CT Zimmer Knee

Indications - pre surgical evaluation prior to knee joint replacement.

Bill under CT LE w/o Contrast charge. Do not include separate hip, knee and ankle charges.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Patient positioning:

    Patient in supine position feet first with knees extended and toes pointing straight up.

    Elevate contralateral leg if prosthesis present to minimize streak artifact.

    Do not allow patient movement between or during the scans.

Topogram - iliac crests through feet.

Craniocaudal scan coverage (see image below):

    3 cm above hip joint through bottom of talus.

    FOV must be ≤250 mm (up to 320 mm if bilateral) and matrix must be 512 x 512 squared.

    If bilateral cannot fit in FOV <320 mm, scan with FOV of 500 mm and recon each leg at 250 mm.

    Only bones have to be included in FOV (soft tissues do not have to be included).

IV Contrast: not given for this protocol.

For **GE scanners**, it is essential for the 1st recon thickness on the scanner to match the 1st recon thickness in this protocol book for the prescribed Noise Index to be valid. The 1st recon should generally be the thickest recon in the protocol.

Prepare an uncompressed DICOM disc containing only axial soft tissue images (do not send coronal and sagittal recons).

Zimmer Customer Support: 800-348-2759.
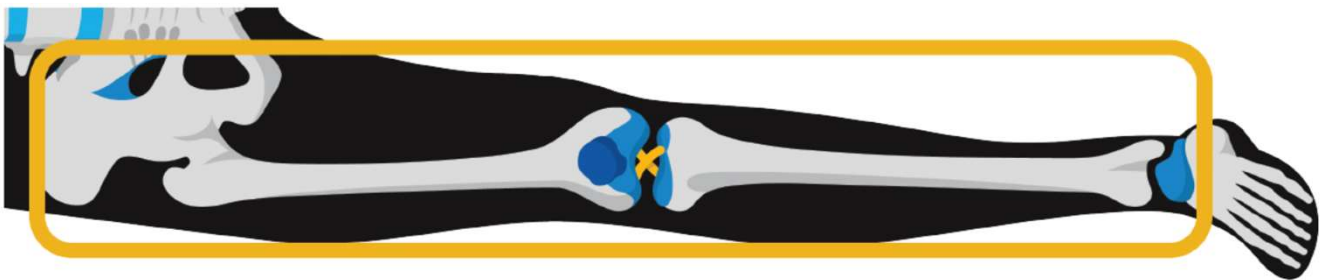
Craniocaudal Scan Coverage

CT Zimmer Knee

SIEMENS PARAMETERS & RECONS

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time
Sensation 16	spiral	120	200	on	NA	0.80	16	0.75	0.5
Go Up 32	spiral	130	109	on	on 170	0.80	32	0.7	1.0
Sensation 64	spiral	120	200	on	NA	0.90	64	0.6	0.5
Definition 64	spiral	120	190	on	on	0.80	64	0.6	1.0
Go Top 64	spiral	120	131	on	on 170	0.80	64	0.6	1.0
Drive 128	spiral	120	133	on	on	0.80	128	0.6	1.0
Force 192	spiral	120	133	on	on	0.80	192	0.6	1.0

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction	
AX SOFT	**1.5**	**0.75**	**Br40 / B31f**	**abdomen**	**3**	**head/feet**	**Zimmer specific recon.**
AX BONE	3.0	3.0	Br59 / B60f	bone/osteo	3	head/feet	
COR BONE	3.0	3.0	Br59 / B60f	bone/osteo	3	front/back	
SAG BONE	3.0	3.0	Br59 / B60f	bone/osteo	3	left/right	

Only the axial soft tissue images are sent to Zimmer.

GE PARAMETERS & RECONS

	Scan Type	SFOV	kV	mA Range	Noise Index	Smart mA	Slice Thick	Beam Coll	Pitch	Speed	Rot Time	Dose Red	ASIR
LS 16	helical	large	120	100-440	27.00	on	1.25	20	1.375	27.50	0.5	NA	NA
Opt 540	helical	large	120	100-440	27.00	on	1.25	20	1.375	27.50	0.5	NA	NA
LS VCT 64	helical	large body	120	120-450	16.26	on	1.25	40	0.984	39.37	0.5	30	70
Disc VCT 64	helical	large body	120	100-700	20.00	on	1.25	40	0.984	39.37	0.8	NA	NA

Name of Series	Thickness	Interval	Recon Algorithm/Mode	Window Width/Level	Recon Direction	
AX SOFT	**1.25**	**0.625**	**std full**	**400/40**	**head/feet**	**Must be first recon.**
AX BONE	2.5	2.5	bone full	2500/480	head/feet	**Zimmer specific recon.**
COR BONE	2.5	2.5	bone full	2500/480	front/back	
SAG BONE	2.5	2.5	bone full	2500/480	left/right	

Only the axial soft tissue images are sent to Zimmer.

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PHILIPS PARAMETERS & RECONS

	Scan Mode	kV	Avg mAs	Dose Index	3D Dose	Pitch	Detect	Colli	Rot Time
Incisive 128	helical	120	103	20	on	0.80	64	0.625	0.75

Name of Series	Thick	Interval	Filter	Window	iDose	Recon Direction	
AX SOFT	**1.5**	**0.75**	**B**	**abdomen**	**3**	**head/feet**	**Zimmer specific recon.**
AX BONE	3.0	3.0	YC	bone	3	head/feet	
COR BONE	3.0	3.0	YC	bone	3	front/back	
SAG BONE	3.0	3.0	YC	bone	3	left/right	

Only the axial soft tissue images are sent to Zimmer.

Purpose and Summary

This CT protocol is applicable for the Zimmer Biomet PSI and Signature Total Knee Guides* manufactured by Materialise. Zimmer Biomet cannot be held liable for other possible subsequent uses (i.e. diagnostic uses).

The scan protocol is created to obtain all relevant clinical data of the anatomical structures of the patient's knee, as well as the overall alignment of the entire limb. The resulting scans of this sequence will be used to create 3-dimensional virtual anatomical models, a personalized surgical plan and surgical guides of the patient's knee prior to knee arthroplasty surgery.

General Scan Requirements

• This protocol is intended for **16-slice** scanners or higher.

Patient Preparation

• Discuss the procedure with the patient. Make sure they understand the table will move during scanning.

• Remove any non-fixed metal prosthesis, jewelry, zippers, etc. that might interfere with the imaging region.

• Position the patient to maximize comfort and minimize motion.

• The patient must not move during any part of the scanning sequence. Patient movement will alter the relative alignment of the joints and invalidate the scan.

Patient Positioning

• Position the patient feet first, supine. Toes should be pointing up.

• Ensure the ankle is scanned on the same plane or slightly lower than the knee joint: the protocol allows for up to a 20 degree flexion of the knee joint.

• The knee can be rotated up to 20 degrees to allow for patient comfort.

• If an implant is present in the contralateral leg, elevate the contralateral knee to prevent the artifact from affecting the surgical side.

Imaging Guidelines

• Execute sagittal and coronal localizers from the anterior superior iliac spine through the calcaneus.

• When scanning the series, do not re-landmark. Laser light on first scan only.

• Only true axial will be accepted: **NO OBLIQUE**

• Do not use gantry tilt

• Use manufacturer's defaults for parameters not listed

• Use the smallest FOV possible to capture the whole required bone regions. This will require careful alignment of the leg to capture the femoral head, knee, and talus.

• Capturing all soft tissue is not necessary, only the bony regions are of interest.
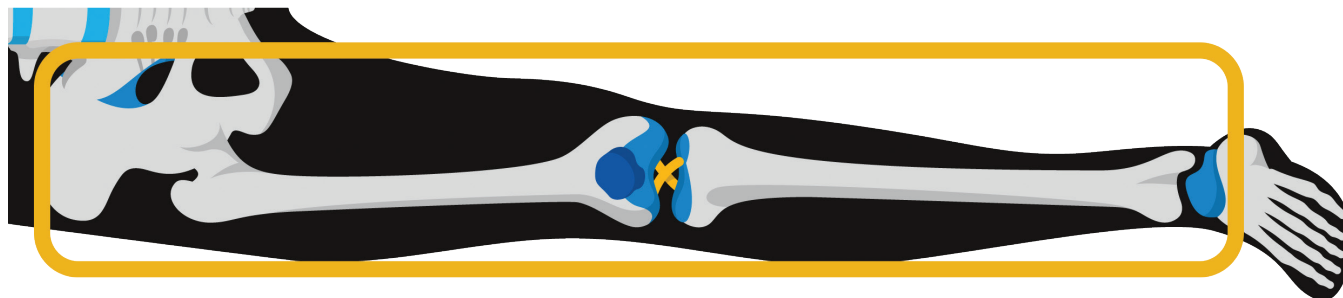
For Bilateral Scans

• Maximum FOV allowed for bilateral scans is 320 mm

• If both legs cannot be captured in 320 mm FOV, acquire at 500 mm FOV and reconstruct individual limbs at 250 mm FOV.

• Scan both legs simultaneously, while still following the above guidelines.

⊜ **Note:** Unilateral images are recommended unless the patient is scheduled for a bilateral knee replacement.
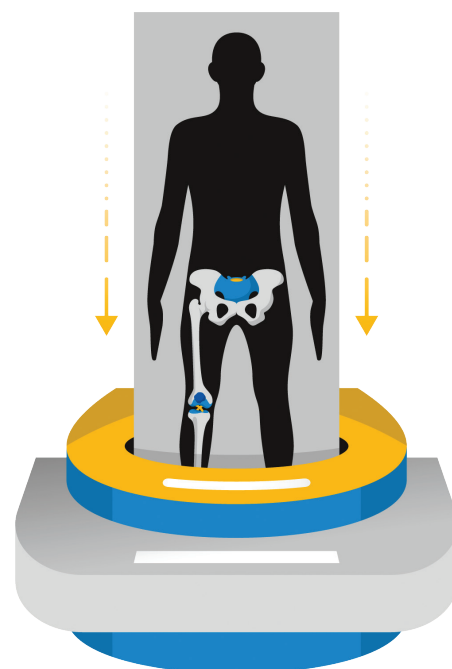
Option 1: Full Leg
(Single Acquisition)

Scan entire limb from anterior superior iliac spine through mid-calcaneus on the surgical side.

| Collimation | *Slice thickness:* 1.5 mm or smaller | *Slice increment:* 50% overlap |
|---|---|
| Field of View | 250 mm or smaller (<320 mm for bilateral scans) |
| Matrix | 512 x 512 |
| Algorithm | Moderate, standard, or soft tissue algorithm with no edge enhancement | Do not use bone algorithm |
| Pitch | 1 or smaller |
| kVp and mAs | *kVp:* 90-140 | *mAs:* as given by automatic tube current modulation
Adjust depending on patient body habitus and the presence of metal in scan region. |

Option 2: Three Region
(Sectional Acquisition)

Scan each lower joint from the surgical side. The minimum scanning volumes required for each scan are as follows:

- Ankle scan to cover the malleoli

- Knee scan to cover at least 100 mm above and 100 mm below the joint,
  to include the patellar ligament attachment at the tibial tubersoity.

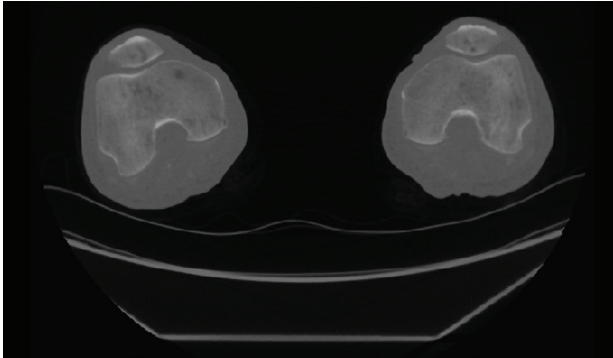- Hip scan to cover the femoral head and neck
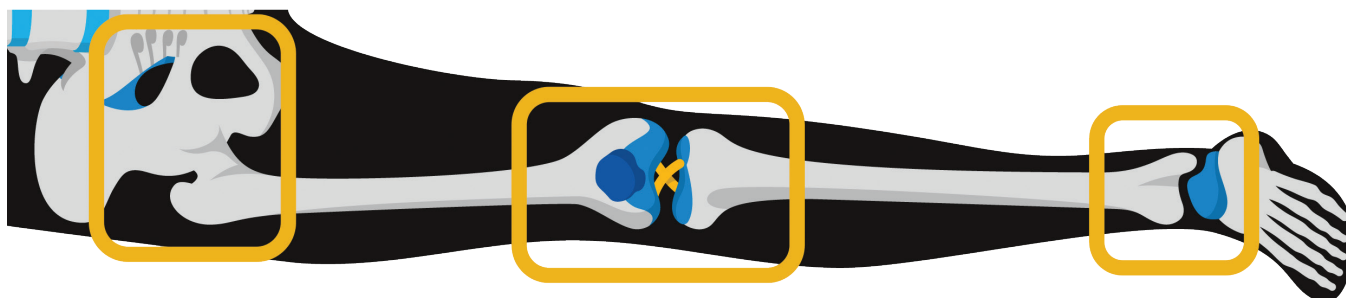
Scan region 1: Ankle
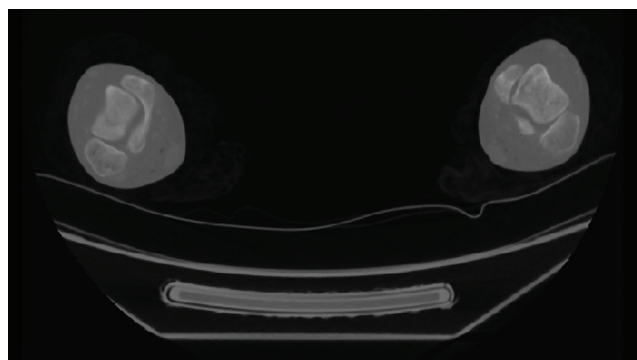
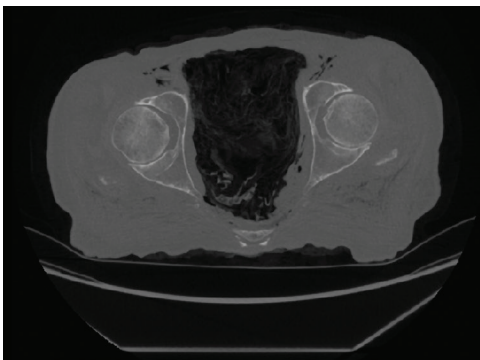⊜ **Note:** Example images are bilateral, scanned at a 320 mm FOV.

Region of interest	20 mm above and below the ankle joint, to include the malleoli and talus
Collimation	*Slice thickness:* 1.5 mm or smaller | *Slice increment:* Contiguous slices
Field of View	250 mm or smaller (<320 mm for bilateral scans)
Matrix	512 x 512
Algorithm	Moderate, standard, or soft tissue algorithm with no edge enhancement | Do not use bone algorithm
Pitch	2 or smaller
kVp and mAs	*kVp:* 90 | *mAs:* as given by automatic tube current modulation **Adjust depending on patient body habitus and the presence of metal in scan region.**

Scan region 2: Knee

Region of interest	100 mm above and below the knee joint
Collimation	*Slice thickness:* 1.5 mm or smaller	*Slice increment:* 50% overlap
Field of View	250 mm or smaller (<320 mm for bilateral scans)
Matrix	512 x 512
Algorithm	Moderate, standard, or soft tissue algorithm with no edge enhancement	Do not use bone algorithm
Pitch	1 or smaller
kVp and mAs	*kVp:* 90-140	*mAs:* as given by automatic tube current modulation **Adjust depending on patient body habitus and the presence of metal in scan region.**

Scan region 3: Hip

Region of interest	Entire femoral head and neck
Collimation	*Slice thickness:* 1.5 mm or smaller	*Slice increment:* Contiguous slices
Field of View	250 mm or smaller (<320 mm for bilateral scans)
Matrix	512 x 512
Algorithm	Moderate, standard, or soft tissue algorithm with no edge enhancement	Do not use bone algorithm
Pitch	2 or smaller
kVp and mAs	*kVp:* 90	*mAs:* as given by automatic tube current modulation **Adjust depending on patient body habitus and the presence of metal in scan region.**

Submitting the Images

- Only DICOM format will be accepted

- No .jpg images or other formats are acceptable

- Do not submit reconstructed or reformatted images.

- Only original scan data is acceptable.

- Uncompressed Dicom data is required for processing.

- Lossy and other forms of compression are not recommended

- The scanner should be set to DICOM format "raw image," with no compression.
  If loading from PACs, import and export the scan as DICOM files with the uncompressed option.