General guidelines for use of the protocols of NewTom 5G series
NOTES
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The medical device referred to in this manual is an X-ray device compliant with Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
Any tampering with, modification, updating or other change both of hardware¹ and software² of the device as supplied and installed by the company (and in the conditions specified in the attached documentation) may partially or totally compromise the device expected operation. This may also alter the safety features with consequent hazard increase for patients, operators and surrounding environment.
For this reason, should the user need to modify the device, he/she must request a written authorisation by CEFLA s.c.
Failure to comply with what is specified in this informative note will null and void the device warranty and the civil and/or penal responsibility for any consequent damage and/or accident and/or worsening of the patient, operator or other people health (including the surrounding environment) will be borne by the person who tampered with the device or his/her legal representative.
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1 Porpouse of the document

This document was produced with the support of "medical specialists" as a means of reference to provide the user with general guidelines on the opportunities for use of the device NewTom 5G series, giving an indicative overview of the protocols used for the most common applications in scope dental / medical.

For more information about the usage of NewTom 5G series refer to the document "User Manual".
2 What is a CBCT

CBCT means a volumetric computerized tomography technique that uses cone beam "Cone-Beam", this technique allows you to scan through a single complete rotation of the tube-detector system around the patient anatomy to examine all the necessary data for the volumetric reconstruction of the anatomical region examined.

In CBCT scan system is formed by the X-ray source, which produces a beam of X-rays in conical geometry, and a solid state detector.

The X-ray beam is collimated on the detector and the pair source - detector rotates around the volume reconstruction of the machine by performing a sequence of digital radiographs.

The CBCT device using a cone-shaped beam to acquire the entire volume makes a single rotation. The result is an accurate image, obtained with a time of exposure to X-rays lower than for a conventional CT equal acquisition protocols.
3 Scanning Modalities

Before taking an exam, it is recommended to choose the smallest field of view available considering the clinical area of interest and dimensions of the patient.

NewTom 5G series offers the possibility to perform scans with 3 different options for each available field of view:

Regular Scan: default option for image quality, scan time and exposure time
Eco Scan: < image quality, < exposure time for every mode
Enhanced Scan: > image quality, > exposure time for every mode

For children, it is recommended using the lowest dose and fastest scanning mode available: Eco Scan.

Positioning pre-sets
Depending on the selected field of view, a number of default pre-sets might become available to the user. A pre-set can help the user by automatically positioning the patient support before accommodating the patient, reducing the overall time for the exam and the patient’s discomfort. After selecting a default pre-set, it is possible that the positioning has to be re-adjusted to accommodate the area of interest.
4 Working Protocols

The following paragraphs will discuss, as a guideline, the most widely used protocols for the most common diseases in the field of dental / medical.

4.1 Available FOVs

The following list shows the available FOVs depending on the device used. Refer to the appropriate FOVs list shown below while choosing the suggested protocols in the clinical applications of interest.

- **NewTom 5G**
  - [18x16]
  - [15x22e] (eFOV scan)
  - [15x12]
  - [12x8]
  - [8x8]
  - [15x5] HiRes
  - [12x8] HiRes
  - [8x8] HiRes
  - [6x6] HiRes

- **NewTom 5G XL**
  - [21x19]
  - [18x16]
  - [15x22e] (eFOV scan)
  - [15x12]
  - [15x5]
  - [12x8]
  - [10x10]
  - [10x5]
  - [8x8]
  - [8x5]
  - [6x6]
  - [15x5] HiRes
  - [12x8] HiRes
  - [10x10] HiRes
  - [10x5] HiRes
  - [8x8] HiRes
  - [8x5] HiRes
  - [6x6] HiRes
  - CineX
  - Ray2D

4.2 Petrosal Bones Imaging

**Main indications:**
Cholesteatoma, otosclerosis, ear infections, hearing loss, vestibular disorders, vertigo, cochlear implants study.

**Patient positioning:**
Before positioning the patient, make sure it has removed any dentures or acoustic furniture, and other metal objects from the area in question.

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1 FOV available only if the software option is enabled. Enhanced Scan option not available.
Then place it on his back, with his head placed inside the headrest dedicated, hard palate perpendicular to the patient table, chin slightly flexed. If necessary, use of restraint for the head-end.

Do not place the patient's chin with hyper-extended, in order to avoid artifacts due to overlap with radio-opaque elements of the upper, if any.
If you are unable to obtain the correct position, use devices such as wedges, thicknesses, etc., and place them under the head of the patient, correcting the hyper-extension of the head.

And ‘essential to inform the patient and instruct the behavior that must be taken during the time of the examination, ie no swallowing, no movements of tongue and eyes, shallow breathing.
FOV used and centering patient:

- Fortresses separate (left/right): FOV 8x8 HiRes
- For children and small size patients it is recommended: FOV 6x6 HiRes
- Rocks in a single exposure: FOV 15x5 HiRes
- For children and small size patients it is recommended: FOV 12x8

- FOV 8x8
  Centering at the level of the external acoustic meatus with both lasers (axial and coronal). With the third laser (sagittal), positioned halfway dell’emivolto under consideration.

- FOV 15x5
  Centering at the level of the external acoustic meatus with both lasers (axial and coronal). With the third laser (sagittal), stand in the middle of the patient’s face.

- Scan cranio-caudal.

Example of patient positioning with laser activated (FOV 8x8 HiRes)

With FOV 8x8 HiRes, in the scout side, the acoustic meatus must be at the center of the field of study, including before the clivus and posterior whole mastoid.

Scout LL petrosal bone DX (Es.FOV 8x8HiRes)
In the anterior-posterior scout, the anatomical region to be studied must understand the entire course of the fortress, from the mastoid to the nasal cavity.

![Scout AP Bone DX (Es FOV 8x8HiRes)](image)

With FOV 15x5 HiRes are acquired simultaneously both fortresses. The centering must be carried out over the entire head of the patient as in the following figure

In the scout side, put the center area between the condyle and the acoustic meatus.

![Scout LL Bones (Es. 15x5HiRes)](image)

In the anterior-posterior scout, make sure that the packages are included within the field of acquisition.

![Scout AP Bones (Es. 15x5HiRes)](image)

Used for rebuilding isometric voxel 0.15mm

**NOTES**
In case of use of FOV 8x8 HiRes, to acquire first the fortress site of the lesion or suspected lesion, this to minimize the possibility of patient movement, particularly in elderly subjects, with difficulty in maintaining the position of immobility.
4.3 Massive Facial Imaging and paranasal sinuses

Main indications:
Chronic sinusitis, polyposis, anatomical variants (septal deviation, etc.). Predisposing to rhino-sinus symptoms, runny nose (suspected CSF fistula), facial fractures (cooperative patient), follow-up post-operative facial trauma, jaw asymmetry, dysplasia.

Patient positioning:
Remove dentures or mobile acoustic and any metal objects from the area in question, after placing the patient supine, with the head placed correctly inside the headrest dedicated, hard palate perpendicular to the patient table.

And ‘essential to inform the patient and instruct the behavior that must be taken during the time of the exam.

Example of patient positioning with laser activated

FOV used and centering patient:
- FOV 15x12 (or FOV 18x16 / 21x19) based on the size of the patient's skull and cranial-caudal extension of the sinuses.
- For children and small size patients it is recommended FOV: 12x8
- Centering the upper lip (for FOV 15x12 and FOV 12x8) and lower lip (for FOV 18x16 / 21x19) with the laser axis.
  - With the axial and coronal centered at the level of the external acoustic meatus.
- Scan cranio-caudal.

Example of patient positioning with laser activated
In the scout side, understand the frontal sinuses to the hard palate and nose (soft parts including, if possible) to the sphenoid sinuses.

It is recommended to use for the reconstruction voxel isometric 0.30 mm
4.4 Orthodontic Imaging Massive Facial

Main indications:
Examination required by dentistry for intervention in cases of malocclusion and malformations (eg, cleft palate).

Patient positioning:
The exam is usually performed on younger patients / young, so remember to wear your gown sealed and make sure it does not interfere with the scan at the level of the shoulders. Remove contaminated clothing and furniture and metal objects.
Patient supine, head positioned correctly in the headrest, hard palate perpendicular to the table, upper and lower molars in contact.

FOV used and centering patient:
- FOV 18x16 / 21x19
- For children and small size patients it is recomended FOV: 15x12
- Centering with laser axial above the upper lip
- Scan cranio-caudal

![Example of patient positioning with laser activated](image)

In the scout side, it is important to understand, from top to bottom, from the glabella to the hyoid bone and from front to back, nose (including the soft parts) to the cervical vertebrae (usually up to the fourth).

These are fundamental points of reference for the measurements carried out by dentists when planning intervention.
Scout LL with FOV 18x16

In the anterior-posterior scout, make sure that the patient is positioned correctly, keeping the nasal septum in the middle of the field.

Scout AP with FOV 18x16

Used for rebuilding isometric voxel 0.25 mm
4.5 Dental Arches Imaging

Main indications:
Implantology, dysodontiasis, included items, surplus items, cysts etc.

Patient positioning:
Remove contaminated clothing and furniture and metal objects, position the patient supine with the head placed in the proper headrest, any bite positioned between the upper and lower front teeth, so you do not have overlapping teeth.

- For upper jaw: the hard palate perpendicular to the bed
- To lower jaw: chin hyper-extended so as to have the horizontal ramus of the mandible perpendicular to the bed.

Example of patient positioning with laser activated (FOV 12x8)

Example of patient positioning with laser activated (FOV 15x5 HiRes)
FOV used and centering patient:

• For the upper jaw using the FOV 12x8,
• For children and small size patients it is recomended FOV 8x8,
• Centering above the upper lip laser with axial, containing in the anterior-posterior scout also the maxillary sinuses and lateral scout in the dental arch must be at the center of the FOV (not include too much arch lower).

• For the lower arch using the FOV 15x5 HiRes,
• For children and small size patients it is recomended FOV 8x8,
• Centered below the lower lip with axial laser. Opt for the FOV 15x12 in case of disease of the mandibular branch, in that case centering lower lip.

• For both arches use the FOV 15x12 with centering at the level of the buccal rhyme.
• For children and small size patients it is recomended FOV 8x8.
Used for rebuilding isometric voxel 0.15 to 0.2 mm
4.6 Wrist Imaging

Main indications:
Fractures, joint disorders, post-intervention controls

Patient positioning:
It exploits the rear of the apparatus, with the subject sitting on a chair and making him bring the pulse inside the gantry, resting on a support positioned above the headrest of the patient table, to obtain a correct centering.

FOV used and centering patient:

- FOV 15x12
- For children and small size patients it is recomended FOV 12x8
- Centering on the bones of the carpus with laser axial
- Scan caudal-cranial

Example of patient positioning with laser activated (FOV 15x12)
Scan LL with FOV 15x12

Scan AP with FOV 15x12

Used for rebuilding isometric voxel 0.2 mm
4.7 Hand Imaging

Main indications:
rheumatoid Arthritis

Positioning:
It exploits the rear of the apparatus with the subject sitting on a chair and making him bring the hand inside the gantry (as for Imaging wrist), resting on a support positioned above the headrest of the patient table, to obtain a correct centering.

FOV used and centering patient:

- FOV 18x16 / 21x19
- For small size patients it is recommended: FOV 15x12
- Centering the center of the hand with laser axial and sagittal planes. Important to understand the articulation radius-ulna-carpal joint, proximal to the articulation of the fingers.
  If it is not possible to contain the entire volume, you must perform two separate scans, one for the wrist and the other to the fingers and metacarpals.
- Scan caudal-cranial

Example of patient positioning with laser activated (FOV 18x16)

Used for rebuilding isometric voxel 0.2 mm
4.8 Hand Imaging

Main indications:
Fractures or joint disease

Patient positioning:
It exploits the rear of the apparatus with the subject sitting on a chair and making him bring the hand inside the gantry (as for Imaging wrist), resting on a support positioned above the headrest of the patient table, to obtain a correct centering.

FOV used and centering patient:

- FOV 8x8
- For children and small size patients it is recommended: FOV 6x6
- Centering on the finger in question with laser axial and sagittal
- Scan caudal-cranial

Example of patient positioning with laser activated (FOV 8x8)

Scout LL with FOV 8x8
Scout AP with FOV 8x8

Used for rebuilding isometric voxel 0.1 mm
4.9 Elbow Imaging

Main indications:
Fractures, joint diseases

Patient positioning:
Lying on its side with the arm extended examination to enter the gantry
Alternatively, make the rear of the apparatus with the subject sitting on a chair and bringing the hand inside the gantry (as for imaging wrist), resting on a support positioned above the headrest of the patient table, to obtain a correct centering.

FOV used and centering patient:

- FOV 15X12
- For children and small size patients it is recommended: FOV 12x8
- Centering the center of the joint with axial laser
- Scan caudal-cranial or cranio-caudal direction depending on the position used.

Example of patient positioning with laser activated (FOV 15x12)

Used for rebuilding isometric voxel 0.2 mm
4.10 Ankle (Fibula and Peroneus) Imaging

**Main indications:**
Fractures, joint diseases

**Patient positioning:**
Sitting / lying on the couch facing the gantry, place pillows under the foot that is below the knee to get a comfortable position for the patient

**FOV used and centering patient:**
- FOV 15x12
- For children and small size patients it is recommended FOV 12x8
- Centering on the articulation with laser axial and sagittal
- Scan caudal-cranial

Example of patient positioning with laser activated (FOV 15x12)
Scout LL with FOV 15x12

Scout AP with FOV 15x12

Used for rebuilding isometric voxel 0.2 mm
4.11 Forefoot and Fingers (Foot) Imaging

Main indications:
Fractures or joint disease

Patient positioning:
Sitting / lying on the couch facing the gantry, place pillows under the knees to get a comfortable position for the patient.

FOV used and centering patient:

- FOV 15x12 or FOV 18x16 / 21x19 (mid forefoot and fingers) FOV.8x8 (Single finger)
- For children and small size patients it is recommended FOV 15x12 (mid forefoot and fingers) FOV.8x8 (Single finger)
- Centering mid forefoot or mid finger laser with axial
- Scan cranio-caudal.

Example of patient positioning with laser activated (FOV 15x12)
Scout AP with FOV 18x16

Scout LL with FOV 18x16

Used for rebuilding isometric voxel 0.3 mm or in the case of single finger 0.1 mm
4.12 Knee Imaging

Main indications:
Fractures, joint diseases

Patient positioning:
Lying on the couch facing the gantry, place pillows under the foot that is below the knee to get a comfortable position for the patient

FOV used and centering patient:
- FOV 18x16 / 21x19 even if in case of childrens and small size patients
- Centering on the articulation with laser axial and sagittal
- Scan caudal-cranial

Example of patient positioning with laser activated (FOV 18x16)
Scout AP with FOV 18x16

Scout LL with FOV 18x16

Used for rebuilding isometric voxel 0.3 mm
4.13 Shoulder Imaging

Main indications:
Fractures and traumatic sprains

Patient positioning: (example: RIGHT shoulder):

- RIGHT arm bent with hand on the abdomen
- support under the RIGHT elbow to make it stable
- LEFT arm bent upwards with the hand under the head
This is to obtain a restriction of the chest circumference and a reduced interference of the other shoulder in the examination result.

FOV used and centering patient:

- FOV 15X12 even if in case of childrens and small size patients.
- Position the patient so that the shoulder to be examined is as close as possible to the centre of FOV 15x12, then move him/her away from the centre with respect to the bed axis and move the bed laterally as much as possible.
- Move the patient away from his/her axis so that the shoulders are NOT parallel.

Example of patient positioning (FOV 15x12)
View with FOV 15x12

Used for rebuilding isometric voxel 0.2 mm.
4.14 Hip Imaging

Main indications:
Fractures, postoperative assessment

Patient positioning:
Lying on the couch facing the gantry with the ankles inside the gantry.

FOV used and centering patient:

- FOV 18x16 / 21x19
- For children and small size patients FOV 8x8 for monolateral and FOV 18x15 for pelvis sacrum.
- Centering on the ankle with laser axial and sagittal
- Scan caudal-cranial

Example of patient positioning (FOV 18x16)
View with FOV 18x16

Used for rebuilding isometric voxel 0.3 mm.
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