



# BASIC 100-15 100-30

MOBILE RADIOGRAPHIC UNIT

## USER'S MANUAL



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## GENERAL INDEX

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# GENERAL Description

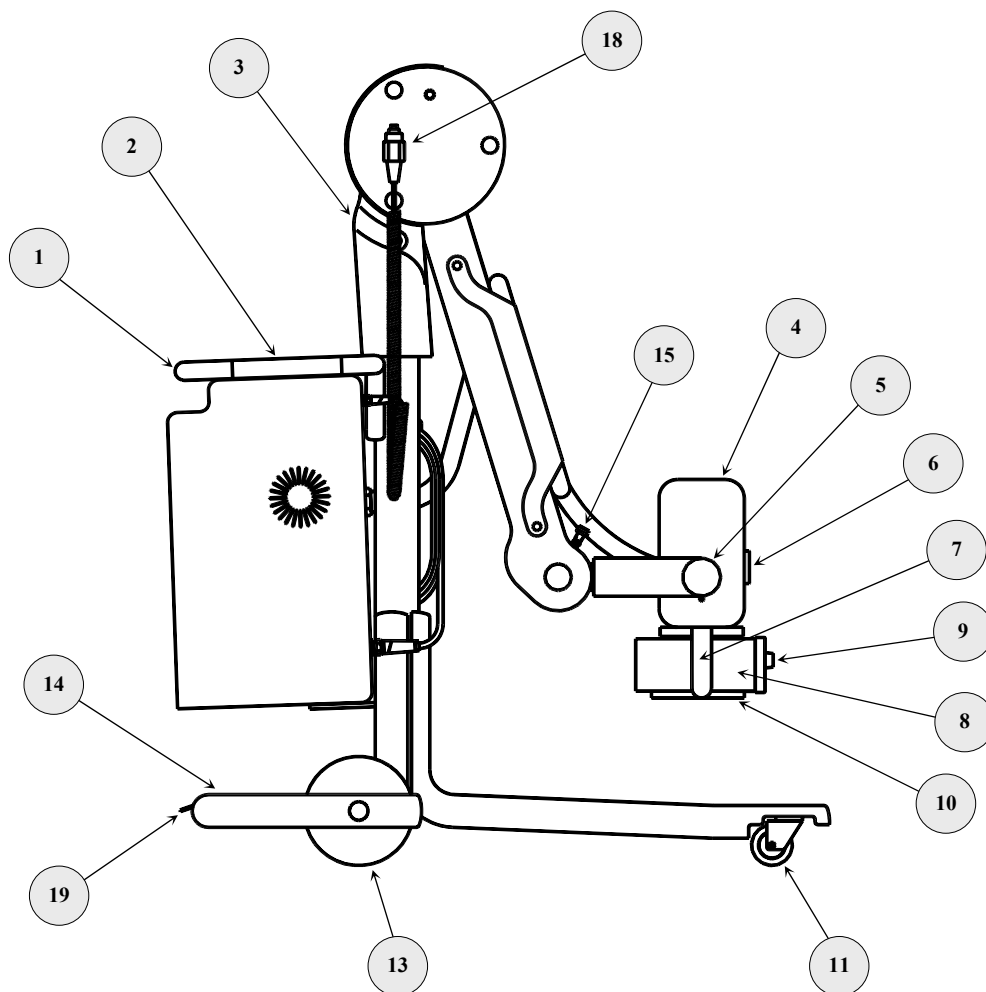
## 1 GENERAL DESCRIPTION

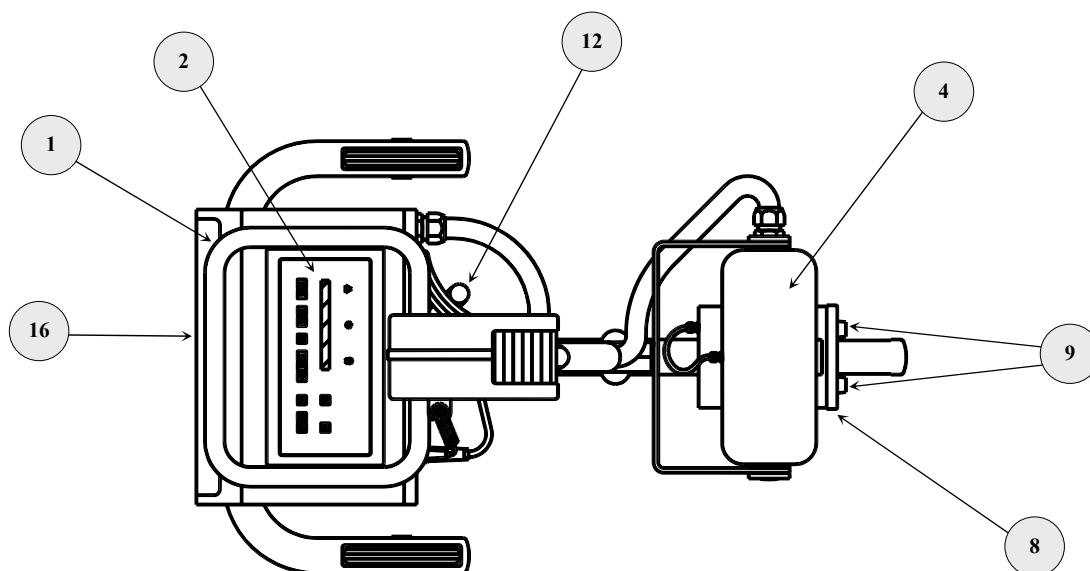
### 1.1 APPLICATIONS AND USE

The equipment is a **MOBILE RADIOGRAPHIC UNIT** for radiography on X-ray film, that may be used in different places and situations: operating theatre, orthopedics, intensive care, emergency room.

## 2 COMPOSITION

### 2.1 MOBILE RADIOGRAPHIC UNIT



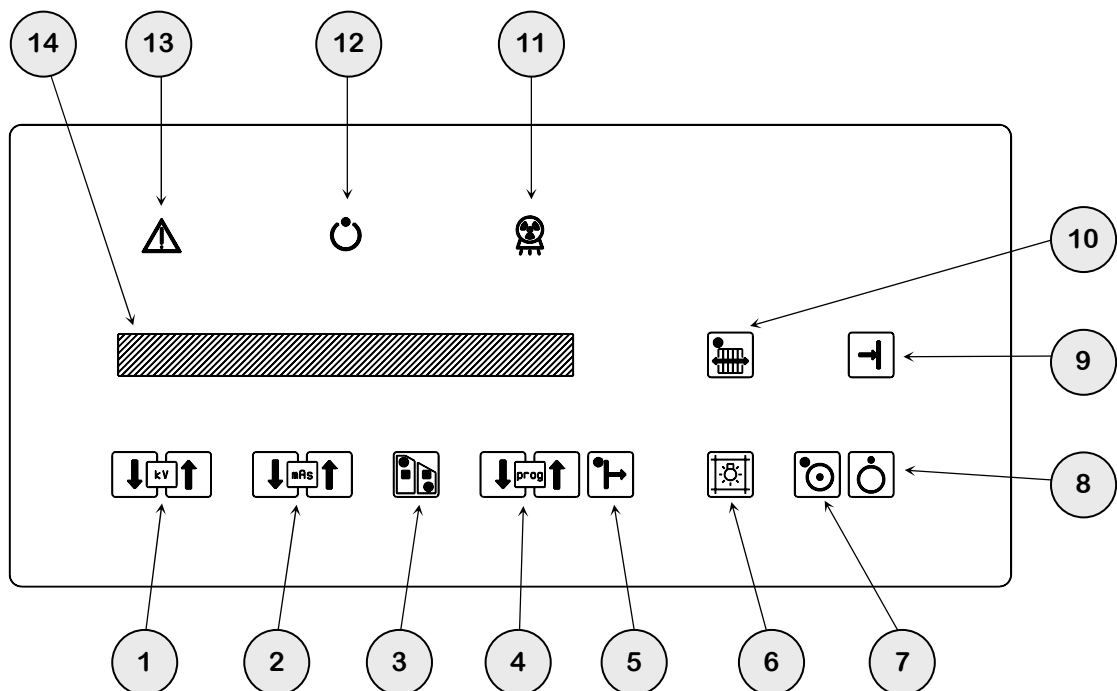


















### MOBILE RADIOGRAPHIC UNIT

<b>1</b>	Transport handle with brake	<b>11</b>	Pivoting wheel (front wheel)
<b>2</b>	Control panel	<b>12</b>	Power supply cable holder
<b>3</b>	Handle for tilting (optional)	<b>13</b>	Wheels (main wheel)
<b>4</b>	X-ray tube head	<b>14</b>	Support for Tilting
<b>5</b>	Lateral goniometer	<b>15</b>	Pantograph arm lock
<b>6</b>	Front goniometer	<b>16</b>	Cassette holder
<b>7</b>	X-ray tube head positioning handle	<b>...</b>	
<b>8</b>	Collimator	<b>18</b>	X-ray control pushbutton
<b>9</b>	Adjustment of collimator diaphragms	<b>19</b>	Pedal for Stationary brake
<b>10</b>	Rail for filters and accessories		



### 2.2 CONTROL PANEL



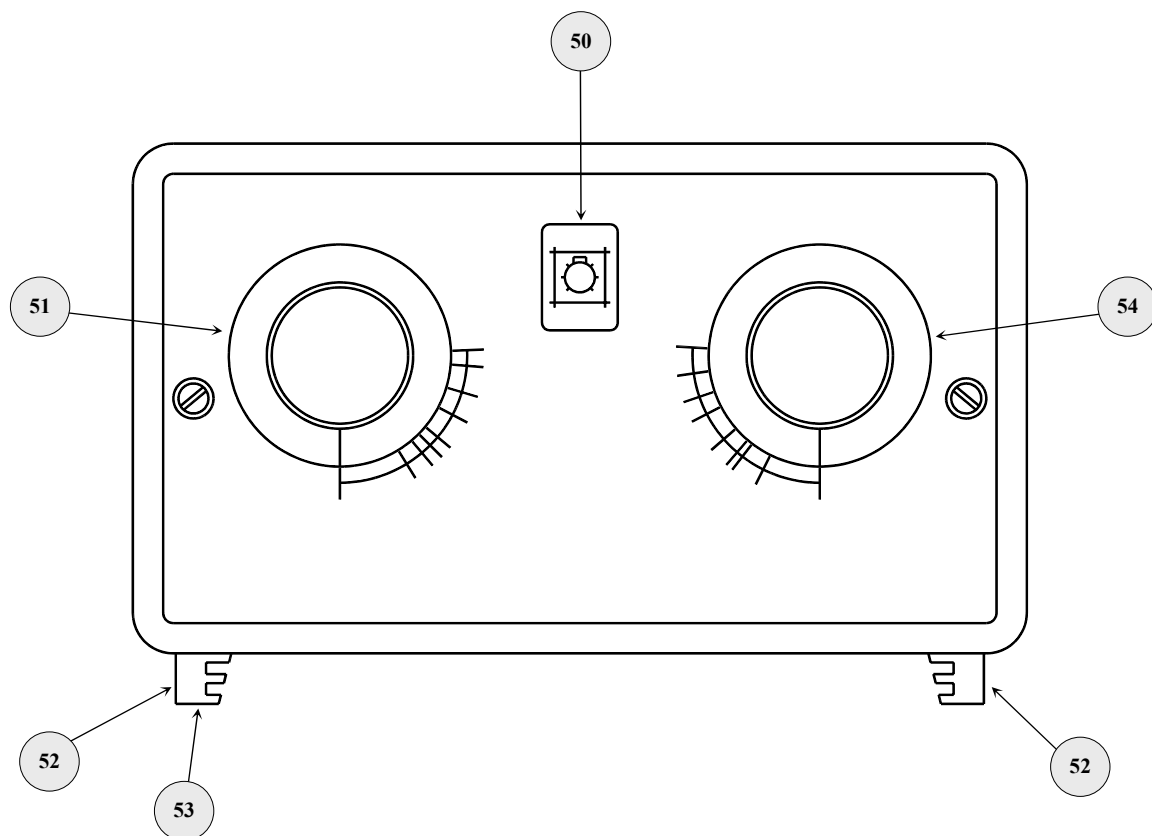
- |   |   |    |  |
|---|---|----|--|
| 1 | <br><b>kV</b> < kV decrease<br><br>< kV increase                      | 7  |  < Unit <b>ON</b>                       |
| 2 | <br><b>mAs</b> < mAs decrease<br><br>< mAs increase                   | 8  |  < Unit <b>OFF</b>                      |
| 3 |  < HP/LP <sup>(1)</sup> Power selection  | 9  |  < Data storage in anatomical technique |
| 4 | <br><b>Prog</b> < N° of exams memorized in Technique Anatomical<br> | 10 |  < Potter-Bucky selection               |
| 5 |  < Anatomical Technique Selection  | 11 |  < X-Ray exposure                       |
| 6 |  < Collimator light activation   | 12 |  < X-Ray ready                          |
|   |   | 13 |  < Alarm signalling                   |
|   |   | 14 | < Display for Dates and Messages   |

(1) A change of the Power level involves a change of the used focal spot:

- High Power (HP) – Big Focus
- Low Power (LP) – Small Focus

In the following paragraphs the abbreviations **HP** and **LP** will be used.

### 2.3 COLLIMATOR



#### COLLIMATOR

<b>50</b>	Collimator light on	<b>53</b>	Retractable meter
<b>51</b>	Adjustment of transverse diaphragm	<b>54</b>	Adjustment of longitudinal diaphragm
<b>52</b>	Rail for filters and accessories		

## 3 TECHNICAL DATA

### 3.1 CLASSIFICATION OF THE APPARATUS

#### CLASSIFICATION – EN 60601 1 § 5

- ➡ Type of protection against short circuit: **CLASS I**
- ➡ Degree of protection against direct and indirect contact: **TYPE B**
- ➡ Use conditions: **CONTINUOUS WORKING WITH INTERMITTENT LOAD**
- ➡ Unit not to be used in the presence of an inflammable anaesthetic mixture with air or nitrous oxide

#### CLASSIFICATION – 93/42/EEC DIRECTIVE



- ➡ In according with Annex IX: **CLASS II b**

### 3.2 TECHNICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS				
SINGLE PHASE VOLTAGE		230 Vac $\pm$ 10%, 16 A (Optional: 115 Vac $\pm$ 10%)		
FREQUENCY		50/60 Hz		
MAX ABSORBED CURRENT	STAND-BY WORKING	1 A (115 Vac: 2.5 A)		
	RADIOGRAPHY WORKING	12 A (115 Vac: 23 A)		
LINE COMPENSATION		Automatic		
LINE RESISTANCE		< 2.5 $\Omega$		
Radiological characteristics				
	15 kW		30 kW	
	LP (Low Power)	HP (High Power)	LP (Low Power)	HP (High Power)
MAX POWER	7.5 kW	15 kW	7.5 kW	30 kW
MAX CURRENT IN RADIOGRAPHY	150 mA	375 mA	150 mA	425 mA
EXPOSURE TIME	3 ms $\div$ 1.3 s	1 ms $\div$ 0.6 s	3 ms $\div$ 1.3 s	1 ms $\div$ 0.5 s
	Selected by the processor according to the mAs			
WORKING FREQUENCY	100 kHz			
RANGE kV	40 $\div$ 125 (Step of 1 kV)			
RANGE mAs	0.5 $\div$ 200 in 25 values			
A.T. PILOTAGE	Inverter driven by IGBT			
RIPPLE	$\leq$ 3% at Max Power			
TOTAL FILTRATION	> 2.7 mmAl			
RISE TIME	$\leq$ 1 ms			

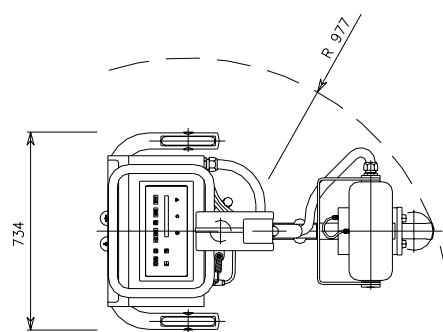
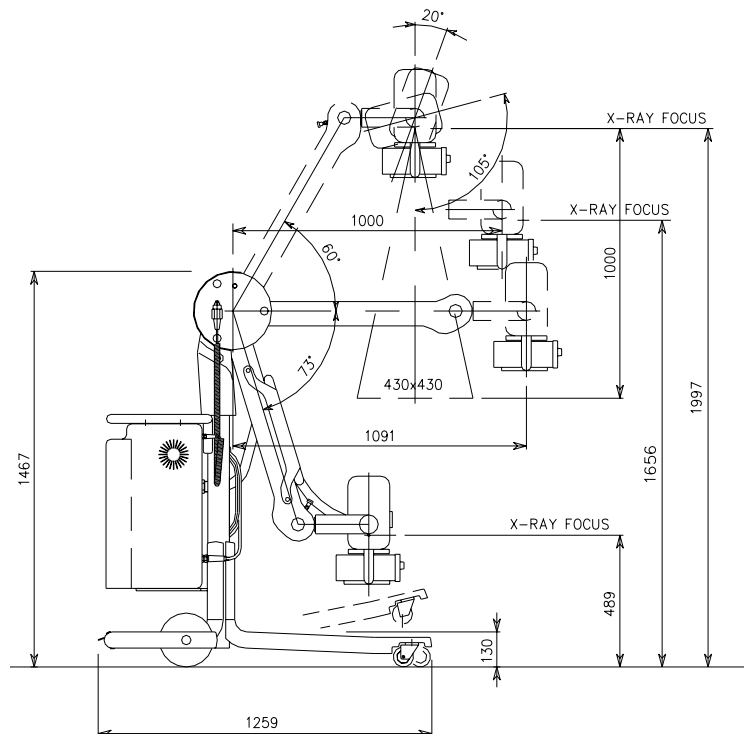
# USER'S MANUAL

## GENERAL DESCRIPTION

X-RAY TUBE HEAD		
TYPE OF ANODE		Rotation with speed 3000 RPM
FOCAL SPOTS		0.6 mm
		1.3 mm
All the other information relevant to the X-Ray Tube Head and to the X-Ray Tube can be found in the X-Ray Tube Head Technical Data Sheet		
Collimator (optional)		
SHUTTERS TO MULTIPLE PLANS		Parallels and perpendicular with manual movement
All the other information relevant to the Collimator can be found in the relative Technical Data Sheet		
Dosimeter (optional)		
MODEL		Kermax-plus      VacuDap 2000 with printer optional
ACTIVE AREA		146 x 146 mm <sup>2</sup> 147 x 147 mm <sup>2</sup>
MINIMAL DOSE RESOLUTION		1 mGycm <sup>2</sup> 1 mGycm <sup>2</sup>
MAXIMAL MEASURABLE DOSE		9999.9999 mGycm <sup>2</sup> 9999.9999 mGycm <sup>2</sup>
OPERATING MODES AND FUNCTIONALITY		
INTERFACE USER		Polycarbonate flat keyboard with alphanumeric LCD display for all the operative parameters and messages of possible anomalous conditions – administrated by a microprocessor.
OPERATING MODES	RADIOGRAPHY	Two-points techniques (kV-mAs)
		40 programmable anatomic technique (20 for LP and 20 for HP)
X-RAY CONTROL		Distance control with double – click and extensible cable (≥4m)
SAFETY	Filament current	
	mA <sub>min</sub> and mA <sub>max</sub>	
	Maximum exposure time	
	Temperature maximum X-ray tube head	
	Count thermal units X-ray tube head	
	Max kV, min kV, max ΔkV, max I	
	Anode rotation	
	Microprocessor self – test	
TRANSPORT AND STORAGE CONDITIONS		
MAXIMAL TEMPERATURE		–10°C ÷ 55°C
RECOMMENDED TEMPERATURE		0°C ÷ 40°C
RELATIVE HUMIDITY		20% ÷ 90%
ATMOSPHERIC PRESSURE		500 hPa ÷ 1060 hPa
OPERATING CONDITIONS		
TEMPERATURE		10°C ÷ 40°C
RELATIVE HUMIDITY		30% ÷ 75%
ATMOSPHERIC PRESSURE		700 hPa ÷ 1060 hPa

MECHANICAL CHARACTERISTICS	
WIDTH	734 mm
LENGHT	1259 mm
HEIGHT	1467 mm
MIN SOURCE-FLOOR DISTANCE	489 mm
MAX SOURCE-FLOOR DISTANCE	1997 mm
MAX RANGE	1091 mm
FOCUS MAXIMUM HEIGHT, WITH RANGE 1000 MM	1656 mm
PIVOTING FRONT WHEEL Ø 75	360°
MAXIMUM DIFFERENCE IN LEVEL WHICH CAN BE OVERCOME WITH TILTING	25 mm
BACK WHEELS DIAMETER	Ø 200
MINIMUM DEFLECTING RAY	977 mm
WEIGHT	191 kg (115 Vac: 205 kg)
MOVEMENT	Manual
CASSETTE HOLDER 35x43	4

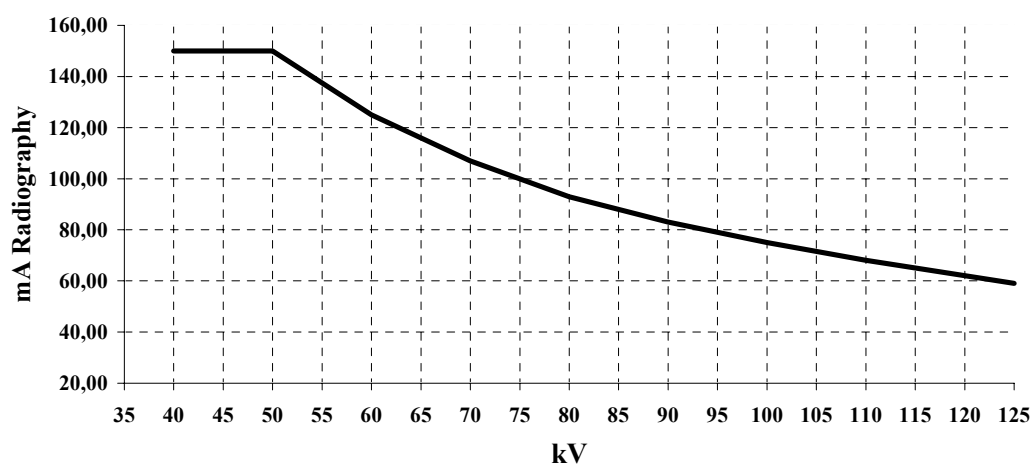
### 3.2.1 DIMENSIONS AND WEIGTHS



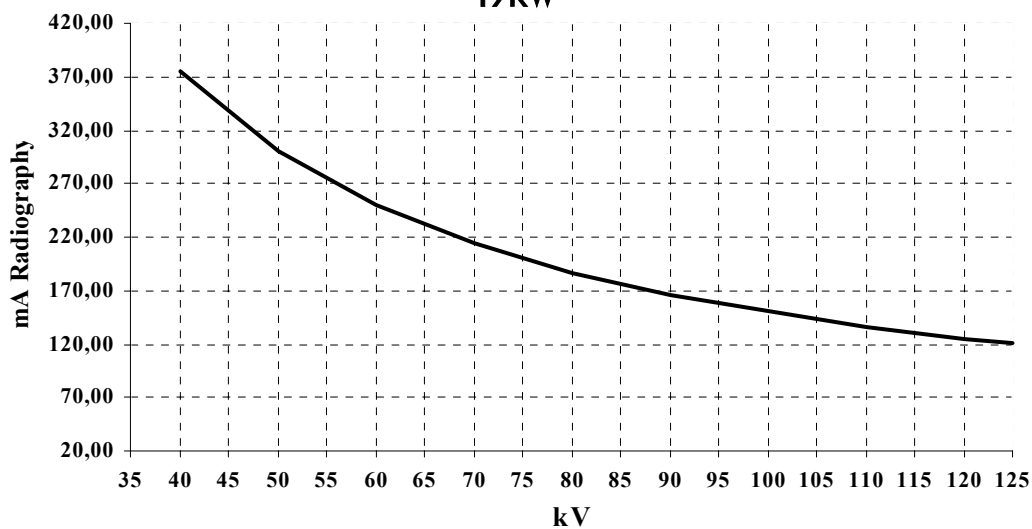
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### 3.2.2 kV – mA RELATIONSHIP

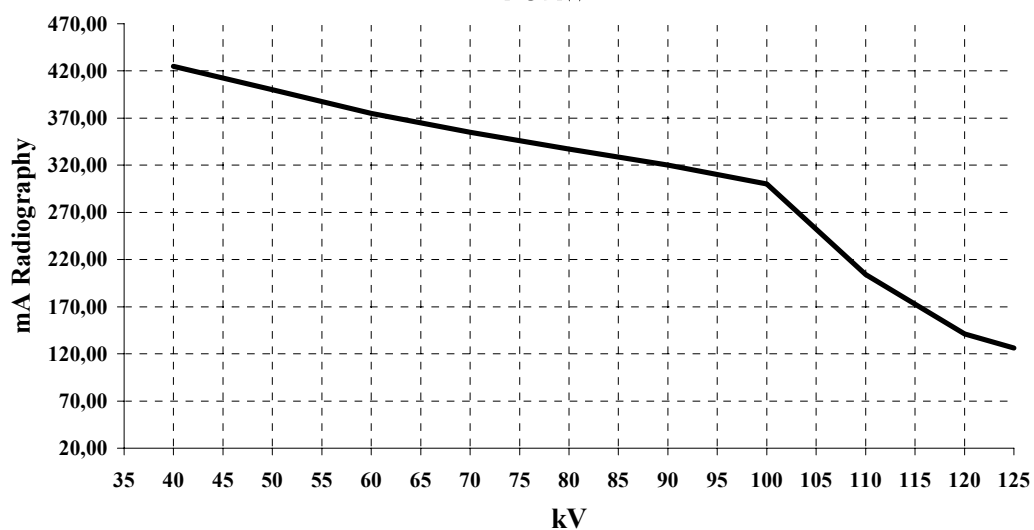
kV - mA RELATIONSHIP in Radiography mode -  
7.5kW



kV - mA RELATIONSHIP in Radiography mode -  
15kW



kV - mA Relationship in Radiography mode -  
30kW





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## GENERAL DESCRIPTION

### 3.2.3 RX EXPOSURE TIME

In the following tables the exposure times (s) associated to kV and mAs are reported. Since the apparatus is a device functioning with a two point technique (kV and mAs) we remind that the values indicated in the table are merely theoretical and can undergo a variation in relation to the tolerance of the mA.

TABLE 1 – 7.5kW POWER

mAs \ kV	0,5	1	1,3	1,6	2	2,5	3,2	4	5	6,3	8	10	13	16	20	25	32	40	50	63	80	100	130	160	200
40 (150mA)	0,003	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,033	0,042	0,053	0,066	0,086	0,106	0,133	0,166	0,213	0,266	0,333	0,420	0,533	0,666	0,866	1,066	1,333
50 (150mA)	0,003	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,033	0,042	0,053	0,066	0,086	0,106	0,133	0,166	0,213	0,266	0,333	0,420	0,533	0,666			
60 (125mA)	0,004	0,008	0,010	0,012	0,016	0,020	0,025	0,032	0,040	0,050	0,064	0,080	0,104	0,128	0,160	0,200	0,256	0,320	0,400	0,504	0,640				
70 (107mA)	0,004	0,009	0,012	0,014	0,018	0,023	0,029	0,037	0,046	0,058	0,074	0,093	0,121	0,149	0,186	0,233	0,299	0,373	0,467	0,588					
80 (93mA)	0,005	0,010	0,013	0,017	0,021	0,026	0,034	0,043	0,053	0,067	0,086	0,107	0,139	0,172	0,215	0,268	0,344	0,430	0,537	0,677					
90 (83mA)	0,006	0,012	0,015	0,019	0,024	0,030	0,038	0,048	0,060	0,075	0,096	0,120	0,156	0,192	0,240	0,301	0,385	0,481	0,602						
100 (75mA)	0,006	0,013	0,017	0,021	0,026	0,033	0,042	0,053	0,066	0,084	0,106	0,133	0,173	0,213	0,266	0,333	0,426	0,533	0,666						
110 (68mA)	0,007	0,014	0,019	0,023	0,029	0,036	0,047	0,058	0,073	0,092	0,117	0,147	0,191	0,235	0,294	0,367	0,470	0,588							
120 (62mA)	0,008	0,016	0,020	0,025	0,032	0,040	0,051	0,064	0,080	0,101	0,129	0,161	0,209	0,258	0,322	0,403	0,516	0,645							
125 (59mA)	0,008	0,017	0,022	0,027	0,034	0,042	0,054	0,068	0,085	0,107	0,136	0,169	0,220	0,271	0,339	0,424	0,542	0,678							

TABLE 2 – 15kW POWER

mAs \ kV	0,5	1	1,3	1,6	2	2,5	3,2	4	5	6,3	8	10	13	16	20	25	32	40	50	63	80	100	130	160	200
40 (375mA)	0,001	0,002	0,003	0,004	0,005	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,034	0,042	0,053	0,066	0,085	0,106	0,133	0,168	0,213	0,266	0,346	0,426	0,533
50 (300mA)	0,001	0,003	0,004	0,005	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,033	0,043	0,053	0,066	0,083	0,106	0,133	0,166	0,210	0,266	0,333	0,433	0,533	
60 (250mA)	0,002	0,004	0,005	0,006	0,008	0,010	0,012	0,016	0,020	0,025	0,032	0,040	0,052	0,064	0,080	0,100	0,128	0,160	0,200	0,252	0,320	0,400	0,520		
70 (214mA)	0,002	0,004	0,006	0,007	0,009	0,011	0,014	0,018	0,023	0,029	0,037	0,046	0,060	0,074	0,093	0,116	0,149	0,186	0,233	0,294	0,373	0,467	0,607		
80 (187mA)	0,002	0,005	0,006	0,008	0,010	0,013	0,017	0,021	0,026	0,033	0,042	0,053	0,069	0,085	0,106	0,133	0,171	0,213	0,267	0,336	0,427	0,534			
90 (166mA)	0,003	0,006	0,007	0,009	0,012	0,015	0,019	0,024	0,030	0,037	0,048	0,060	0,078	0,096	0,120	0,150	0,192	0,240	0,301	0,379	0,481	0,602			
100 (150mA)	0,003	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,033	0,042	0,053	0,066	0,086	0,106	0,133	0,166	0,213	0,266	0,333	0,420	0,533				
110 (136mA)	0,003	0,007	0,009	0,011	0,014	0,018	0,023	0,029	0,036	0,046	0,058	0,073	0,095	0,117	0,147	0,183	0,235	0,294	0,367	0,463	0,588				
120 (125mA)	0,004	0,008	0,010	0,012	0,016	0,020	0,025	0,032	0,040	0,050	0,064	0,080	0,104	0,128	0,160	0,200	0,256	0,320	0,400	0,504					
125 (121mA)	0,004	0,008	0,011	0,013	0,016	0,021	0,026	0,033	0,041	0,052	0,066	0,082	0,107	0,132	0,165	0,207	0,264	0,331	0,413	0,521					

**TABLE 3 – 30kW POWER**

<b>kV \ mAs</b>	<b>0,5</b>	<b>1</b>	<b>1,3</b>	<b>1,6</b>	<b>2</b>	<b>2,5</b>	<b>3,2</b>	<b>4</b>	<b>5</b>	<b>6,3</b>	<b>8</b>	<b>10</b>	<b>13</b>	<b>16</b>	<b>20</b>	<b>25</b>	<b>32</b>	<b>40</b>	<b>50</b>	<b>63</b>	<b>80</b>	<b>100</b>	<b>130</b>	<b>160</b>	<b>200</b>
<b>40</b> <i>(425mA)</i>	0,001	0,002	0,003	0,003	0,004	0,005	0,007	0,009	0,011	0,014	0,018	0,023	0,030	0,037	0,047	0,058	0,075	0,094	0,117	0,148	0,188	0,235	0,305	0,376	0,470
<b>50</b> <i>(400mA)</i>	0,001	0,002	0,003	0,004	0,005	0,006	0,008	0,010	0,012	0,015	0,020	0,025	0,032	0,040	0,050	0,062	0,080	0,100	0,125	0,157	0,200	0,250	0,325	0,400	
<b>60</b> <i>(375mA)</i>	0,001	0,002	0,003	0,004	0,005	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,034	0,042	0,053	0,066	0,085	0,106	0,133	0,168	0,213	0,266	0,346		
<b>70</b> <i>(355mA)</i>	0,001	0,002	0,003	0,004	0,005	0,007	0,009	0,011	0,014	0,017	0,022	0,028	0,036	0,045	0,056	0,070	0,090	0,112	0,140	0,177	0,225	0,281	0,366		
<b>80</b> <i>(337mA)</i>	0,001	0,002	0,003	0,004	0,005	0,007	0,009	0,011	0,014	0,018	0,023	0,029	0,038	0,047	0,059	0,074	0,094	0,118	0,148	0,186	0,237	0,296			
<b>90</b> <i>(320mA)</i>	0,001	0,003	0,004	0,005	0,006	0,007	0,010	0,012	0,015	0,019	0,025	0,031	0,040	0,050	0,062	0,078	0,100	0,125	0,156						
<b>100</b> <i>(300mA)</i>	0,001	0,003	0,004	0,005	0,006	0,008	0,010	0,013	0,016	0,021	0,026	0,033	0,043	0,053	0,066	0,083	0,106	0,133	0,166						
<b>110</b> <i>(204mA)</i>	0,002	0,004	0,006	0,007	0,009	0,012	0,015	0,019	0,024	0,030	0,039	0,049	0,063	0,078	0,098	0,122	0,156	0,196	0,245	0,308	0,392				
<b>120</b> <i>(141mA)</i>	0,003	0,007	0,009	0,011	0,014	0,017	0,022	0,028	0,035	0,044	0,056	0,070	0,092	0,113	0,141	0,177	0,226	0,283	0,354	0,446					
<b>125</b> <i>(126mA)</i>	0,004	0,008	0,010	0,013	0,016	0,020	0,026	0,032	0,040	0,050	0,063	0,079	0,103	0,127	0,159	0,198	0,254	0,317	0,397	0,500					

# USER'S MANUAL

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## GENERAL DESCRIPTION

White Page

# Safety AND Maintenance

# 1 SAFETY

## 1.1 INTRODUCTION

The aim of this manual is to provide qualified radiology technicians, medical and paramedical staff with operating instructions to make use of the radiographic unit simple and safe.

This apparatus emits X-RAYS and must **only** be used in compliance with the safety instructions indicated in this manual and must not be used for any other purposes than those foreseen.

The system must only be used by personnel with the necessary knowledge in the field of radiation protection and with the necessary training in use of X-ray apparatus.

Follow the indications given below very carefully:

- the apparatus must not be used when there are any electrical and/or mechanical faults;
- do not use the system when any signalling or alarm device of the system is not working properly;
- under no circumstances work with the unit in places saturated with vapours and/or flammable gases or explosives;
- any modification to the system must be authorised in writing by the **MANUFACTURER**;
- if you want to use the apparatus in combination with other equipment, components or modules, and when compatibility with the latter is not certain, it is indispensable to make sure that there is no danger to the patients and/or operating personnel. In this case, consult the manufacturer of the apparatus in question or an expert in the sector;
- like any other apparatus, the System must be used correctly. It also need **PERIODIC CHECKS AND MAINTENANCE** as specified under § 2.1 in this section;
- all maintenance, repair and/or modification work must be carried out by **PERSONNEL QUALIFIED AND AUTHORIZED** by the Manufacturing Company. The latter declines any responsibility for malfunctions caused by unauthorised interventions;
- the **MANUFACTURING COMPANY** of the apparatus declines any responsibility for damage to people and/or things caused by its improper use.

## 1.2 RESPONSIBILITY DECLARATION

Enclosed to the presente manual the **MANUFACTURER RESPONSIBILITY DECLARATION** (SEE ANNEX 1).

## 1.3 COMPLIANCE AND REFERENCE ADDRESS

For information relevant to the compliance make always reference to ANNEX 1.

## 1.4 SYSTEM SAFETY

### 1.4.1 MECHANICAL SAFETY

- ➡ For moving the unit only use the proper handle
- ➡ for tilting operations of the unit only use the proper handles and relative tail rotor control panel
- ➡ avoid hitting the unit against obstacles
- ➡ do not remove the protective casing of the apparatus except for maintenance work expressly foreseen and described in this USER'S MANUAL or in the SERVICE MANUAL.

### 1.4.2 ELECTRICAL SAFETY

- ➡ Make sure that the power supply socket where the apparatus is to be connected is approved for the foreseen voltage and current for use of the system
- ➡ the radiology system must not be used in rooms where there is the risk of explosion
- ➡ disconnect the installation from the mains before carrying out any cleaning, disinfection and/or sterilisation
- ➡ the cleaning and disinfection products for the installation can form explosive gaseous mixtures. It is compulsory to only use products which comply with the corresponding Standards in force
- ➡ take care not to spill conductive liquids on the apparatus as they would jeopardise operation and safety were they to penetrate to the inside
- ➡ always turn the apparatus off after use.

### 1.5 PROTECTION AGAINST IONISING RADIATION

Before carrying out any X-ray exposure, make sure that all the necessary precautions against radiation have been taken.

During radiation emission, the personnel in the X-ray room must respect the regulations in force regarding protection against radiation. For this, bear in mind the following rules:

- where necessary, use protective accessories against radiation;
- always use the special X-ray protective coats: an X-ray protective material equivalent to **0.35 mm of lead (0.35 mm Pb)** attenuates the radiation produced at **50 kV** by **99.95%** and at **100 kV** by **94.5%**;
- the best protection against radiation is distance: therefore keep as far away as possible both from the source of radiation and from the exposure object, also by using the suited exposure-push-button with its extensible cable;
- avoid moving or standing in the path of the rays;
- always use the smallest exposure range possible: the radiation dispersed largely depends on the volume of the object X-rayed;
- keep the patient's examination area the furthest away as possible from X-ray source.

### 1.6 RESIDUAL RISKS

The system is designed and constructed according to the strictest principles of compliance with safety requirements. However, there are residual risks due either to incorrect use of the apparatus or to deficiencies in the protective measures taken.

With regard to the risks due to incorrect use of the apparatus, please see the instructions and recommendations given in the points above and we underline that:

- ➡ The mobile unit has been designed and constructed so that it will not tilt over up to an angle of 10° to horizontal in transport position (SEE SECTION 3 - § 1). It is therefore advisable:
  - not to stand, move or place the mobile unit on surfaces with a slope of more than 10°
  - not to try to move the mobile unit with the brakes on
  - to take care to avoid any obstacles on the floor when moving the mobile unit (cables, steps and uneven levels of all kinds)

For the residual risks due to any defect in the protection measures taken, it must be remembered that:

- ➡ Protection against electric shocks is carried out by means connecting the metallic covering parts of the apparatus to earth: it is therefore necessary to periodically check – according to the **NORMAL MAINTENANCE PLAN** described under § 2.1 of this section – correct operation of the whole earthing circuit.



**Not taking notice of the unit alarms could cause overheating of the X-RAY TUBE HEAD: this overload could lead to loss of the means of insulation in the X-ray tube head itself at very high temperatures.**



**During apparatus movements, take care that the parts do not hit the patient or the operator.**



**Avoid very fast movements: the kinetic energy accumulated could be a hazard for personnel near the unit.**






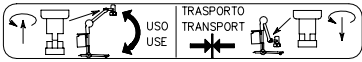




# USER'S MANUAL

## SAFETY AND MAINTENANCE

### 1.7 SIGNALS

#### 1.7.1 SYMBOLS USED

Apart from the symbol on the Control console, others have been used on the unit, as illustrated below.

SYMBOL	MEANING	POSITIONING
	<b>CAUTION: SEE THE ATTACHED DOCUMENTATION</b>	Cassette holder and panel of protection of the electronic group
	<b>RADIOGRAPHY</b>	Radiography pushbutton
	<b>X-RAY FOCUS POSITION</b>	X-ray tube head covering
	<b>TRANSPORT POSITION</b>	Pantograph arm
	<b>LOCKED MOVEMENT</b>	Pantograph arm
	<b>UNLOCKED MOVEMENT</b>	Pantograph arm
	<b>HIGH VOLTAGE</b>	Panel of protection of the electronic group
	<b>PROTECTIVE EARTH</b>	Equipotential bar

#### 1.7.2 LABELLING

Sample of the **IDENTIFYING LABELS** stuck on the X-ray unit is attached to the present manual (SEE ANNEX 2).

### 1.7.3 SIGNALLING AND ALARM MESSAGES

In the presence of the following alarms visualized on the display, the X-ray exposition is disqualified and the console's alarm red led light up. In case the alarm is also present after the execution of the suggested intervention, please contact the service assistance department.

MESSAGE	MEANING	INTERVENTION
<b>SUPPLY FAULT</b>	Error in the electronic system	Contact technical service
<b>KV FAULT</b>	During a radiograph the effective kV are less than 85% of those set: fault on the power circuit	Switching off the unit, switching it on and repeat the X-ray
<b>MA FAULT</b>	During an exposure the mA value is lower than the allowed limit	Switching off the unit, switching it on and repeat the X-ray
<b>FILAMENT FAULT</b>	No current in the filament	Switching off the unit, switching it on and repeat the X-ray
<b>THERMIC SAFETY</b>	X-ray tube head too higt	Wait for the X-ray tube head to cool down.
<b>STARTER FAULT</b>	Error in the x-ray tube stator power supply circuit	Contact technical service
<b>X-RAY LACKING</b>	Error in the high voltage generation circuit	Switching off the unit, switching it on and repeat exposure
<b>MAN STOP RX</b>	During a radiograph with cassette, the control pushbutton for X-ray command has been released early	Assess the validity of the image obtained and, if necessary, repeat the exposure.
<b>MAX TIME</b>	The unit has interrupted radiography exposure as the maximum exposure time allowed has been reached	Switching off the unit, switching it on and repeat exposure
<b>X-RAY TUBE TOO HOT</b>	It is not possible to begin exposure since the remaining thermal units available are too few	Wait for the X-ray tube to cool down.
<b>X-RAY COMMAND ACTIVE</b>	The operator has pressed the radiography command before the system had finished the initial control stage	Release the radiography pushbutton and wait until the system is ready
<b>INVERTER FAULT</b>	Fault into the inverter	Switching off the unit, switching it on and repeat exposure
<b>SWITCH OFF FOR 1 MIN</b>	Capacitors bank still loads	With the unit off wait 1 minute before switching it on
<b>BATTERY FAULT</b>	Power circuit fault	Contact technical service
<b>OVERVOLTAGE BATTERY</b>	Battery circuit fault	Contact technical service
<b>WAIT CONNECTION</b>	The keyboard does not communi- cate with the unit	Switching off the unit, switching it on and repeat exposure
<b>POTTER FAULT (only with Potter installed)</b>	Potter fault	Switching off the unit, switching it on and repeat exposure

## 2 MAINTENANCE

This manual only refers to routine maintenance. For special maintenance operations, interventions in the case of faults and/or replacement of components, the SERVICE MANUAL - SECTION 3 - § 2 must be consulted.

### 2.1 ROUTINE MAINTENANCE

#### 2.1.1 GENERAL RACOMMENDATIONS

The radiological system requires regular checks and maintenance. The following recommendations have the aim of helping the operator to keep the apparatus in good working and safe conditions during service.

The system contains mechanical parts subject to wear according to use: following prolonged use, wear on parts may decrease safety during use. For this reason, it is essential for the checking and maintenance operations indicated below to be carried out consistently to protect the operators and patients against any damage caused by mechanical breakdowns.

Correct adjustment of the electrical and electronic systems has a direct influence on the operation of the system, on the quality of the image and on the electrical safety of the system, as well as on the level of exposure to radiation the operators and patients are subjected to.

The **MAINTENANCE PROGRAMME**, described in the following paragraphs, consists of controls and interventions to be carried out by specialised personnel authorised by the manufacturer. All maintenance operations are the responsibility of the owner of the apparatus.



**Should it be necessary to replace components or parts which may in any way condition the safety of the machine, only use original spare parts.**

### 2.1.2 FREQUENT CHECKS AND INSPECTIONS

The operating personnel must be suitably trained to be able to carry out the daily and weekly checks indicated in TABLE 1.

The other controls described in this chapter and the interventions described in the following chapters are reserved for qualified and authorised personnel of the technical assistance service.

TABLE 1

INTERVAL	CHECK
DAILY CHECKS	Operation of the signals, displays and LEDs Operation of the stationary brake Integrity of the warning and danger labels
WEEKLY CHECKS	Absence of oil leaks from the X-ray tube head Absence of unusual noises in the X-ray tube head during X-ray emission
6-MONTHLY CHECKS	Correct operation and the value of the whole earthing circuit Power supply voltage value Value of the continuous voltages generated inside the system Fixing and general state (dust and corrosion) of the boards Centering of the X-ray tube head-collimator assembly

## 2.2 CLEANING AND DISINFECTION

Products with a high content of alcohol, corrosive and/or abrasive detergents or solvents must not be used to clean the surfaces of the apparatus.

To disinfect the system, only use methods in compliance with the laws in force regarding disinfection and protection procedures against explosion.

To carry out the cleaning and disinfection operations, take the following precautions:

- turn the system off and disconnect the mains power supply cable
- make sure that no liquid gets into the apparatus so as to avoid any short-circuits or corrosion of the electrical and electromechanical parts.



**The unit has not to be used in presence of anaesthetic and/or inflammable disinfectant and cleaning products.**

**If, producing explosive gaseous mixture, are used, make sure that gases are dispersed before switching on the unit.**

### 2.3 DISPOSAL OF DEVICE

During the disposal of a device you have to take case of the components that may present risks connected to their elimination:

- the **X-ray tube head** holds an insulating dielectric means and lead protections that have to be eliminated taking into account the standards and the laws in force (consult the documentation released by the manufacture)
- the **collimator** holds leads shutters that have to be eliminated in respect of the standards in force (consult the documentation released by the manufacture)
- the **electrolytic capacitors** holds an insulating dielectric means that have to be eliminated taking into account the standards and the laws in force.

The other elements of the unit are composed of:

- ferrous material (chassis, screws, etc)
- plastic material (covering)
- electrical cables
- electronic boards.

These elements do not represent a direct source of risk during the elimination phasis of the devices.



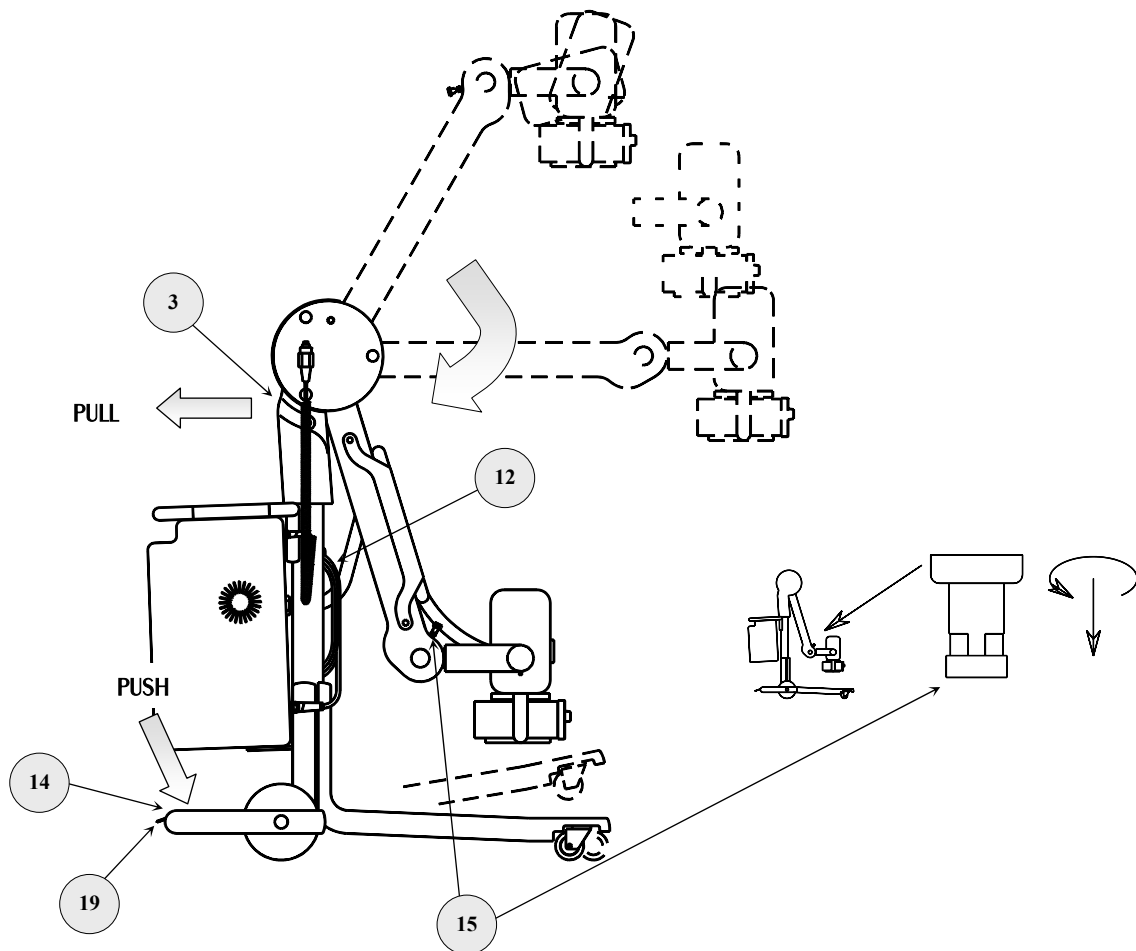
**The disposal of all components have to be carried out in compliance with the local laws in force at the moment of the disposal.**

# USE OF THE UNIT

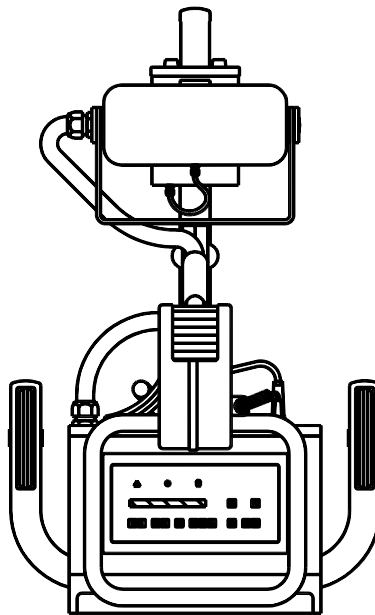
### 1 TRANSPORT

For the transport of the unit follow what mentioned indicated below: the figure shows the transport configuration (for the numerical references SEE SECTION 1 - § 2.1):

- wind up the power supply cable to its special power supply cable holder (12)
- insert the pantograph arm lock (15)
- move the unit just after the release of the positional brakes by pressing the special pedal (19)
- to overcome any small differences in level, press the tilting support (14) with one foot and meanwhile pull the tilting handle (3-optional) in the direction shown in the figure.



**NOTE:** the mobile unit is normally braked and cannot be moved unless the pedal brake, shown in the figure (19), is applied.





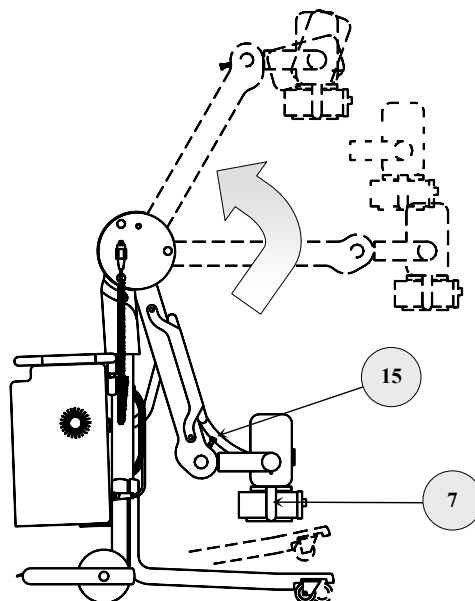
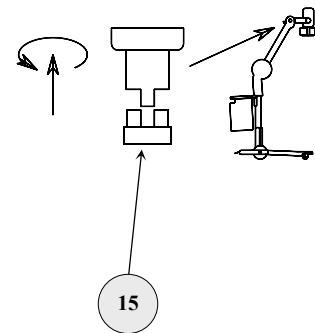
## 2 UNIT MOVEMENTS



**Do not try to move the system when the brakes are applied.**  
**To move the apparatus, use the special handles provided.**

### 2.1 ARM POSITIONING

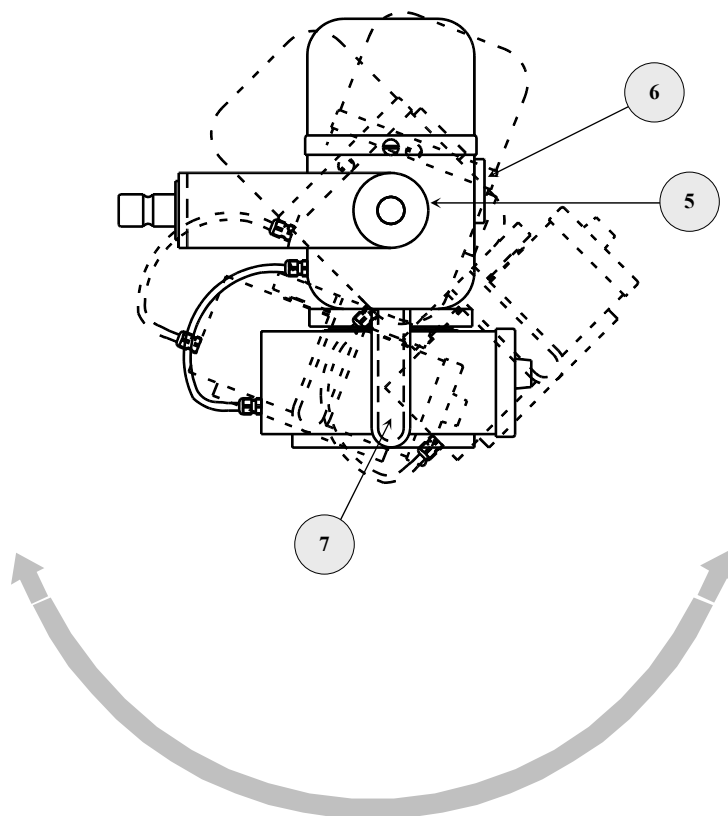
- Release the pantograph arm lock (15)
- using the X-ray tube head positioning handle (7), lift the X-ray tube head/collimator assembly up to the required height. By releasing the handle, the system stays in the position it has been put, thanks to a clutch device incorporated in the tube arm.



## 2.2 X-RAY TUBE HEAD/COLLIMATOR ASSEMBLY MOVEMENTS

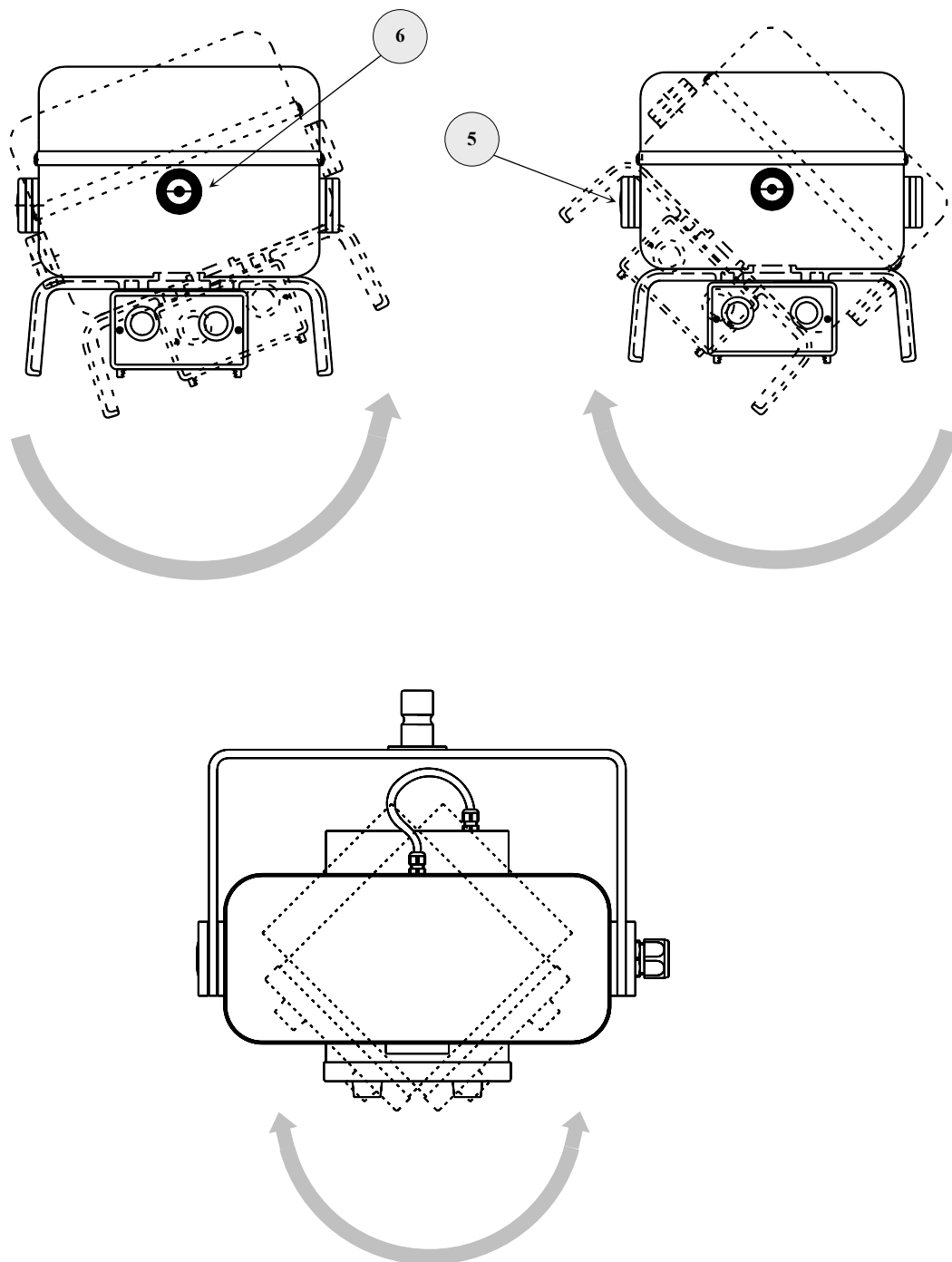
The **X-RAY TUBE HEAD/COLLIMATOR** assembly can be rotated in all directions, as shown in the figures below. For positioning, use the **X-RAY TUBE HEAD POSITIONING HANDLE** (7).

The angle of the **X-RAY ASSEMBLY** is indicated by the two **GONIOMETERS** positioned in the front (6) and lateral (5) position respectively.



# USER'S MANUAL

## USE OF THE UNIT



## 3 SWITCHING ON



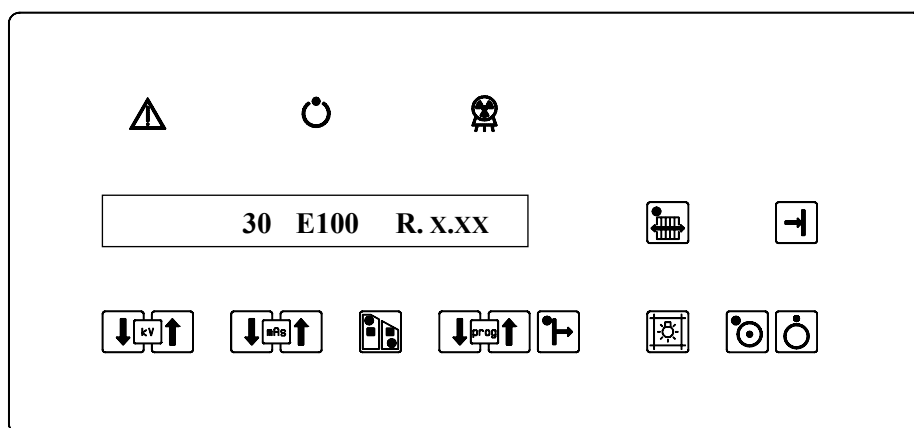
**Make sure that the power supply socket is approved for the values reported on the unit label and provided with earthing terminal**



**Do not carry out continuous switching on and off of the unit.**

To make the system operational, follow the indications given below:

- ➡ connect the unit to the power supply mains: on unit the LED of the control console remain lit
- ➡ turn the unit on
- ➡ the initial automatic test of the unit will be activated immediately:
  - for about 4 seconds, the display shows the version of control software installed; all the leds light up in sequence



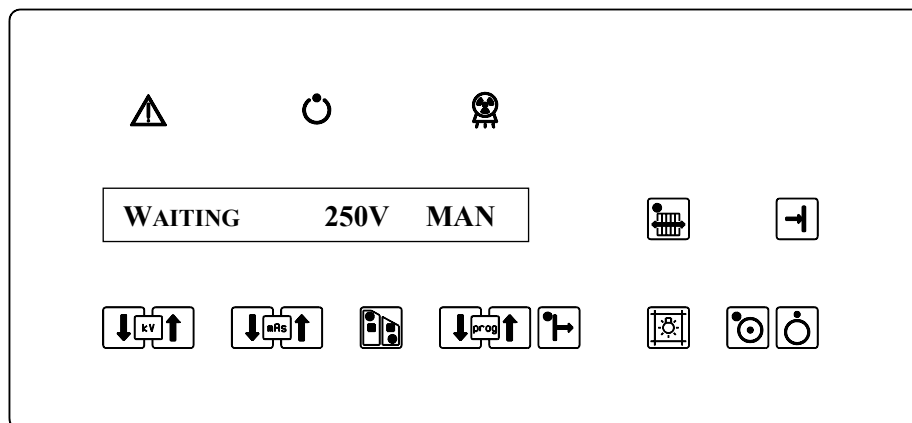
UNIT CONTROL CONSOLE – MESSAGES SHOWN ON SWITCHING ON

- ➡ successively will appear on the display the message **WAITING** until the capacitors battery loading are ready, the value of the battery voltage and the job technique

**NOTE:** Before carrying out any other operation, wait until the wording “WAITING” disappears from the display.

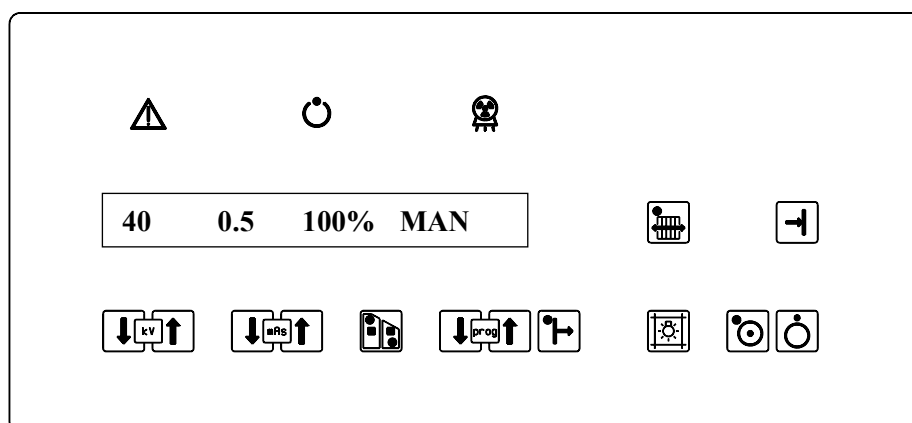
# USER'S MANUAL

## USE OF THE UNIT



UNIT CONTROL CONSOLE – MESSAGES SHOWN ON SWITCHING ON

- ▶ the display shows the preset radiography values and the working technic (technic preset manual), indicates the percentage of thermal units still available (when the X-ray tube head is under starting conditions, the display will indicate a percentage of **H.U.** of **100%**)
- ▶ in this situation the machine is ready for X-ray command
- ▶ select the type of exposure required according to the description on the following pages.



UNIT CONTROL CONSOLE – MESSAGES SHOWN WHEN SYSTEM IS READY

## 4 CONFIGURATION

### 4.1 CHANGING THE LANGUAGE FOR THE UNIT CONSOLE

The signalling on the unit console can be displayed in Italian, English, French or Spanish. Selection of the language is made when the system is turned on as shown below.

- ➡ Turn the unit on using the ON/OFF button (SEE § 3): the initial test of the unit will be activated automatically, during which the display will show the version of the control software installed
- ➡ keep immediately the relevant button pressed until the word "WAITING" appears on the display in the language selected.



ENGLISH



ITALIAN



FRENCH



SPANISH

### 4.2 PROGRAMMING THE ANATOMICAL TECHNIQUES

Programming an ANATOMICAL TECHNIQUE means associating the **KV** and **mAs** values considered suitable with the identifier (i.e. with the name, such as "SKULL", "SHOULDER"...). It will then be possible to call up an ANATOMICAL TECHNIQUE by means of its name and immediately find the radiographic parameters already set to the values memorised previously. To associate the **KV** and **mAs** values with an identifier, proceed as follows.

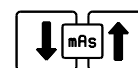
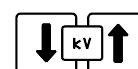
- Press the **ANATOMICAL TECHNIQUE SELECTION** button: the LED in the corner of the button itself will light up



- using the **PROGRAM SELECTION** *up-down* type buttons, select the ANATOMICAL TECHNIQUE for which the KV and mAs values are to be inserted; also select the power **LP** or **HP** where the values will be memorised



- select the KV and mAs values considered suitable for that type of examination using the **KV SELECTION** and **mAs SELECTION** buttons (if necessary see the § 6.2)



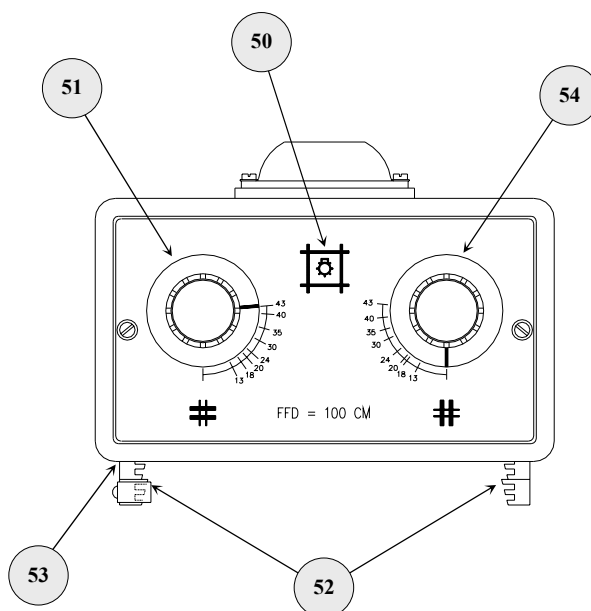
- Press the **DATA MEMORISATION** button until the acoustic signal is heard. At this point, the KV and mAs values relative to the selected ANATOMICAL TECHNIQUE have been memorised



- It is therefore possible to select a new ANATOMICAL TECHNIQUE to associate specific radiographic parameters to, by repeating the same procedure
- For exit to the programming the ANATOMICAL TECHNIQUES press the **ANATOMICAL TECHNIQUE SELECTION** button

## 5 ADJUSTMENT OF THE X-RAY FIELD SIZE

- ➡ Adjust the Focus / Film distance - which can be measured using the RETRACTILE METER (53) - moving the X-Ray Assembly (SEE § 2.2)
- ➡ once the X-ray tube head/Collimator Assembly has been positioned, switch the Collimator light on by pressing the Collimator Light On Button (50) on the Control Panel or by pressing the Collimator Light On Button on the Collimator itself
- ➡ at this point, adjust the luminous field (which coincides with the X-Ray Field) by means of the Longitudinal Diaphragm Adjustment (54) and Transverse Diaphragm Adjustment (51) knobs.

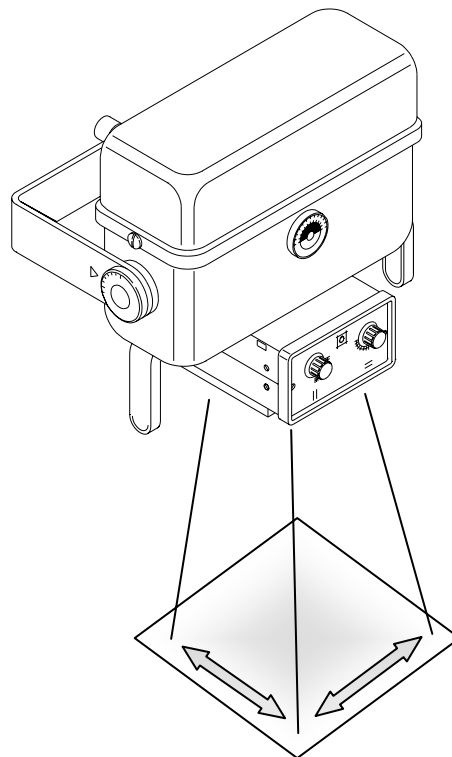




# USER'S MANUAL

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## USE OF THE UNIT



## 6 EMISSION OF X-RAYS



Before carrying out any exposure, make sure that all the necessary precautions against radiation have been taken.

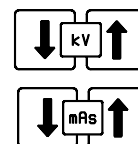
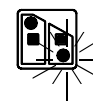


Whatever the exposure mode chosen, X-ray passage is signalled by the LED lighting up.

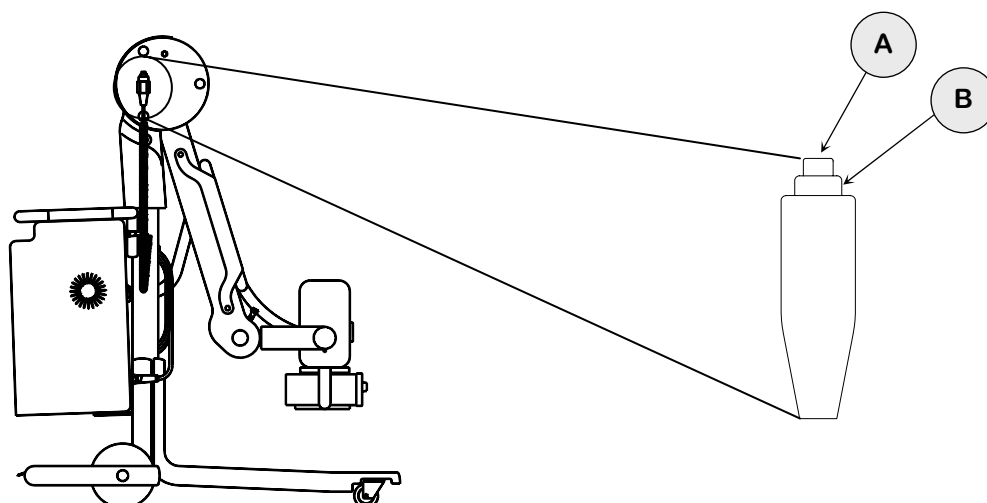


### 6.1 EMISSION OF X-RAYS USING THE MANUAL TECHNIQUE

- ➡ After being switched on (SEE § 3 of this section), the unit automatically goes into MANUAL TECHNIQUE on Low Power **LP**; if you like select High Power **HP** use the button
- ➡ the preset **kV** and **mAs** values appear on the display
- ➡ using the **kV SELECTION** and **mAs SELECTION** up-down buttons, set the required values for these parameters



- (1) ➡ pull out the **X-RAY CONTROL** pushbutton. This device is a double-click button (Click A and Click B – see figure) and must be used as indicated below



# USER'S MANUAL

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## USE OF THE UNIT

- ➡ use the **X-RAY CONTROL** pushbutton and make the first click (A); keep the button in this position until on the display appears the wordings **READY FOR RADIOGRAPHY** and the X-ray ready LED lights up
- ➡ make the second click (B) with the **X-RAY CONTROL** pushbutton and keep it in that position. At that moment **X-ray** emission starts and the X-ray on LED lights up
- ➡ at the end of **X-ray** emission, the X-ray ON LED turns off and the acoustic signal stops. At this point both of the X-ray control clicks can be released and the display shows the actual emission time.



**Releasing the first click (A) too soon has no effect.**

**Releasing the second click (B) too soon interrupts X-ray emission; the display will show the message “MAN STOP RX” for about 10 seconds and the unit will give an alarm sound (SEE SECTION 2 - § 1.7.3).**

## 6.2 X-RAY EMISSION USING THE ANATOMICAL TECHNIQUE

The X-ray unit allows up to **20 anatomical techniques** to be memorized for each power (LP and HP). ANATOMIC TECHNIQUE means *preset kV* and **mAs** values which have been assigned a more easily understood name for the user. The identifiers (i.e. the names) of each of the 20 Anatomical techniques which can be programmed on the unit are shown in table.

PROGRAMMABLE ANATOMICAL TECHNIQUES			
Nº	EXAM	KV	mAs
1	SKULL	75	40
2	CERVICAL	65	16
3	BACK-BONE	90	50
4	LUMBAR	95	50
5	LUNG	110	1
6	SHOULDER	70	20
7	COLLAR-BONE	70	10
8	HUMERUS	50	10
9	ELBOW	48	10
10	INFERIOR ARM	46	10
11	WRIST	42	10
12	FINGER	40	5
13	PELVIS	75	20
14	FEMORAL JOINT	70	25
15	ABDOMEN	85	16
16	FEMUR	70	16
17	KNEE	60	6.3
18	INFERIOR LEG	55	10
19	ANKLE	55	8
20	FOOT	48	6.3

# USER'S MANUAL

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## USE OF THE UNIT

It is possible to select one of the ANATOMICAL TECHNIQUES programmed previously at any time and to use the memorized radiographic parameters. This procedure is described in the following steps:

- select the power and consequently the filament which you desire to use



- press the **ANATOMICAL TECHNIQUE SELECTION**: the LED in the corner of the button itself will light up



- using the **PROGRAMME SELECTION up-down** type buttons, select the anatomical technique to be used



**NOTE:** to make a radiography is possible to use the stored dates or change the value using the *KV SELECTION* and *mAs SELECTION up-down* buttons. If you desire to memory the variation of the value compare with the § 4.2 of this section; differently, when you go out from the modality “Anatomical technique” the value variation will be lost.

- make the exposure as described in § 6.1 **X-RAY EMISSION IN MANUAL TECHNIQUE** starting from point (1).

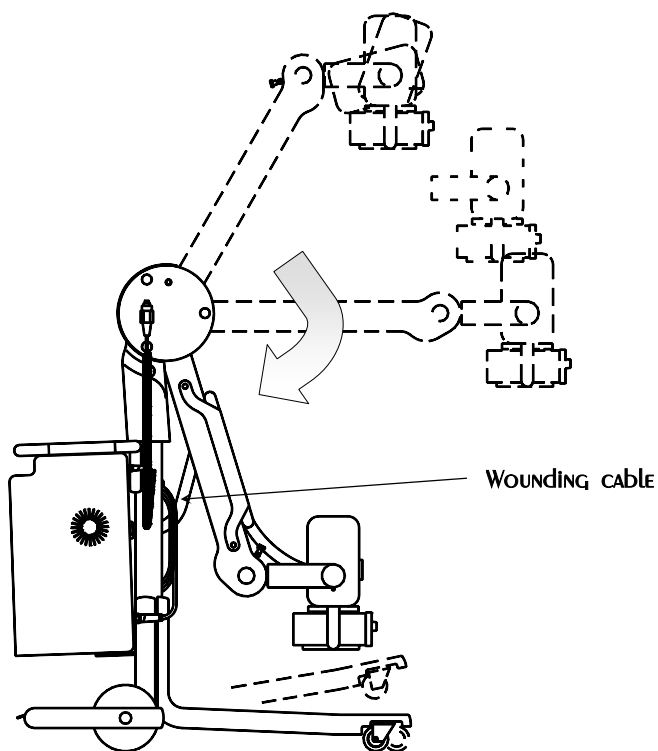
## 7 OPERATIONS AFTER USE

On completion of use, **always** proceed as specified below:

- ➡ Put the unit in the parking position (SEE § 1)
- ➡ Turn the unit off using the OFF button
- ➡ Disconnect the cable and wind it up over the special supports.



**Do not remove the connector from the power supply socket if the UNIT has not been turned off.**



# USER'S MANUAL

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USE OF THE UNIT

White Page

### DECLARATION OF RESPONSIBILITY

- ➡ IMD is only responsible for the safety of its products when their maintenance, repair and/or modification has been carried out by IMD or by personnel expressly authorised to do so by IMD itself.
- ➡ IMD shall not be held responsible in any way for malfunction, damage and/or danger due to incorrect use of the system or to disregard of the maintenance Regulations.
- ➡ The user of the installation where the system is connected is responsible for making sure that the installation itself is **only** used by suitably trained and qualified operators.

### COMPLIANCE AND REFERENCE ADDRESS

The **BASIC MOBILE RADIOLOGICAL UNIT** is in compliance with the national and international standard in force. Information relevant to the compliance may be required to:



Via Aldo Moro, 5/7 ♦ I-24020 SCANZOROSCIATE (BG) ♦ ITALY






☎ +39 035 66.81.63 ♦ FAX +39 035 66.81.66

P. IVA E Codice Fiscale IT 02602490167



## SYSTEM IDENTIFICATION PLATES

Plate placed  
on the UNIT

		Via Aldo Moro, 5/7 - Scanzorosciate • BG • ITALY ☎ +39 035 66.81.63 - FAX +39 035 66.81.66		 0051					
MODELLO / MODEL		[ ]							
ALIMENTAZIONE / MAINS VOLTAGE		MATR. / S.N.							
[ ]		[ ]							
CLASSIFICAZIONE / CLASSIFICATION : 1-B  IEC 601-1 STABILITÀ MECCANICA / MECHANICAL STABILITY  EFFETTI FISILOGICI / PHYSIOLOGICAL EFFECTS 		CORRENTE ASSORBITA / CURRENT ABSORPTION							
		FUNZIONAMENTO CONTINUO CONTINUOUS WORKING		[ ]					
		FUNZIONAMENTO INTERMITTENTE INTERMITTENT WORKING		<table border="1"> <tr> <td>LP</td> <td>[ ]</td> </tr> <tr> <td>HP</td> <td>[ ]</td> </tr> </table>		LP	[ ]	HP	[ ]
LP	[ ]								
HP	[ ]								