, including but not limited to responsibility for the operating safety, reliability and performance of equipment serviced or repaired by other parties. After service or repairs have been carried out, a qualified electrical engineer or hospital technician should verify the safety of all equipment.

Caring for the Transducer

The transducer may be damaged during use or processing, so it must be checked before use for cracks or irregularities in the surface. It should also be checked thoroughly once a month following the procedure in *Care and Cleaning*.

Cleaning and Disinfection

To ensure the best results when using BK Medical equipment, it is important to maintain a strict cleaning routine.

Full details of cleaning and disinfection procedures can be found in *Care and Cleaning* that accompanies this user guide. A list of disinfectants and disinfection methods that the transducer can withstand are listed in the Product Data sheet.

Sterile covers are available. See the Product Data sheet for more information.

WARNING

Users of this equipment have an obligation and responsibility to provide the highest possible degree of infection control to patients, co-workers and themselves. To avoid cross contamination, follow all infection control policies for personnel and equipment that have been established for your office, department, or hospital.

Starting Imaging

All equipment must be cleaned and disinfected before use.

Connecting the Transducer

WARNING

Keep all plugs and sockets absolutely dry at all times.

The transducer is connected to the system using the array Transducer Socket on the system. To connect, the transducer plug's locking lever should first be in a horizontal position. Align the plug to the system socket and insert securely. Turn the locking lever clockwise to lock in place.

When connected, the transducer complies with Type BF requirements of EN60601-1 (IEC 60601-1).

Changing Frequency

The Multi-Frequency Imaging (MFI) facility enables you to select the imaging frequency. See the applicable system user guide for instructions. The selected frequency is displayed at the top of the screen.

Using a Transducer Cover

The transducer should be enclosed in a transducer cover or a standard condom. See the Product Data sheet for a list of available transducer covers.

WARNING

Because of reports of severe allergic reactions to medical devices containing latex (natural rubber), FDA is advising health-care professionals to identify their latex-sensitive patients and be prepared to treat allergic reactions promptly.

Apply sterile gel to the tip of the transducer or fill the cover with 1 to 2 ml of sterile water. This improves the screen images by preventing image artifacts caused by air bubbles.

Pull the transducer cover over the transducer.

Gel also creates a good acoustic contact between the skin and the transducer; therefore, apply a small amount to the outside of the cover prior to imaging. Re-apply the gel frequently to ensure good screen images.

WARNING

Use only water-soluble agents or gels. Petroleum or mineral oil-based materials may harm the cover materials.

WARNING

Do not use excessive force during insertion. Do not make excessive lateral movements during or after insertion. Risk of injury or tissue damage to the patient could occur under certain circumstances. A digital palpation of the rectum may need to be carried out by a clinician prior to insertion or use of the probe as a precautionary measure.

Using the Transducer Control Button

To change the imaging plane, press the button corresponding to that plane (see Figure 1). Pressing the button activates (starts) or freezes (stops) imaging in that plane. One button enables the sagittal or longitudinal array. A long press on this button also activates endfire imaging. A second button enables the transverse array. Each time a button is pressed, a beep is emitted.

Changing Orientation

To change the orientation of the image on the monitor, refer to the applicable system user guide for instructions.

Imaging with Type 8818

Simultaneous Biplane Imaging

8818 can transmit transverse (T) and sagittal (S) images simultaneously. When you press the system's **Split** key, simultaneous live transmission is automatically activated. On the screen, this is indicated by a green dot in front of **Simultan**.

Transverse or Sagittal Imaging

Click **Simultan** to toggle simultaneous live transmission on or off. When simultaneous transmission is off, you can change which plane is active and which is frozen by pressing the **Split** key or by placing the cursor on the image you want to be active and pressing the **Select** key.

Endfire Imaging

Type 8818 can perform endfire imaging. A long press on the transducer's **Sagittal/Endfire** button activates endfire imaging. On the screen, this is indicated by the letter **E**, which appears to the right of the transducer number. To switch imaging plane, click **E** and select transverse (**T**) or sagittal (**S**).

When you activate endfire imaging, one image appears (and by default, simultaneous imaging is off). You must enable split screen imaging as there is no defined isocenter in this context. When you press the system's **Split** key, two images appear on the screen. The endfire image appears and either a transverse or sagittal image appears, depending on what was last used during imaging.

Click **Simultan** to toggle simultaneous live transmission on or off.

Imaging Without Puncture or Biopsy

When 8818 is used for transrectal imaging without the puncture facilities, the dummy bracket UA1325 must be in place. This clicks into position on the transducer to cover the open channel (see Figure 3).



Figure 3. Type 8818 and the dummy channel bracket UA1325.

Note: *The dummy bracket must be removed before 8818 is prepared for disinfection. The bracket can be disinfected using the same methods as explained later under UA1326.*

Contrast Imaging

See the system user guide for instructions on how to perform contrast imaging.

Viewing B-Mode and Contrast Images Simultaneously

When performing contrast imaging, use the system's split screen functionality to see the B-mode image and the contrast image simultaneously.

By default, the system will present one image on top and one on the bottom. The following table shows where the B-mode and contrast images appear:

	Endfire imaging	**Transverse plane imaging**	**Sagittal plane imaging**
Top image	Contrast	Contrast	B-mode
Bottom image	B-mode	B-mode	Contrast

Adjusting Image Area and Using Expanded Sector (Trapezoidal View)

The width of the image area can be adjusted using the Width key on the system's control panel. See the applicable system user guide for instructions.

With the Expanded Sector feature and the 8818, you can increase the transverse sector angle from a default width of 140° to 180°.

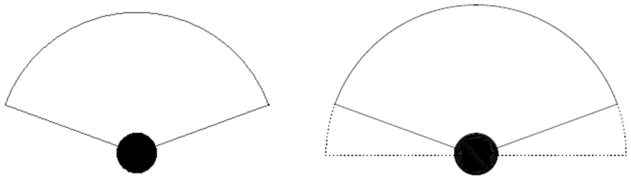


Figure 4. Dotted lines indicate expanded transverse sector on the 8818 transducer.

Puncture and Biopsy Facilities

Puncture and biopsy are possible with 8818. The appropriate puncture attachments are illustrated in the following pages with a brief description of their uses and operating instructions. The transducer has an open channel into which the appropriate puncture accessories fit when the dummy channel bracket (UA1325) has been removed (see Figure 3).

⚠ **WARNING**

It is essential for the patient's safety that only the correct puncture attachments, as described in this guide, are used. Never use unauthorized combinations of transducers and puncture attachments or other manufacturers' puncture attachments.

For Transrectal Puncture

With Type 8818, you can perform transrectal puncture and biopsy by imaging in one of three ways:

- **Simultaneous biplane** (imaging in both the transverse and sagittal planes).
- **Endfire** (imaging in the sagittal plane).
- **Dual** (combines both the simultaneous biplane and endfire imaging in one biopsy guide).

All the biopsy guides for transrectal puncture have a bore diameter of 1.6 mm, suitable for 17- and 18-gauge needles.

For transrectal puncture, biopsy guides are available in both non-sterile reusable versions and sterile-packed single-use versions.

Non-sterile biopsy guides (light green)

The dummy channel bracket UA1325 and the reusable biopsy guides (UA1326, UA1327 and UA1328) are non-sterile when supplied. This is also the case with puncture attachment UA1324 and needle guides UC5302, UC5303 and UC0100. They must all be reprocessed following the procedure in *Care and Cleaning*.

The dummy channel bracket and reusable biopsy guides may be damaged during use or processing, so they must be checked before use for cracks or irregularities in the surface. They should also be checked thoroughly once a month following the procedure in *Care and Cleaning*.

Sterile biopsy guides (dark green)

The sterile single-use biopsy guides (UA1322-S, UA1322-S14, UA1323-S and UA1329-S) come assembled in peel packs. Contents are only sterile if the package is intact.

⚠ **WARNING**

Disposable components are packaged sterile and are intended for single-use only.

Do not use if:

- integrity of packaging is violated
- expiration date has passed
- package label is missing

The sterile-packed biopsy guides must be stored at a temperature range from +5 °C (+41 °F) to +25 °C (+77 °F) and at a storage humidity of 0% to 80%.

⚠ **WARNING**

Sterile-packed components must be stored in a safe environment and kept out of direct sunlight. Large temperature changes during storage may cause condensation and violate the integrity of the packaging.

Please refer to *Care and Cleaning* for an example of how to open a sterile-packed product.

WARNING

For contaminated disposables such transducer covers or needle guides, follow disposal control policies established for your office, department or hospital.

Simultaneous Biplane

The sterile single-use biopsy guide UA1322-S, UA1322-S14 and reusable biopsy guide UA1326 are used for simultaneous biplane imaging.



Figure 5. Reusable biopsy guide UA1326.

The puncture line for UA1322-S, UA1322-S14 and UA1326 on 8818 is shown in Figure 6. UA1322-S and UA1326 have a bore diameter of 1.6mm, suitable for 18-gauge needles. UA1322-S14 has a bore diameter of 2.1mm, suitable for 14-gauge needles.The puncture line is angled at 19° to the transducer's axis.

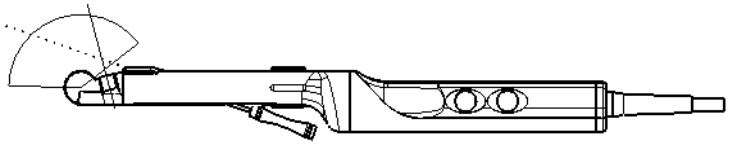


Figure 6. Illustration of the puncture line for biopsy guide UA1322-S, UA1322-S14 and UA1326.

Endfire

The sterile single-use biopsy guide UA1323-S and reusable biopsy guide UA1327 are used in endfire imaging.



Figure 7. Reusable biopsy guide UA1327.

The puncture line for UA1323-S and UA1327 on 8818 is shown in Figure 8. The needle guide is parallel to the centerline of the transducer.

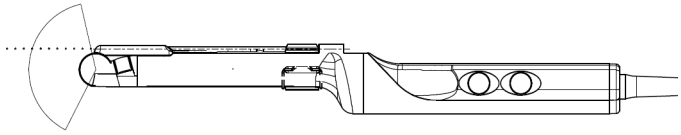


Figure 8. Illustration of the puncture line for biopsy guides UA1323-S and UA1327.

Dual

The sterile single-use biopsy guide UA1329-S and reusable biopsy guide UA1328 are used in dual imaging. Needle guide UC0100 is marked with a blue band (see Figure 9). On screen, you will see this corresponds to the color of the puncture line displayed on the image.

WARNING

Before beginning a puncture or biopsy procedure using dual imaging, ensure that the color of the puncture line on the system monitor matches that of the needle guide you will insert your needle into.



Figure 9. Reusable biopsy guide UA1328.

The puncture lines for UA1328 and UA1329-S on Type 8818 are shown in Fig. 10. The needle guides are angled at 0° and 19° to the transducer's axis.

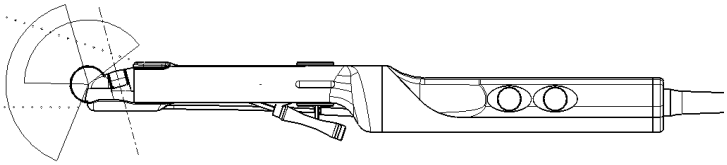


Figure 10. Illustration of the puncture line for biopsy guides UA1328 and UA1329-S.

During endfire imaging, only the endfire biopsy line can be displayed on screen.

Mounting a Transrectal Biopsy Guide

To mount a biopsy guide on 8818:

1 If a dummy channel bracket is mounted on the transducer, remove it.

2 Pull a transducer cover or a standard condom containing a suitable amount of imaging gel over the transducer.

3 Slide the needle guide into the biopsy channel bracket.

WARNING

Do not use excessive force when inserting the needle guide.

4 Insert the assembled needle guide and biopsy channel bracket into the open channel on the transducer. A small nodule on the end of the channel bracket fits into an indentation in the channel on the transducer to help you place the bracket correctly. Click the channel bracket into position on the transducer and lock it into place (see Figure 11).



Figure 11. Biopsy channel bracket and needle guide mounted on 8818.

WARNING

Ensure that the channel bracket and needle guide are correctly positioned. Never insert the needle guide while the transducer is inside the patient.

For Transperineal Puncture

The metal puncture attachment UA1324, shown in Figure 12, is designed for transperineal puncture and biopsy. When UA1324 is being used, the dummy channel bracket UA1325 (shown in Figure 3) must be in place.

UA1324 consists of a needle guide and a mounting ring with clamp. The needle guide comprises 9 parallel guide channels, spaced 5mm apart, each with an internal diameter of 2.1mm, suitable for a 14-gauge needle. The guide is parallel to the centerline of the transducer.

Note: *The needle guide can be adjusted 70mm lengthwise with respect to the mounting ring, using the adjustment screw.*



Figure 12. Puncture attachment UA1324.

Mounting the Transperineal Puncture Guide

To mount the transperineal puncture attachment, ensure that the dummy channel bracket UA1325 is in place. Pull a sterile transducer cover over the transducer. Loosen the clamp on UA1324, and slide the attachment over the tip of the transducer until it meets the steel stud on the side of the transducer. The puncture attachment should be correctly positioned so that the groove slides easily over the stud. No force should be used when attaching the puncture attachment to the transducer.

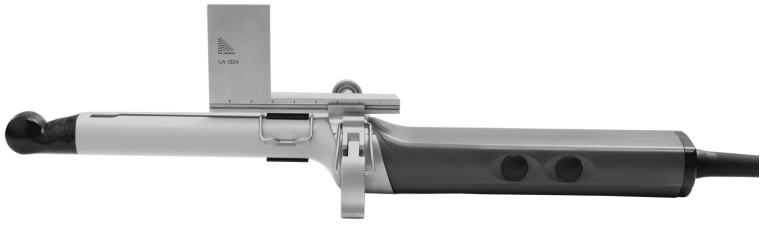


Figure 13. Puncture attachment UA1324 mounted on 8818.

The puncture lines for UA1324 on 8818 are shown in Figure 14.

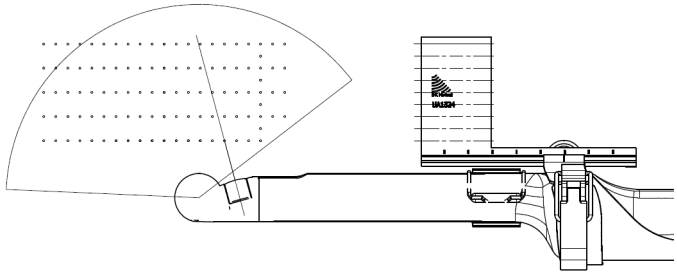


Figure 14. Illustration of the puncture line for puncture attachment UA1324.

Performing Puncture and Biopsy

WARNING

It is essential for the patient's safety that only the correct puncture attachments, as described in this guide, are used. Never use unauthorized combinations of transducers and puncture attachments or other manufacturers puncture attachments.

Before beginning a puncture or biopsy procedure, always check that the type number of the transducer and the type number or description of the puncture attachment match exactly those displayed on the system monitor.

WARNING

The puncture line on the image is an indication of the expected needle path. The needle tip echo should be monitored at all times so any deviation from the desired path can be corrected.

If the transducer cover is damaged when attaching the puncture attachment, replace it with a new cover.

See the Product Data sheet for a list of available transducer covers.

Superimpose puncture line

Press the system **Puncture** or **Biopsy** control button to superimpose a puncture line on the image.

If more than one puncture line is available, refer to the applicable system user guide for instructions on how to change which one appears.

Move the transducer until the puncture line transects the target. Insert the needle and monitor it as it moves along the puncture line to the target. The needle tip echo will be seen as a bright dot on the screen.

The puncture line will differ depending on the imaging plane orientation. In the sagittal plane, the puncture path is indicated by a line of dots. The distance between each puncture dot is 5 mm.

In the transverse plane, a single dot indicates the point at which the needle will transect the imaging plane.

WARNING

If the needle guide is detached from the transducer during interventional procedures, cover the transducer with a new transducer cover.

If the cover is damaged during interventional procedures, follow the policies of the hospital or clinic for treatment of the patient under such circumstances.

To remove the puncture line from the image, refer to the applicable system user guide for instructions.

WARNING

When performing a biopsy, always make sure that the needle is fully drawn back inside the needle guide before moving the probe.

Cleaning after Puncture and Biopsy

If biological materials are allowed to dry on the transducer, disinfection and sterilization processes may not be effective. Therefore, you must clean transducers immediately after use.

Use a suitable brush to make sure that biological material and gel are removed from all channels and grooves. See *Care and Cleaning* for cleaning instructions.

3D Imaging

3D imaging with the 8818 may be carried out in either of two ways:

- Freehand – where the transducer is combined with the appropriate 3D system software.
- Using mover support – where the transducer is combined with the appropriate 3D system software, the Magnetic Wheel Mover UA0513 and the Variable Friction Arm UA0553.

Magnetic Wheel Mover UA0513

Further information about the Magnetic Wheel Mover UA0513 can be found in the user guide for the Magnetic Wheel Mover.

Variable Friction Support Arm UA0553

Further information about the Variable Friction Support Arm UA0553 can be found in the user guide for the Variable Friction Support Arm.

Disposal

When the transducer is scrapped at the end of its life, national rules for the relevant material in each individual land must be followed. Within the EU, when you discard the transducer, you must send it to appropriate facilities for recovery and recycling. See the applicable system user guide for further details.

⚠ **WARNING**

For contaminated disposals such as transducer covers or needle guides, follow disposal control policies established for your office, department or hospital.

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