CE
0434

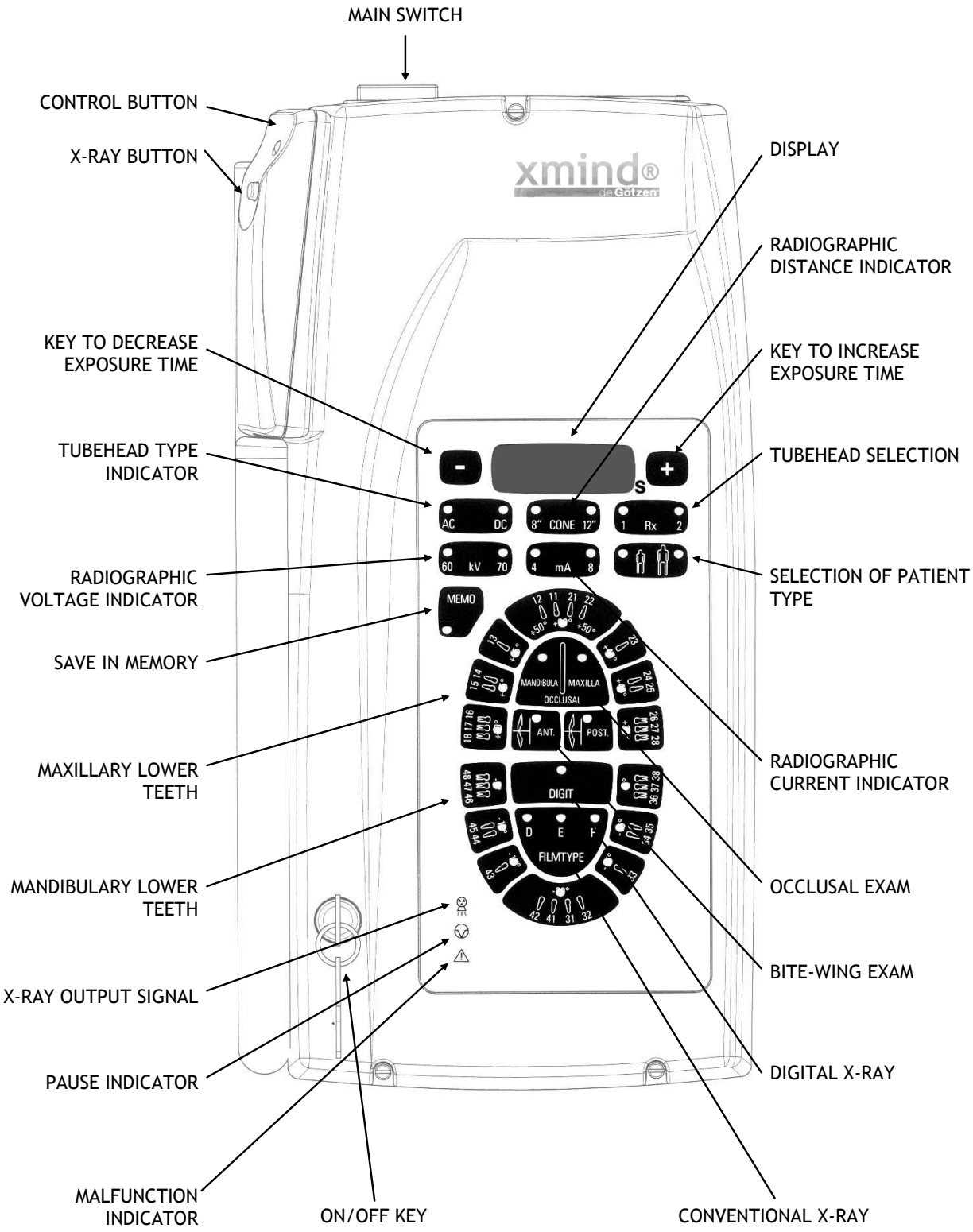
xmind®dc

intraoral x-ray system at constant potential

USER'S MANUAL

IMAGING ACTEON

Control panel



THE RADIOGRAPHIC SYSTEM DESCRIBED IN THIS MANUAL REFERS TO A WALL INSTALLATION.

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DRAWN UP BY	APPROVED BY
	
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Summary

PRELIMINARY INFORMATION

Before you start to use the "**xmind®dc**" radiographic system, it is recommended to carefully read and follow the instructions contained herein, in order to obtain the best possible performance.

Always pay close attention to the

CAUTION
WARNING
PLEASE NOTE

messages when operating the system.

KEY

CAUTION

The word **CAUTION** identifies those occurrences which might jeopardize the operator's personal safety or cause physical injuries.

WARNING

The word WARNING identifies those occurrences which might compromise the radiographic system's performance.

PLEASE NOTE

PLEASE NOTE gives special indications to facilitate maintenance or to make important information clearer.

INFORMATION FOR THE USER

Dear Customer,

Thanks for having chosen the "**xmind®dc**" radiographic system.

It is designed and manufactured by "de Götzen® S.r.l." and is the result of many years of experience in the field of radiology and in the application of advanced electronics.

This high performance system represents a further development of technological research at the service of dental radiography.

PLEASE NOTE

This manual does not contain all the recommendations and the obligations relative to the possession of a source of ionising radiations - since they can vary from state to state - but only the most common ones.

The user must consult his/her country's legislation so as to fulfil all local obligations.

WARRANTY CONDITIONS

Inappropriate use or any arbitrary tampering will nullify the liability of "de Götzen® S.r.l.", as manufacturer of the "**xmind®dc**" radiographic system, for the provision of any service or other responsibility under the terms of the warranty.

The warranty is valid only if the following precautions are taken:

- Any repairs, modifications, adjustments, re-calibrations must be performed only by "de Götzen® S.r.l."
- The installation must be made by professionally qualified technicians according to the regulations in force
- The system must be installed and used in compliance with the instructions given in this Manual and for the purposes and applications for which it was designed
- The power supply must be adequate to supply the required power indicated in the radiographic system's nameplate data
- In order to safeguard one's warranty rights, please fill in the enclosed Warranty Document, immediately after the installation is completed, with the technician's help.

TRANSPORT CONDITIONS

The "xmind®dc" radiographic system travels at the receiver's own risk.

All claims for damage or loss regarding the shipment must be identified in the presence of the shipping agent.

In the case of loss, or actual or suspected damage, the receiver should indicate the proper reserves on the way-bill or on the consignment note.

SAFETY WARNINGS

The safety recommendations listed here below should be followed when using the "**xmind®dc**" radiographic system.

CAUTION

PROTECTION AGAINST RADIATIONS

"The general principles regarding safety and protection of workers and people" must always be applied when using the unit:

1. Justification of the examination
2. Protection Optimisation (ALARA)
3. Reduction of the limits of individual dose and risks.

The radiographic system must only be used by authorized and qualified personnel.

All personnel present during the radiographic examination must comply with safety measures foreseen with regard to protection from radiation.

For the operator's own safety, a distance of more than 2 meters from the radiographic unit must always been respected.

To protect the patient from unnecessary exposure to radiation, additional anti-radiation protections may be used whenever necessary (aprons, collars, etc.).

ATTENSION X-RAYS

CAUTION

MECHANICAL RISK

Before removing the tubehead from the positioning arm, RELEASE THE SPRING because the joint might burst open and hit the operator.

CAUTION

ELECTRIC SAFETY

The radiographic system contains high voltage.

When inspecting internal parts, always turn off the power before touching any electric part.

The unit must be used only in environments that are in full compliance with all electric safety standards for medical environments.

The unit is NOT equipped with protections against the penetration of liquids; it will therefore be necessary to make sure that no water or other liquids penetrate inside so as to avoid short circuits or corrosion.

Always disconnect the radiographic system from the power supply before cleaning and disinfecting operations.

CAUTION

PROTECTION AGAINST EXPLOSIONS

The radiographic system MUST NOT be used in the presence of disinfectants, flammable or potentially explosive gases or vapours that might catch fire and cause damage.

In the case that these disinfectants have to be used let the vapour completely evaporate before turning on the radiographic system.

RADIOGRAPHIC SYSTEM

The **"xmind®dc"** radiographic system guarantees maximum safety both for the operator and the patient.

It is built in compliance with the following European Directives:

- 93/42/EEC
  MEDICAL DEVICES
- 73/23/EEC
  LOW VOLTAGE
- 89/336/EEC
  ELECTROMAGNETIC COMPATIBILITY
- EURATOM 96/29
  IONISING RADIATIONS

and the following American Standard:

- American Radiation Performance Standard 21 CFR, Subchapter J.

The following protective measures were adopted in the design and construction of the unit:

- Protection against the risk of electric injuries, ensured by a grounded protection conductor
- Protection against leakage radiation, made negligible by the shielded casing
- Protection against excessive radiations, thanks to the immediate activation of the safety device
- Protection against continuous service, since the system is designed, according to standards, so as not to allow use in radioscopy
- Protection for the patient against dangerous radiations, obtained by means of the high frequency technology capable of producing a constant and hard radiation
- Protection against exposure mistakes obtained with the high frequency technology which is unaffected by voltage fluctuation and consequently capable to guarantee extremely accurate exposure parameters
- Protection for the operator against irradiation ensured by the extensible cable of the hand control which allows for a safety distance of more than 2 meters
- Protection against involuntarily selection of radiographic technique (FILM or DIGIT) obtained, according to standards, by means of the confirming of the key of selection.

"ELECTRO-MEDICAL" CLASSIFICATION

According to paragraph 5 of the general safety regulations EC.EN.60 601-1/1998 on safety of medical equipment, the system is classified as: **Class I - Type B.**

"MEDICAL DEVICES" CLASSIFICATION

According to the classification rules indicated in attachment IX of the EEC Directive 93/42 on medical devices the system is classified as: **Class IIb.**

"E.M.C." CLASSIFICATION

According to paragraph 4 of the EEC EN 55011, the system is classified as: **Group 1 - Class B.**

SYSTEM COMPONENTS

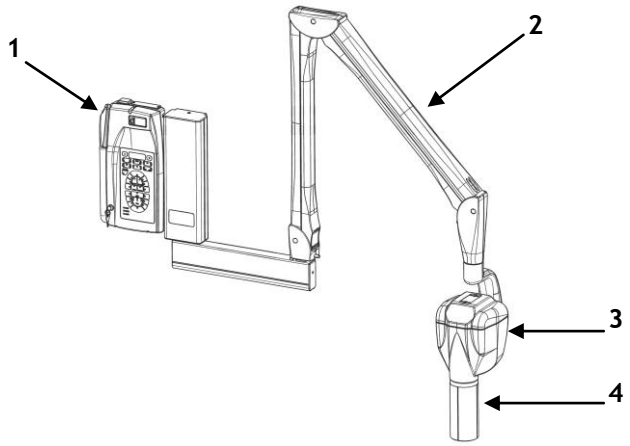


Figure 1

"**xmind®dc**" radiographic system (Figure 1) consists of:

1. **xmind® TIMER**

   The timer is the control panel used to manage the times and to safely use the tubehead.

   To take the exposure the control button is equipped with a safety button.

   The timer can be connected to two tubeheads.

   The timer is a "multi-technological" type and it is able to control tubeheads of different technologies: alternating current "**xmind®ac**" and direct current "**xmind®dc**".

   In the case of alternating current tubeheads the timer technology is "self-compensating".

   Depending on the line voltage fluctuation the microprocessor automatically modifies the predetermined exposure time guaranteeing a constant dose to the patient.

   This technological feature avoids the repetition of exposures due to over/under exposure errors.

2. **PANTOGRAPH**

   Thanks to the new shape and new mechanisms of the positioning arm, it can be adjusted in height and depth so as to precisely explore any spot in its reach.

   It is made of light alloy with an ABS coating.

3. xmind® TUBEHEAD

The "**xmind®dc**" intra-oral tubehead is a monoblock type and the light alloy housing is divided into two compartments.

The high voltage transformer, the x-ray tube and the expansion chamber are submerged in highly dielectric insulating oil inside a light alloy container.

The expansion chamber guarantees an adequate compensation to oil expansion for the entire temperature range.

The x-ray tube is located in the back part of the container, allowing a source-skin distance 50% higher than traditional structures.

In the second compartment are placed the main electronic board and the control electronic board.

4. CONE

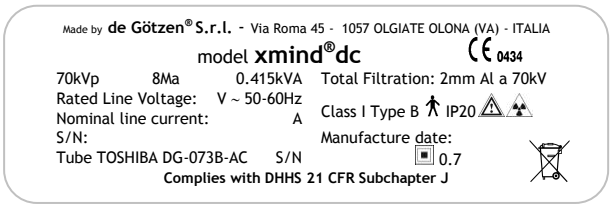
Made of the transparent polycarbonate, it allows for:

- Correct focal spot to skin distance
- Dimension, direction and centering of x-ray beam
- Realization of different radiographic technique (bisecting and parallel technique).

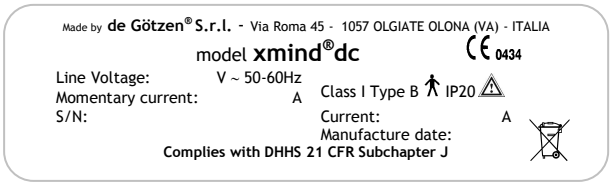
IDENTIFICATION TAGS

The identification tags on the tubehead, on the timer and on the cone indicate the model number, the serial number, the manufacturing date and the symbols of the main technical characteristics.

TUBEHEAD



TIMER



CONE

GRADUATED SCALE

PICTOGRAMS USED

THIS SYMBOL GUARANTEES THAT THE RADIOGRAPHIC SYSTEM COMPLIES WITH THE REGULATIONS CONTAINED IN THE EUROPEAN DIRECTIVE EEC 93/42 RELEVANT TO MEDICAL DEVICES

THE DEGREE OF PROTECTION AGAINST DIRECT AND INDIRECT ELECTRIC CONTACTS IS B TYPE

REFER TO THE INSTRUCTIONS MANUAL

SYMBOL INDICATING DANGER DUE TO IONISING RADIATIONS

SIZE OF THE FOCAL SPOT

WEEE (Waste Electrical and Electronic Equipment) symbol, in conformity with 2002/96/CE Directive and EN 50419 standard.

CONFIGURATION

The "**xmind®dc**" radiographic system is factory configured in "standard mode".

On the control panel the LED relevant to the following exposure parameters will light up:

No. of the selected tubehead
LED 1

Supplied cone
LED 8" = SHORT CONE
LED 12" = LONG CONE

Tubehead type
LED AC = ALTERNATING CURRENT
LED DC = DIRECT CURRENT

Radiographic voltage
LED 70 kV

Radiographic current
LED 8 mA

Type of patient
LED ADULT

Radiographic technique
CONVENTIONAL LED D

The following exposure times (sec) have been stored:

0.020 - 0.025 - 0.032 - 0.040 - 0.050 - 0.063 - 0.080 - 0.100 - 0.125 - 0.160 - 0.200 - 0.250 - 0.320 - 0.400 - 0.500 - 0.630 - 0.800 - 1.00 - 1.250 - 1.600 - 2.000 - 2.500 - 3.200

PLEASE NOTE

These times are in compliance with current CEI EN 60601-2-7 (1999) norms and with the ISO 497 series R'10 recommendations.

MAY NOT BE MODIFIED

Certain exposure values have been predefined which depend on the selection of the operating parameters:

- Cone (8”/12”)
- Type of patient (ADULT/CHILD)
- Radiographic technique
- Intra-oral test.

PLEASE NOTE

If one so desires, it is possible to change this values.

(refer to Chapters 5 and 6)

POSSIBLE MODIFICATIONS OF THE EXPOSURE VALUES

- Radiographic voltage (60 kV/70 kV)
- Radiographic current (4 mA/8 mA)
- Type of patient (ADULT/CHILD)
- Radiographic technique.

⬇

(refer to Chapter 4)

POSSIBLE MODIFICATIONS OF THE EXPOSURE VALUES

- Cone (8”/12”)
- Type tubehead
- Control button no.

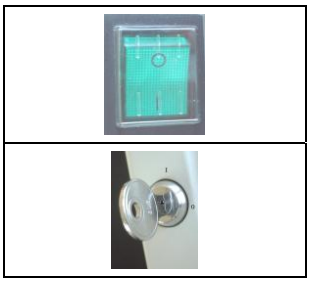
⬇

inside the timer, by changing the dip-switch position.

THIS OPERATION MUST BE CARRIED OUT BY THE INSTALLER ONLY.

INSTRUCTIONS FOR USE

TURN ON - 1°



Put the main switch located on the upper part of the timer to the "I" position (ON).

Turn the key switch to the "I" position (ON).

1. The green light turns on indicating that the system is powered.
2. The LEDs of the set parameters automatically light up.
3. The exposure time is shown on the display.

CAUTION

If an error is detected when the system is turned on, the anomaly is indicated as follows:

- An intermittent beep sounds
- The ⚠ LED MALFUNCTION INDICATOR flashes
- The error code (E ….) appears on the display *(refer to Chapter 8)*
- All control panel functions are inhibited.

In this case turn off the timer and then turn it back on.

If the error should repeat itself, call the "After Sales Service".

PLEASE NOTE

The exposure time and parameters which appear on the display are the last that were set before the timer was turned off.

If the timer remains inactive for a few minutes, it switches to stand-by mode. Press any key on the control panel to restore it to the operative mode.

CHECK THE SELECTED PARAMETERS - 2°

Before making the exposure check that the parameters selected on the control panel (from STEP 1 to STEP 8) are suitable for the radiographic examination.

STEP 1 CHECK THE SELECTED TUBEHEAD

The LED of the chosen tubehead should be turned on.

LED **Rx 1 ON** indicates that the tubehead connected to the timer XRAY1 terminal block is selected.

LED **Rx 2 ON** indicates that the tubehead connected to the timer XRAY2 terminal block is selected.

To change the selection press the button again.

STEP 2 CHECK THE SELECTED RADIOGRAPHIC DISTANCE CONE

The LED of the cone length (source-skin distance = SSD) in use should be turned on.

LED **8" ON** indicates that the selected tubehead is equipped with 8" = 20 cm (SSD) cone.

LED **12" ON** indicates that the selected tubehead is equipped with 12" = 31 cm (SSD) cone.

To change the selection call the "After Sales Service".

PLEASE NOTE

After modification, default exposure values will be changed automatically.

STEP 3 CHECK THE SELECTED TYPE TUBEHEAD

The LED of the type of selected tubehead should be turned on.

LED **AC ON** indicates that the selected tubehead works in alternating current technology.

LED **DC ON** indicates that the selected tubehead works in direct current technology.

To change the selection call the "After Sales Service".

PLEASE NOTE

After modification, default exposure values will be changed automatically.

STEP 4 CHECK THE SELECTED RADIOGRAPHIC VOLTAGE

The LED of the desired radiographic voltage should be turned on.

LED **60 kV ON** indicates that the radiographic system is set with the high contrast radiodiagnostic technology.

LED **70 kV ON** indicates that the radiographic system is set with the low contrast radiodiagnostic technology.

To change the selection press the button again.

PLEASE NOTE

60 kV mode can be selected with the **"xmind®dc"** radiographic system only.

PLEASE NOTE

After the modification, default exposure values will be changed automatically.

STEP 5 CHECK THE SELECTED RADIOGRAPHIC CURRENT

The LED of the desired radiographic current should be turned on.

LED **4 mA ON** indicates that the radiographic system is set with reduced dose. It is advisable when using the digital radiographic technique.

LED **8 mA ON** indicates that the radiographic system is set with nominal dose. It is advisable when using the conventional radiographic technique.

To change the selection press the button again.

PLEASE NOTE

The 4 mA mode can be selected with the **"xmind®dc"** radiographic system only.

PLEASE NOTE

After modification, default exposure values will be changed automatically.

STEP 6 CHECK THE SELECTED TYPE OF PATIENT

The LED of the desired patient type should be turned on.

LED **CHILD ON** indicates that the radiographic system is set for a patient with a small physique.

LED **ADULT ON** indicates that the radiographic system is set for a patient with a large physique.

To change the selection press the button again.

PLEASE NOTE

After modification, default exposure values will be changed automatically.

STEP 7 CHECK THE SELECTED RADIOGRAPHIC TECHNIQUE

CONVENTIONAL TECHNIQUE (FILM)

The LED of the chosen film speed should be turned on.

LED **D ON**: the radiographic system is set for use with D speed film.

LED **E ON**: the radiographic system is set for use with E speed film.

LED **F ON**: the radiographic system is set for use with F speed film.

To change the selection press the button again for 3 sec until the signal beeps.

PLEASE NOTE

With films it is advisable to use a radiographic current of 8 mA *(refer to STEP 5)*.

PLEASE NOTE

After modification, default exposure values will be changed automatically.

DIGITAL TECHNIQUE (SENSOR)

The LED should be turned on.

To change the selection press the button again for 3 sec until the signal beeps.

PLEASE NOTE

With films it is advisable to use a radiographic current of 4 mA *(refer to STEP 5)*.

PLEASE NOTE

After modification, default exposure values will be changed automatically.

STEP 8 CHECK THE SELECTED RADIOGRAPHIC TECHNIQUE

PERIAPICAL EXAM

The LED of the selected teeth should be turned on.

To change the selection press the key relevant to the tooth chosen.

OCCLUSAL EXAM

The LED of the selected type of test should be turned on.

LED **MANDIBULA ON:** the radiographic system is set for occlusal exam of the lower jaw.

LED **MAXILLA ON:** the radiographic system is set for occlusal exam of the upper jaw.

To change the selection press the button again.

BITE-WING EXAM

The LED of the selected type of test should be turned on.

LED **ANT ON:** the radiographic system is set for anterior bite-wing exam.

LED **MAXILLA ON:** the radiographic system is set for posterior bite-wing exam.

To change the selection press the key relevant to the examination chosen.

POSITIONING THE PATIENT - 3°

Position the patient according to standard intra-oral procedures.

POSITIONING THE FILM OR SENSOR - 4°

Position either the film or the digital sensor depending on the technique to be used.

POSITIONING THE CONE - 5°

Position the cone according to standard intra-oral procedures.

CHECK THE SELECTED TIME ON THE DISPLAY - 6°

Before proceeding with the exposure, check the selected time on the display.

To change the selection press the following keys.

WARNING

This modification of the exposure time is momentary and will be lost unless it is saved.

(refer to Chapter 6).

To restore the previous values, press one of the keys with the LED turned off on the control panel.

TO MAKE THE EXPOSURE - 7°

1. Take the control button of the timer relevant to the selected tubehead and keep a safety distance (of a least 2 meters) from the tubehead, so as to be able to constantly check the radiographic exposure.

2. Advise the patient to remain still.

3. On the control button press the X-RAY key and keep it pressed until the acoustic signal (beep) stops and the yellow LED turns off .

PLEASE NOTE

If the "X-RAY" key is released early, the exposure is immediately interrupted and the E12 error message appears on the display.

4. At the end of the exposure the green LED flashes PAUSE.

5. The display indicates the actual exposure time.

6. All the timer functions are inhibited.

PLEASE NOTE

The pause time is necessary to allow the x-ray tube to cool down.

This time is calculated by the microprocessor, depending on the exposure time, with a ratio of 1:32 (32 second of pause are required for each second of exposure).

A NEW EXPOSURE WILL BE POSSIBLE AFTER THE GREEN LED HAS TURNED OFF

REPEAT THE OPERATIVE SEQUENCE FROM POINT 2 TO POINT 7

CHART OF DEFAULT EXPOSURE VALUES

The chart indicates the **"xmind®dc"** radiographic system's predefined exposure values.

(refer to Chapter 3).

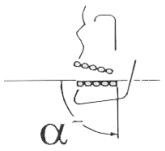
I	INCISOR
C	CANINE
P	PREMOLAR
M	MOLAR
Ba	ANTERIOR BITE-WING
Bp	POSTERIOR BITE-WING
Oa	OCCLUSAL ANTERIOR
Op	OCCLUSAL POSTERIOR

PLEASE NOTE

The default exposure times can be modified.

(refer to Chapter 6).

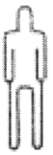
12” LONG CONE
(SSD = 31 cm)



CONVENTIONAL RADIOGRAPHIC TECHNIQUE
(FILM)

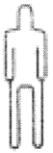
ADULT

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
70kV - 8mA																								
FILM D	MAXILLA												I	C P Bp	M	Op								
	MANDIBLE											I	C P Ba	M	-	Oa								
FILM E	MAXILLA										I	C P Bp	M	Op										
	MANDIBLE									I	C P Ba	M	-	Oa										
FILM F	MAXILLA									I	C P Bp	M	Op											
	MANDIBLE								I	C P Ba	M	-	Oa											



ADULT

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
60kV - 8mA																								
FILM D	MAXILLA															I	C P Bp	M	Op					
	MANDIBLE														I	C P Ba	M	-	Oa					
FILM E	MAXILLA													I	C P Bp	M	Op							
	MANDIBLE												I	C P Ba	M	-	Oa							
FILM F	MAXILLA												I	C P Bp	M	Op								
	MANDIBLE											I	C P Ba	M	-	Oa								



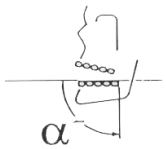
CHILD

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
70kV - 8mA																								
FILM D	MAXILLA											I	C P Bp	M	Op									
	MANDIBLE										I	C P Ba	M	-	Oa									
FILM E	MAXILLA									I	C P Bp	M	Op											
	MANDIBLE								I	C P Ba	M	-	Oa											
FILM F	MAXILLA								I	C P Bp	M	Op												
	MANDIBLE							I	C P Ba	M	-	Oa												

CHILD

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
60kV - 8mA																								
FILM D	MAXILLA														I	C P Bp	M	Op						
	MANDIBLE													I	C P Ba	M	-	Oa						
FILM E	MAXILLA												I	C P Bp	M	Op								
	MANDIBLE											I	C P Ba	M	-	Oa								
FILM F	MAXILLA											I	C P Bp	M	Op									
	MANDIBLE										I	C P Ba	M	-	Oa									

12” LONG CONE
(SSD = 31 cm)



DIGITAL RADIOGRAPHIC TECHNIQUE
(SENSOR)

ADULT

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
70kV - 4mA																							
MAXILLA						I	C P Bp	M	Op														
MANDIBLE					I	C P Ba	M	-	Oa														

ADULT

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
60kV - 4mA																							
MAXILLA									I	C P Bp	M	Op											
MANDIBLE								I	C P Ba	M	-	Oa											

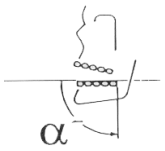
CHILD

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
70kV - 4mA																							
MAXILLA					I	C P Bp	M	Op															
MANDIBLE				I	C P Ba	M	-	Oa															

CHILD

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
60kV - 4mA																							
MAXILLA								I	C P Bp	M	Op												
MANDIBLE							I	C P Ba	M	-	Oa												

8" SHORT CONE
(SSD = 20 cm)



CONVENTIONAL RADIOGRAPHIC TECHNIQUE
(FILM)

ADULT

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
70kV - 8mA																								
FILM D	MAXILLA									I	C P Bp	M	Op											
	MANDIBLE								I	C P Ba	M	-	Oa											
FILM E	MAXILLA							I	C P Bp	M	Op													
	MANDIBLE						I	C P Ba	M	-	Oa													
FILM F	MAXILLA						I	C P Bp	M	Op														
	MANDIBLE					I	C P Ba	M	-	Oa														

ADULT

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
60kV - 8mA																								
FILM D	MAXILLA												I	C P Bp	M	Op								
	MANDIBLE											I	C P Ba	M	-	Oa								
FILM E	MAXILLA										I	C P Bp	M	Op										
	MANDIBLE									I	C P Ba	M	-	Oa										
FILM F	MAXILLA									I	C P Bp	M	Op											
	MANDIBLE								I	C P Ba	M	-	Oa											

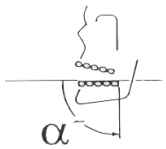
CHILD

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
70kV - 8mA																								
FILM D	MAXILLA								I	C P Bp	M	Op												
	MANDIBLE							I	C P Ba	M	-	Oa												
FILM E	MAXILLA						I	C P Bp	M	Op														
	MANDIBLE					I	C P Ba	M	-	Oa														
FILM F	MAXILLA					I	C P Bp	M	Op															
	MANDIBLE				I	C P Ba	M	-	Oa															

CHILD

PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200
60kV - 8mA																								
FILM D	MAXILLA											I	C P Bp	M	Op									
	MANDIBLE										I	C P Ba	M	-	Oa									
FILM E	MAXILLA									I	C P Bp	M	Op											
	MANDIBLE								I	C P Ba	M	-	Oa											
FILM F	MAXILLA								I	C P Bp	M	Op												
	MANDIBLE							I	C P Ba	M	-	Oa												

8” SHORT CONE
(SSD = 20 cm)



DIGITAL RADIOGRAPHIC TECHNIQUE
(SENSOR)

ADULT

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200	
70kV - 4mA																								
MAXILLA			I	C P Bp	M	Op																		
MANDIBLE		I	C P Ba	M	-	Oa																		

ADULT

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200	
60kV - 4mA																								
MAXILLA						I	C P Bp	M	Op															
MANDIBLE					I	C P Ba	M	-	Oa															

CHILD

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200	
70kV - 4mA																								
MAXILLA		I	C P Bp	M	Op																			
MANDIBLE	I	C P Ba	M	-	Oa																			

CHILD

PROGRAMMED EXPOSURE TIMES (sec)	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200	
60kV - 4mA																								
MAXILLA					I	C P Bp	M	Op																
MANDIBLE				I	C P Ba	M	-	Oa																

PROGRAMMING DEFAULT EXPOSURE VALUES

WARNING

The 23 programmed exposure times may not be modified in the "xmind®dc" radiographic system.

Meanwhile you can customize the default exposure values.

(refer to Chapter 3).

WARNING

After customization the "Chart of default exposure values" *(refer to Chapter 5)* are no longer valid.

For programming the new exposure values press the following keys.

PLEASE NOTE

When the key is kept pressed the "repeat" function is automatically activated so the time shown on the display scrolls faster.

To confirm the new program check the LED of the key is lit up.

LED **MEMO ON** indicates that it is possible to save the new default exposure value.

Press the button for 3 sec until the acoustic signal beeps to save the new default exposure values.

LED **MEMO OFF** indicates that it is not possible to save the new default exposure value.

PLEASE NOTE

It is not possible to save data when the "range of exposure field" exceeds the programmed exposure time limits.

(refer to example to the next page).

EXAMPLE

12" LONG CONE
(SSD = 31 cm)

CONVENTIONAL RADIOGRAPHIC TECHNIQUE
(FILM)

PREDEFINED DEFAULT EXPOSURE VALUES

ADULT																									
PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200	
70kV - 8mA																									
FILM D	MAXILLA												I	C P Bp	M	Op									
	MANDIBLE											I	C P Ba	M	-	Oa									
FILM E	MAXILLA										I	C P Bp	M	Op											
	MANDIBLE									I	C P Ba	M	-	Oa											
FILM F	MAXILLA									I	C P Bp	M	Op												
	MANDIBLE								I	C P Ba	M	-	Oa												

CUSTOMIZED EXPOSURE VALUES

	I	C P Bp	M	Op
I	C P Ba	M	-	Oa

THE RANGE OF EXPOSURE FIELD HAS BEEN REDUCED BY TWO STEPS.

ADULT																									
PROGRAMMED EXPOSURE TIMES (sec)		0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.320	0.400	0.500	0.630	0.800	1.000	1.250	1.600	2.000	2.500	3.200	
70kV - 8mA																									
FILM D	MAXILLA										I	C P Bp	M	Op											
	MANDIBLE									I	C P Ba	M	-	Oa											
FILM E	MAXILLA								I	C P Bp	M	Op													
	MANDIBLE							I	C P Ba	M	-	Oa													
FILM F	MAXILLA							I	C P Bp	M	Op														
	MANDIBLE						I	C P Ba	M	-	Oa														

RESTORING ORIGINAL VALUES

1. Turn the timer off.

2. Keep the key pressed turn the timer on.

OFF 3. On the display appears.

4. Release the key.

5. Press again the key.

ON 6. Appears on the display.

7. Turn the timer on and off.

★ ★ ★

DIAGNOSIS

With the "**xmind®dc**" radiographic system it is possible it visualize certain functional parameters.

To visualize them proceed as follows:

1. Press simultaneously and keep pressed the keys
   (17) MAXILLA MOLAR
   (47) MANDIBULARY MOLAR
2. Press the key associated to the parameter one wishes to:

KEY	DISPLAY PARAMETER
	RADIOGRAPHIC SYSTEM NOMINAL VOLTAGE
	LINE VOLTAGE
	SOFTWARE VERSION

ERROR MESSAGES

The following chart gives a list of error messages that may appear while the **"xmind®dc"** radiographic system is working.

The chart also includes the causes of the error messages and what to do to solve them.

ERROR MESSAGES	CAUSE	SOLUTION
E00	RX1 TUBEHEAD IS NOT CONNECTED OR IS OUT OF ORDER	CALL THE "AFTER SALES SERVICE"
E01	RX2 TUBEHEAD IS NOT CONNECTED OR IS OUT OF ORDER	CALL THE "AFTER SALES SERVICE"
E02	CORRUPTED EEPROM DATA	CALL THE "AFTER SALES SERVICE"
E03	EEPROM DATA NOT SAVED PROPERLY	CALL THE "AFTER SALES SERVICE"
E05	LINE VOLTAGE VALUE NOT INCLUDED WITHIN THE SET LIMITS	CALL THE "AFTER SALES SERVICE"
E07	LINE VOLTAGE VALUE NOT INCLUDED WITHIN THE ±15% NOMINAL VALUE	CALL THE "AFTER SALES SERVICE"
E08	THE X-RAY KEY ALWAYS SEEMS TO BE PRESSED	MAKE SURE IT IS NOT JAMMED
E09	ANOMALY IN THE CONTROL PANEL	CALL THE "AFTER SALES SERVICE"
E12	THE EXPOSURE HAS BEEN PREMATURELY INTERRUPTED	KEEP THE X-RAY KEY PRESSED TILL THE END OF THE EXPOSURE
E20	ANOMALY IN THE TRIAC/RELAY	CALL THE "AFTER SALES SERVICE"
E21	ANOMALY IN THE ELECTRONIC CIRCUIT	CALL THE "AFTER SALES SERVICE"
E22	ANOMALY IN THE CONTROL CIRCUIT	CALL THE "AFTER SALES SERVICE"
E23	INCORRECT DIP-SWITCH CONFIGURATION	CALL THE "AFTER SALES SERVICE"
E24	THE CONTROL BUTTON DOES NOT CORRESPOND TO THE SELECTED TUBEHEAD	CALL THE "AFTER SALES SERVICE"
E30	THE TUBEHEAD DOES NOT WORK PROPERLY	CALL THE "AFTER SALES SERVICE"
E32	THE TUBEHEAD IS NOT IN THE CORRECT MODE	CALL THE "AFTER SALES SERVICE"
E33	THE TUBEHEAD HAS NOT COMPLETED THE EXPOSURE	REPEAT THE EXPOSURE CALL THE "AFTER SALES SERVICE"
E40	PROBLEM IN THE FREQUENCY OR REGULATION	CALL THE "AFTER SALES SERVICE"
E41	THE TUBEHEAD IS NOT CALIBRATED	CARRY OUT WITH THE CALIBRATION CALL THE "AFTER SALES SERVICE"
E42	EEPROM DATA NOT SAVED PROPERLY	CALL THE "AFTER SALES SERVICE"
E43	CORRUPTED EEPROM DATA	CALL THE "AFTER SALES SERVICE"
E44	OVERVOLTAGE ERROR	CALL THE "AFTER SALES SERVICE"
E45	ANODE VOLTAGE OUT OF TOLERANCE	CALL THE "AFTER SALES SERVICE"
E46	ANODE CURRENT OUT OF TOLERANCE	CALL THE "AFTER SALES SERVICE"
E47	CONTROL CONNECTOR	CALL THE "AFTER SALES SERVICE"
E48	PROBLEM IN THE REFERENCE VOLTAGE	CALL THE "AFTER SALES SERVICE"
ERR	MAJOR ERROR	CALL THE "AFTER SALES SERVICE"

SYSTEM TECHNICAL DATA

POWER SUPPLY CHARACTERISTICS

TYPE OF POWER SUPPLY	**Single phase alternate**	
NOMINAL VOLTAGE	**230 V**	**115 V**
MAXIMUM VOLTAGE VARIATION	**± 15%**	**± 15%**
NOMINAL CURRENT	**6 A**	**11 A**
FREQUENCY	**50/60 Hz**	**50/60 Hz**
ABSORBED POWER	**1.4 kVA**	**1.4 kVa**
APPARENT LINE RESISTANCE	**0.5 Ω**	**0.5 Ω**
PROTECTION FUSES (F1-F2-F3-F4)	**8AF - 250V**	**12.5AF - 250V**
CIRCUIT PROTECTION FUSES	**(F5) - no. 1 630 mA - 125 V** **(F6) - no. 1 500 mA - 125 V**	

TECHNICAL DATA OF THE RADIOGRAPHIC SYSTEM

GENERATOR	**At constant potential**
NOMINAL HIGH VOLTAGE	**60 kV - 70 kV**
NOMINAL CURRENT	**4 mA - 8 mA**
NOMINAL ELECTRIC POWER AT 0.1 sec	**560 W (70 kV - 8 mA)** **480 W (60 kV - 8 mA)** **280 W (70 kV - 4 mA)** **240 W (60 kV - 4 mA)**
REFERENCE CURRENT-TIME PRODUCT	**0.8 mAs - 8 mA - 0.1 sec** **0.4 mAs - 4 mA - 0.1 sec**
INTENSITY OF RADIATION IN THE AIR	**> 30 uGy/mAs at 1 meter away from focal**
TOTAL FILTRATION	**2 mm Al at 70 kV**
HALF VALUE LAYER (HVL) AT 70 kV	**> 1.6 mm Al**
LEAKAGE RADIATION	**< 0.25 mGy/h to 1 meter away from focal spot**
LINEARITY	**10%**
REPRODUCIBILITY	**0.05**
ELECTRICAL CLASSIFICATION	**Class I - Type B - intermittent service**

MEASUREMENT CONDITIONS

kVp	**Non-invasive measurement**
mA	**Direct measurement with digital instrument**
EXPOSURE TIME (sec)	**Non-invasive measurement**

ACCURANCY OF TECHNICAL DATA

NOMINAL VOLTAGE OF X-RAY TUBE	**± 10%**
NOMINAL CURRENT OF THE X-RAY TUBE	**± 10%**
SELECTED EXPOSURE TIME	**± 0.005 - 0.020 sec ≤ t ≤ 0.1 sec** **± 10% - 0.125 sec ≤ t ≤ 3.2 sec**

WEIGHT

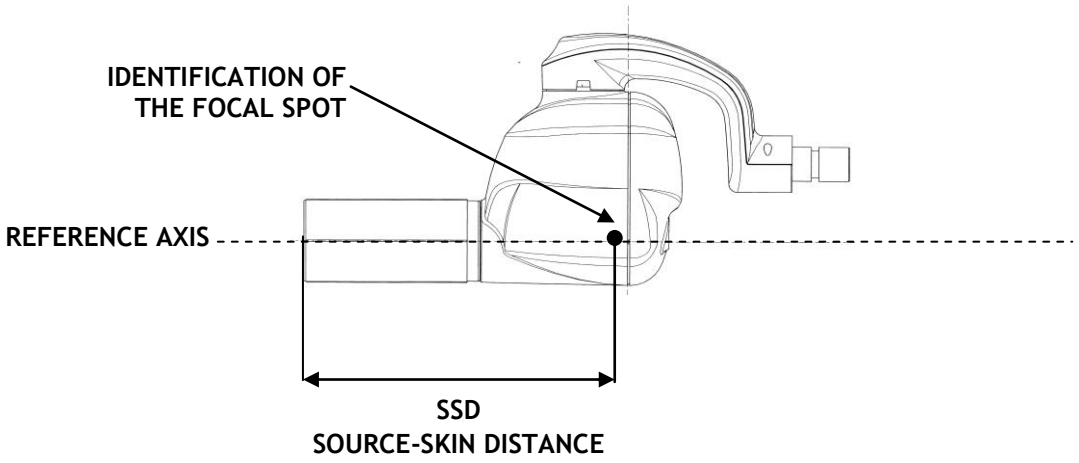
TOTAL WEIGHT	**19.5 kg**
WEIGHT OF TUBEHEAD	**5.5 kg**

ENVIRONMENTAL CHARACTERISTICS

OPERATIVE TEMPERATURE	**+5°C - +40°C**
WAREHOUSE TEMPERATURE	**-15°C - +50°C**
HUMIDITY	**25% - 75%**

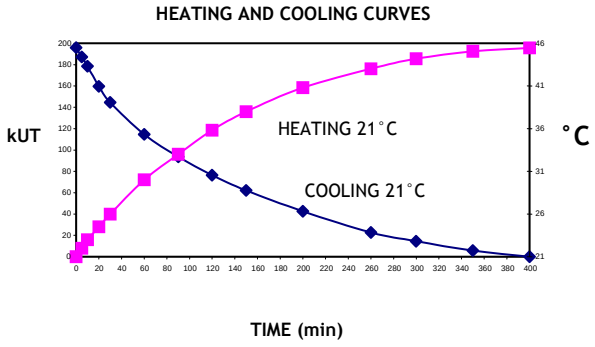
TECHNICAL DATA OF THE CONE

SOURCE-SKIN DISTANCE (SSD)	
SHORT CONE	**20 cm (8”)**
LONG CONE	**31 cm (12”)**
RECTANGULAR CONE	**31 cm (12”)**
DISTANCE OF X-RAY BEAM	
SHORT CONE	**≤ 60 mm**
LONG CONE	**≤ 60 mm**
RECTANGULAR CONE	**44 x 35 mm**



THERMAL CHARACTERISTICS OF THE TUBEHEAD

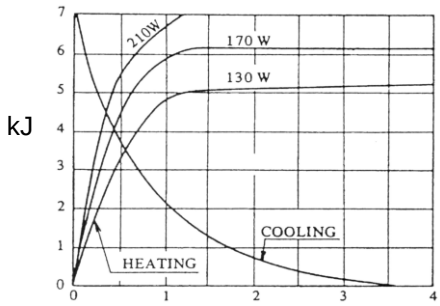
TUBEHEAD'S HEAT ACCUMULATION CAPACITY	**140 kJ (196 kUT)**
MAXIMUM COOLING SPPED	**1.2 kJ/min (1.8 kUT/min)**



TECHNICAL DATA OF THE X-RAY TUBE

X-RAY TUBE	**TOSHIBA DG-073-DC**
SIZE OF FOCAL SPOT	**0.7 in compliance with IEC 336/1993**
NOMINAL ANODE VOLTAGE	**70 kV**
NOMINAL ANODE CURRENT	**8 mA**
NOMINAL ANODE POWER	**560 W**
EXPOSURE TIME	**0.020 sec ÷ 3.2 sec (23 steps)**
NOMINAL HIGH VOLTAGE and MAXIMUM CURRENT	**(70 kV - 8 mA) ± 10%**
TUBE INHERENT FILTRATION	**0.8 mm Al at 70 kV**
ANODE MATERIAL	**Tungsten**
ANODE INCLINATION	**20°**
ANODE HEAD LOAD	**7 kJ (10 kUT)**
MAXIMUM CONTINUOUS HEAT DISSIPATION	**17.5 W**
OPERATING CYCLE	**1:32**

ANODE THERMAL CHARACTERISTICS



TIME (min)

RECOMMENDED MAINTENANCE

In order to guarantee safety of the radiographic system, it is necessary to set up a maintenance schedule.

The owner is responsible for organising and observing a maintenance schedule which must be executed by qualified technicians able to certify their work with a “Conformity Declaration”.

CAUTION

Run an inspection on the radiographic system and on its operation when it is installed and every twelve months.

Once a year, lubricate the pins and bushes of the wall plate and the positioning arm, as specified.

(refer to INSTALLATION & MAINTENANCE MANUAL).

WARNING

Do not lose the adjustment key that comes with the system, since, in time, it could become necessary to make readjustments.

WARNING

If the parts should become hard to move or should squeak, call the “After Sales Service”.

CLEANING THE OUTER SURFACE

Use a soft cloth dampened with water and soap to clean the outer surfaces.

The spacer cone may be cleaned with cotton wool soaked with surgical alcohol.

REPAIRS

In case of a malfunction, send the defective part using the original packaging to:

de Götzen® S.r.l.
Via Roma 45
21057 OLGIATE OLONA VA ITALY

Tel. +39 0331 376760 r.a.
Fax +39 0331 376763

E-mail: degotzen@degotzen.com

DISPOSAL

The use of the WEEE symbol  indicates that this product may not be treated as household waste, but must be treated separately, in conformity to the 2002/96/CE Directive.

By ensuring this product is disposed of correctly, you will help to protect the environment.

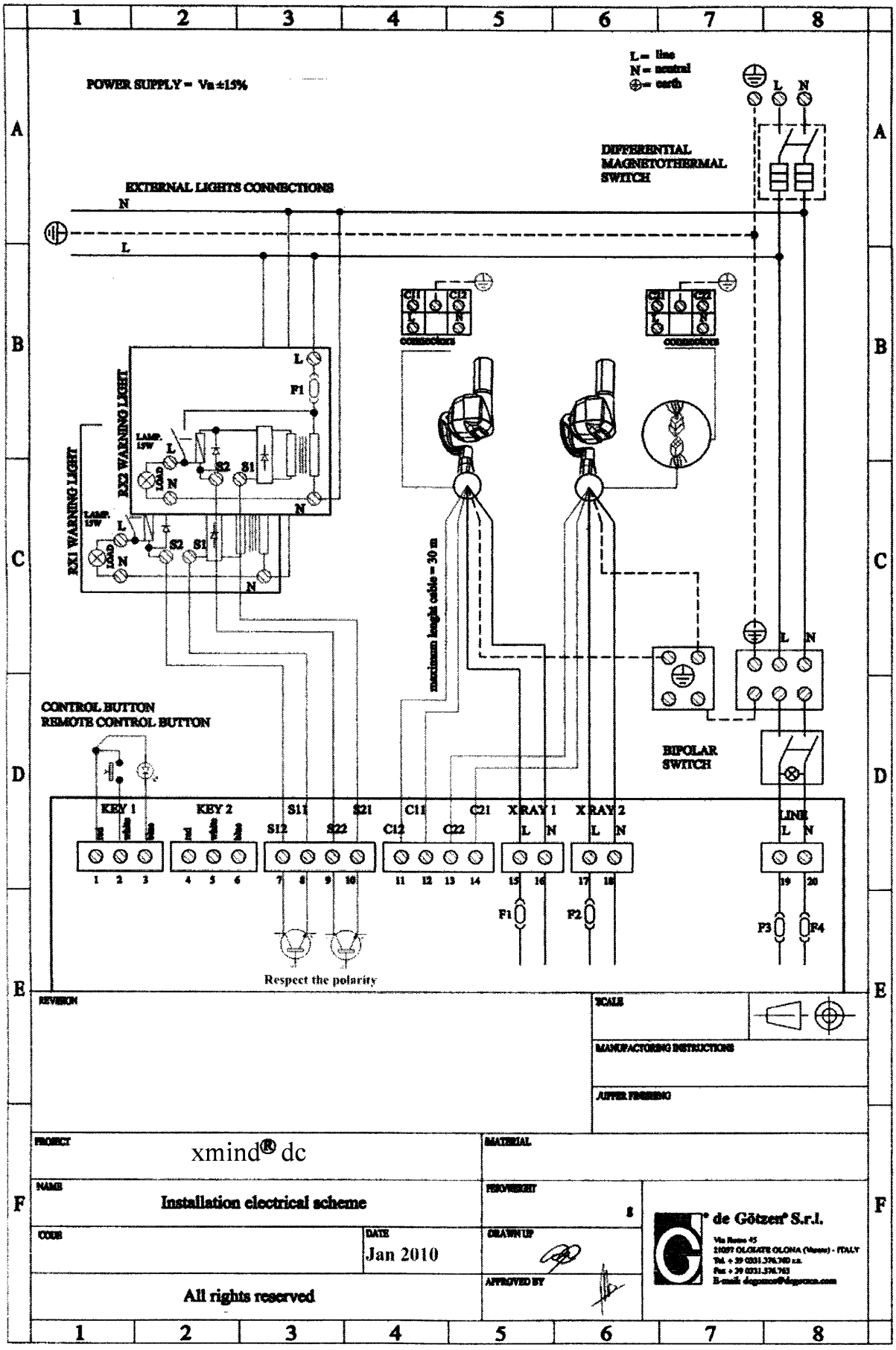
For more detailed information about the recycling of this product, please contact your local authority, your house waste disposal service provider or the dealer from whom you purchased the product.

CAUTION

To avoid any risk of environmental contamination, do not dispose of the device and its accessories with the household waste materials.

ATTACHMENTS

The manufacturer undertakes to supply, upon request, drawings, circuit diagrams, component parts lists, instructions or other information needed by qualified technical personnel to perform repairs on those parts of the "**xmind®dc**" radiographic system which may be repaired.


L = line
N = neutral
⊕ = earth
POWER SUPPLY = Vn ±15%
DIFFERENTIAL MAGNETOTHERMAL SWITCH
EXTERNAL LIGHTS CONNECTIONS
N
L
EX2 WARNING LIGHT
EX1 WARNING LIGHT
LAMP. 15W
LOAD
F1
S1
S2
maximum length cable = 30 m
CONTROL BUTTON
REMOTE CONTROL BUTTON
BIPOLAR SWITCH
KEY 1
KEY 2
S11
S21
S12
S22
C11
C21
C12
C22
X RAY 1
X RAY 2
LINE
F2
F3
F4
Respect the polarity
REVISION
SCALE
MANUFACTORING INSTRUCTIONS
JUPPER FIGHING
PROJECT
xmind® dc
MATERIAL
NAME
Installation electrical scheme
FOG/WEIGHT
CODE
DATE
Jan 2010
DRAWN UP
APPROVED BY
All rights reserved
de Götzen S.r.l.