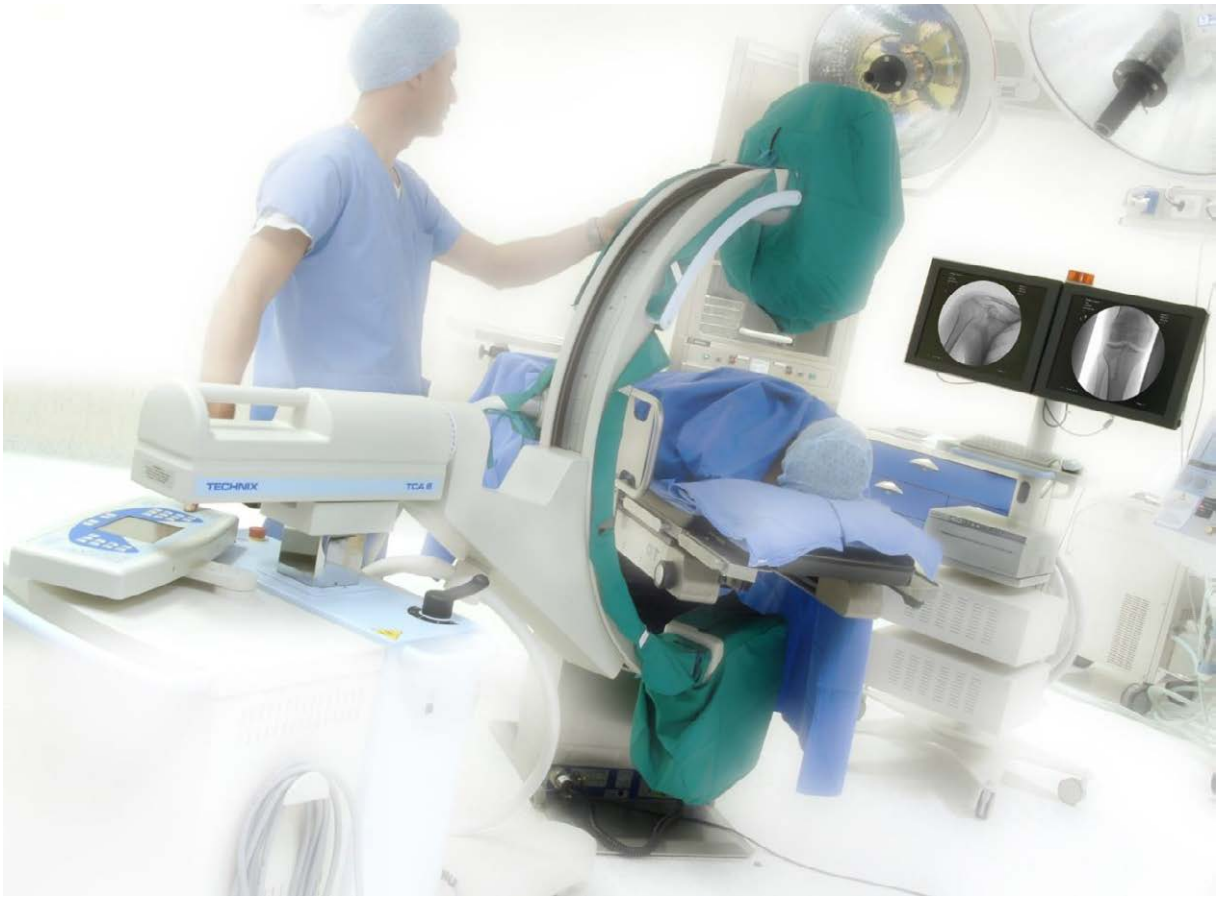
TECHNIX

User's Manual



System:	**TCA 6 S/R**
Version:	**9" / 12"**
Revision:	**M**
Data:	**09/2019**
Language:	**ENG**
File:	**201175-00-01-M**

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1 USEFUL INFORMATION

1.1 Compliance

This medical device is in compliance with the Medical Device Directive 93/42/EC and its revised versions.
The medical device, hereafter called equipment, has been classified in class IIb according to annex IX rule 10 of the directive mentioned above.

1.2 Manufacturer

The Manufacturer (according to MDD 93/42/EC and its revised versions) of the equipment is:

Technix S.p.A.
via E. Fermi, 45
24050 Grassobbio, BG (Italy)
Tel.: +39 (0)35 3846611
Fax: +39 (0)35 335675
Web: http://www.technix.it
e-mail: technixd@technix.it

Information about the compliance can be required to the Manufacturer.

1.3 Distributor

The Distributor of the equipment is:

Technix S.p.A.
via E. Fermi, 45
24050 Grassobbio, BG (Italy)
Tel.: +39 (0)35 3846611
Fax: +39 (0)35 335675
Web: http://www.technix.it
e-mail: technixd@technix.it

1.4 Publishing details

Published by the Manufacturer.
The Manufacturer reserves the right to modify this User's Manual and the equipment here described.
The equipment specifications are subject to variations without notice. Nothing written in this User's Manual can be considered as an offer, warranty, promise or contractual condition, nor should it be so.

1.5 Copyright

Translations from the original instructions in Italian language.

1.6 Information about User's Manual

The purpose of this User's Manual is to provide a valid help in order to ensure a safe and efficient use of the described equipment to the users.
Before starting up the equipment, it is necessary to read the User's Manual, note down and strictly respect all the notices indicating Warning and Precaution messages.
Pay particular attention to information and procedures in the paragraph " Safety".
User's Manual is an integral part of the equipment. It must be kept near the equipment, so that it is possible to consult it at any minute.

A WARNING message indicates a potential serious outcome, critical event or safety risk. The missing observation of a warning can cause death or serious injuries to the user and to the patient.

This equipment generates ionizing radiations. Before proceeding with x-ray exposure make sure that the necessary safety measures against radiations have been adopted

A PRECAUTION message indicates where it is necessary a particular attention to ensure a safe and efficient use of the equipment. The non-observance of a precaution message can cause slight or moderate personal injuries, damages to the equipment or to other goods, and expose to a possible remote risk of more serious injury and/or environmental pollution.

This indication signals particular suggestions, for example to help the user or to improve an operative sequence.

(A)	Reference to position in the figure.
"EMERGENCY BUTTON PRESSED"	Display messages are in capital letters, italics, and quoted. In the figures/photos, the messages are displayed in English language, while in the text there is their translation in the language of the manual.
1. Perform visual checks 2.Switch on the equipment 3. Switch on the collimator	Operations that must be done step by step following the logical numbering order. Even a sequence consisting of a single step is numbered

The User's Manual describes the most complete equipment configuration with the highest number of options and accessories.
Depending on configuration, further use instructions can be supplied together with the equipment. These instructions must be consulted for information about safety, calibration, test procedures and maintenance.
The User's Manual respects the equipment specifications and it is in compliance with all safety norms applicable at the date of publication.
The Manufacturer reserves the right to make changes according to technical progress.

1.7 Compatibility

The equipment described in this User's Manual mustn't be used together with other products or components, except in case they are explicitly indicated as compatible by the Manufacturer.
A list of these products and components is available by the Manufacturer.
Equipment changes and/or additions must be performed by the Producer or by any third party explicitly authorized by the Manufacturer.
These changes and/or additions must be in compliance with all effective laws and local rules and must be performed with the highest technical capability.

Equipment changes and/or additions performed by not properly skilled people and/or by people who use not approved spare parts, can nullify the equipment warranty.
As for all complicated technical products, maintenance performed by not qualified people and/or by people who use not approved spare parts can cause serious damages to the equipment and personal injuries risks.

1.8 Training

Equipment users must be properly trained for a safety and effective use before trying to start up the equipment described in this User's Manual.
Contents of the training for this type of equipment are different in every country,
It is up to users to be sure to have received a proper training in compliance with effective laws and local norms.

1.9 Application and final destination

This x-ray equipment must not be used in areas where danger of explosion exists.
For use in operating room, it is necessary to use sterile / sterilizable coverings to protect the arm-monobloc-intensifier group from liquids seepage.

The patient support must not have an equivalent filtration higher than 2mmAl.
The patient must be placed as close as possible to the image intensifier.

The equipment is available in two versions:
Equipment with stationary anode monobloc, successively named "Stationary anode version",
Equipment with rotating anode monobloc, successively named "Rotating anode version".
If not else specified, the technical characteristics are intended available for both versions.

The system does not belong to the category of equipment designed for continuous operation.
The system is not used in contact with the patient; however, accidental contact of some unit parts with the patient and the operator is possible.
Contact with the patient is non-invasive.
Contact with the operator is strictly for reasons linked to the use of the equipment (normal operation).

The equipment is a mobile system used for x-ray examinations in radioscopy, radiography and diagnosis. Its use in professional health service, such as physician offices, clinics, hospitals (emergency rooms, patient rooms, intensive care, surgery rooms,..) is oriented to:

- Traumatology
- Pediatrics
- Simple interventional radiology
- Pace Maker implantation
- Operating theater
- Intensive care
- Respiratory system
- Skeletal structure

2 SAFETY

2.1 Warnings and precautions

Maintenance and defects
Do not use the equipment for any application before the user correctly performs all regular checks and updates the periodical equipment maintenance. If it is sure (or probable) that any part of the equipment is defective or wrong adjusted, don't use it before performing all reparations.
The use of an equipment with defective parts or adjusted in a wrong way, can expose the user or the patient to ionizing radiations or to other dangers concerning safety. This can cause serious or mortal physical injuries, or wrong diagnosis or therapies.
Importance of safety
Do not use the equipment for any application before reading, understanding and assimilating all information about safety, safety and emergency procedures specified in the current chapter about Safety, The use of the equipment without a proper knowledge of safety rules can cause serious or mortal physical injuries, or wrong diagnosis or therapies.
Proper training
Do not use the equipment for any application unless you have a proper and adequate training to a safe and efficient use.
If you aren't sure to be able to use this equipment in a safe and efficient way, don't use it. The use of this equipment without proper and adequate training can cause serious or mortal physical injuries or wrong diagnosis or therapies.
Do not use the equipment with the patients if there is no adequate understanding of its capabilities and functions. Using the equipment without an adequate knowledge of its functioning can compromise the efficacy and/or reduce the safety of the patient, the user and other people nearby.
Safety systems
Never try to remove, modify, exclude or obstruct any safety device on the equipment. An intervention on safety devices can cause serious physical injuries or even death.
Expected use and compatibility
Do not use the equipment for purpose other than those for which it is intended. Do not use the equipment with other products than the ones whose compatibility has been recognized by the Manufacturer. The use of the equipment for purposes other than the ones expected or with an incompatible product, can cause serious or mortal physical injuries or wrong diagnosis or therapies.
This equipment must be used only in compliance with the safety instructions specified in this User's Manual and exclusively for intended purposes.

It is user's responsibility to ensure that effective norms concerning installation and use of medical equipment are respected.

The Manufacturer is responsible for safety features of its own products, only provided that maintenance, repairs and modifications are performed exclusively by the Manufacturer's personnel or by personnel expressly authorized by the Manufacturer.
As for all technical equipments, even this medical device must be used properly and subject to regular maintenance and care, as described in " Maintenance, cleaning and disposal" paragraph.
The Manufacturer can't be considered responsible for any error, damage or injury caused by improper use or lack of maintenance of the equipment.
It is necessary to contact the assistance service authorized by the Manufacturer even in the case no error messages are displayed, but the equipment doesn't work as usual (first symptoms of a fault).
Do not modify or remove in any way the safety circuits.

2.2 Electrical Safety

This equipment is in compliance with safety class I, Type B, in accordance with IEC 60601-1 norm.

Do not use the equipment near or leaned against other equipments.

Do not remove protections or cables from this equipment, unless it is expressly required in this User's Manual, because inside it there are dangerous electrical voltages. The removal of protections or cables can cause mortal injuries or serious damages to the people.

Protections or cables must be removed only by qualified and authorized technical personnel. Use the equipment only in rooms or areas comply with all applicable laws (or regulations having the force of law), referring to electrical safety of this type of medical device.
Always insulate the equipment from the power supply before proceeding with cleaning or disinfection operations in order to avoid electric shocks.

Equipotential earth connection
The equipment is supplied with an equipotential earth connection point.
The equipment can be used only in areas comply with local electrical safety norms and in environments suitable for medical activities. Besides IEC 60601-1 norm provides instructions about the equipotential earth connection point.

Additional equipotential earth connection
An additional equipotential earth connection is provided because the equipment is movable and the reliability of the main equipotential earth connection point can be insufficient.
It is possible to use this equipment only in rooms comply with IEC norm requirements.

The equipment described isn't protected against liquids seepage. Its classification is IPx0.

2.3 Mechanical safety

Be sure that parts of the body or clothes aren't stuck among moving components of the equipment.
Remove all objects from range of motion of the equipment.
Check that the unused hanging components (monitor and radiogenic complex) are positioned so as not to affect neither the user nor the patients.
It is not possible to transport this equipment while it is working. For a safety transport, switch off the equipment before transporting it and ensure that all system peripherals (monitor, mouse, keyboard, cables etc.) are disconnected.
Do not remove protections or cables from this equipment, unless this operation is expressly requested in this User's Manual.
The equipment includes moving parts. The removal of protections can cause serious or mortal physical injuries to people.

2.4 Protection against explosions

This device mustn't be used in presence of explosive gas or fumes, such as some kind of gaseous anesthetics. Do not use disinfectant spray flammable or potentially explosive. The use of this equipment in an unsuitable environment can cause fires or explosions.

2.5 Fire safety

• Do not use this equipment in areas where there is a risk of fire.
• Do not cover the ventilation openings while the equipment is turned on.
• For electrical or chemical fires use only fire extinguisher marked as suitable for such uses. The use of water or other liquids in an electrical fire can cause physical injuries or even death.
• Before trying to extinguish the fire, the safety measure to be taken is to separate the equipment from other electric power sources and from all other sources in order to reduce the risk of electrical shocks.

2.6 Electrostatic discharge (ESD)

Always resort to static procedures, protections and appropriate products before opening or during the handling of the equipment. This equipment includes electrostatically sensitive components. Non-compliance with ESD procedures may cause damages to the components. Such damages to the components are not covered by any warranty.

The electrostatic discharge (ESD) can cause a remarkable voltage that could cause damages to printed circuit boards (PCB) or to other equipment components.
Electrostatic discharge (ESD) damages can accumulate and can initially not be visible, such as a hardware failure, but can reduce performances. Therefore, it is recommended to use proper ESD handling procedures.
ESD can be due to low humidity or to the use of electrical equipment on carpets, bedding and clothes.

2.7 Electromagnetic compatibility (EMC)

This equipment complies with international and national laws and regulations relating to electromagnetic compatibility (EMC) in force for this type of product, if it is used for the intended purposes. Such laws and regulations define the electromagnetic emissions level coming from the product and the requested immunity against electromagnetic interferences from external sources. Other electronic products that exceed the limits defined by EMC standards can, in unusual situations, affect on the equipment working.

- Electromedical products request special precautions referring to electromagnetic compatibility (EMC) and must be installed and started up in compliance with EMC information provided in the documentation enclosed.
- The use of accessories and cables other than those specified can cause a higher emission or lowest immunity levels.
- The equipment mustn't be used in proximity of other products or stacked on them and, if this will be necessary, you must check the right functioning.

Mobile phones and laptops
Communications among RF portable and mobile equipments can affect medical equipments. It is recommended to use caution while using such communication devices within the specified radius of electromedical devices

2.7.1 Warning and Safety Precautions for Electromagnetic Compatibility

Increased emission or reduced interference immunity.
Use of unsuitable accessory or lines
► Exclusive use of the listed accessory or line with the exception of internal original spare part components.

Electric medical units are subject to special precautionary measures with regard to EMC and may only be installed and put into operation in compliance with the EMC information contained in the Operating Manual. Portable and mobile radiofrequency communication devices can influence electric medical devices

Annex A

Guidance and manufacturer's declaration – Electromagnetic emissions		
The equipment is suitable for use in the specified electromagnetic environment. The purchaser or user of the equipment should assure that it is used in an electromagnetic environment as described below:		
Emissions test	**Compliance**	**Electromagnetic Environment**
RF emissions CISPR 11	Group 1	This equipment uses RF energy only for its internal function. Therefore. the RF emission is very low and not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The equipment is suitable for use in all establishments, other than domestic and those directly connected to the public low voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Annex B

Guidance and manufacturer's declaration – Electromagnetic immunity			
The equipment is suitable for use in the specified electromagnetic environment. The purchaser or user of the equipment should assure that it is used in an electromagnetic environment as described below:			
Immunity Test	**IEC 60601-1-2 Test level**	**Compliance level**	**Electromagnetic Environment**
Electrostatic discharge (ESD) IEC 61000-4-2	8 kV contact 2/4/8/15 kV air	IEC 60601-1-2 Test level	Floors should be wood. concrete or ceramic tile. If floors are covered with synthetic material. the relative humidity should be at least 30%.
Radiated electromagnetic field IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz	IEC 60601-1-2 Test level	Portable and mobile RF communications equipment should be used no closer to any part of the equipment including cables. Minimum distance 30 cm
Electrical fast transient/burst IEC 61000-4-4	2 kV for power supply lines 1 kV for input/output lines > 3 m	IEC 60601-1-2 Test level	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	0.5/1 kV differential mode 0.5/1/2 kV common mode	IEC 60601-1-2 Test level	Mains power quality should be that of a typical commercial or hospital environment.
Conducted disturbances induced by RF fields IEC 61000-4-6	3 V 150 kHz to 80 MHz 6V ISM frequencies	IEC 60601-1-2 Test level	Portable and mobile RF communications equipment should be used no closer to any part of the equipment including cables. Minimum distance 30 cm
Voltage dips. short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0% U_n for 0.5 cycle 0 % U_n for 1 cycle 70 % U_n for 25 cycles 0 % U_n for 5 s	IEC 60601-1-2 Test level	Mains power quality should be that of a typical commercial or hospital environment. If the user of the equpment requires continued operation during power mains interruptions. it is recommended that the equipment be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	IEC 60601-1-2 Test level	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the equipment, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

2.8 Protection against ionizing radiations

This equipment generates ionizing radiations (hereinafter called radiations).
Before proceeding with x-ray exposure, be sure that all safety measures in protection against radiations have been taken.
While using the equipment, the examination room personnel have to respect all necessary protection rules. In this context, please observe the following rules:

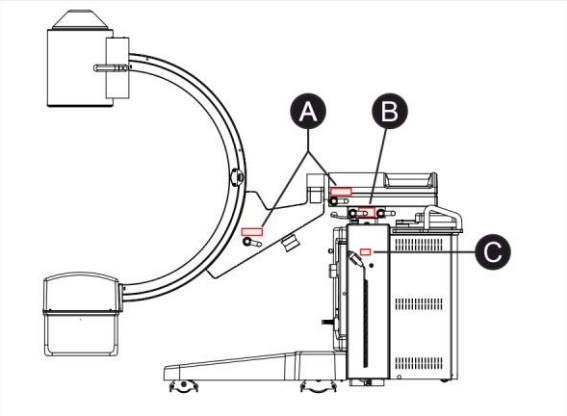
● To protect patients from radiations, use tools suitable for protection against radiations, as well as the devices supplied together with the x-ray equipment (for example, diaphragm, spacer, filter)
● Always wear protective clothing. Anti-radiation clothing with an equivalent of 0,35 mm of lead can reduce the 99,84% of radiations at 50 kV and the 91,2% at 100 kV.
● If it is necessary to stay in the controlled area, please wear a personal dosimeter. The Manufacturer suggests to define the personal dose that occurs in the workplace under practical conditions and to use it as basis for precautions against radiations.
● Distance represents the more efficient protection against radiations. Please keep the largest possible distance from the exposed object and from x-ray complex.
● Avoid to work in the direct irradiation area; if it isn't possible, please protect yourself, Wear gloves for protection against radiations.
● Always use the lowest collimation of the x-ray area. Check that interested area is completely exposed. The diffused radiation depends largely on the volume of the object exposed.
● Always check that the x-ray field collimation completely covers the measurement range selected.
● Always select the largest possible distance between focal point and skin in order to minimize the dose absorbed by the patient.
● Always select the shortest examination time, in this way the radiation dose is considerably reduced.
● Move the interested area as close as possible to the image intensifier/ cassette / detector. Radiations exposure is reduced and even optimized.
● Always keep in mind that any material interposed along the path of radiation between the patient and the image receiver (for example film) reduces the images quality and increases the dose absorbed by the patient.
● Always check that there is visual and audible communication between the user and the patient during all the examination. If necessary keep the communication using technical means such as an intercom.
● Do not modify or remove safety circuits that under certain conditions prevent the x-ray emission.

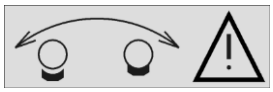
2.9 Laser light source

The equipment is supplied with a red laser module Class 2 according to IEC 60825-1:2007. Maintain a good room lighting. Do not look inside the exit window of the laser modules. Do not fix the laser beam. Before beginning the examination, the patient should remove earrings, eyeglasses, necklaces, etc. and everything that can reflect the laser and be impressed on the image. Do not clean the openings of the laser modules with tools that may affect the optics of the same. Any cleanup action must be performed only by service personnel.

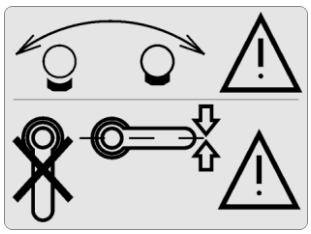
2.10 Labeling

2.10.1 C-arm stand symbols

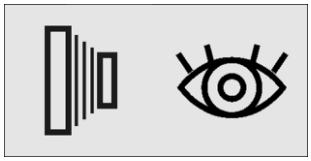




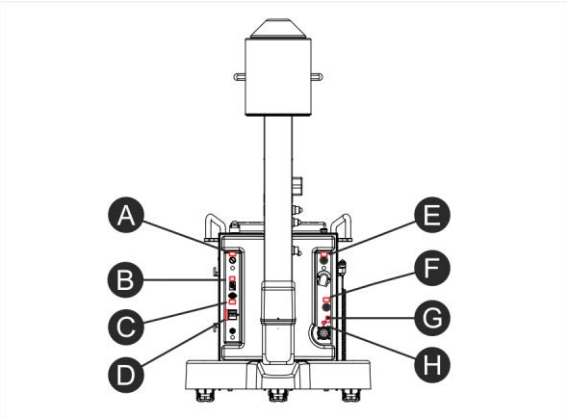
Pos.A - Brakes lock/release label

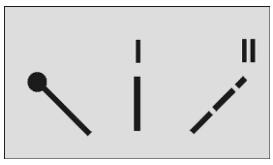


Pos.B - Warning label for the horizontal handle positioning

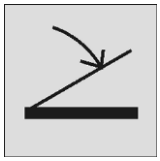


Pos.C - Radiography and fluoroscopy control label

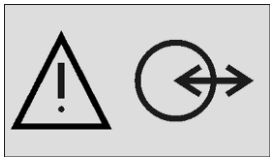




Pos.A - ON key label (if present)



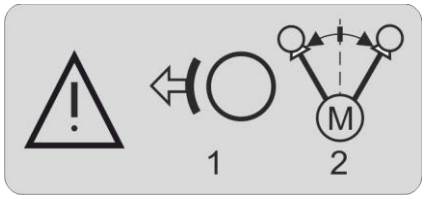
Pos.B - Footswitch label



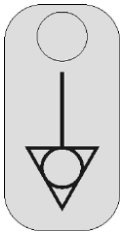
Pos.C - External connections

Pos.D - MAIN label (if present)

Pos.E - Monitor connection (only version with monitor aboard)

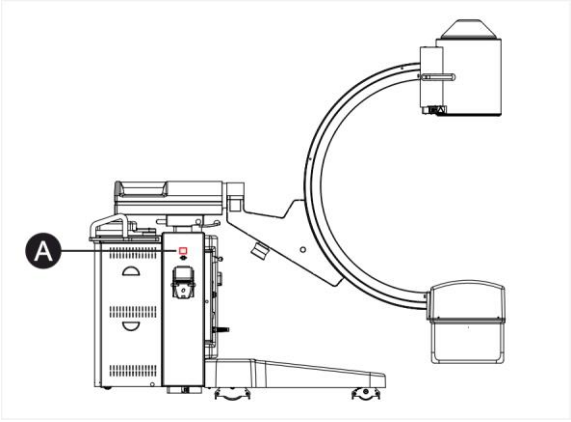


Pos.F - Footswitch for C-arm rotation label

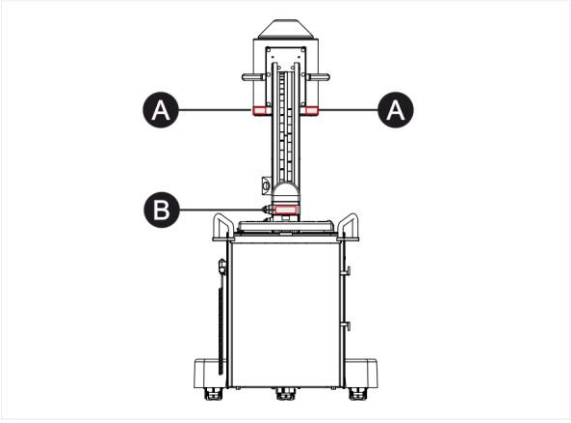


Pos.G - Equipotential node label

Pos.H - Clutch of the display station - C-arm stand connection label (if present)

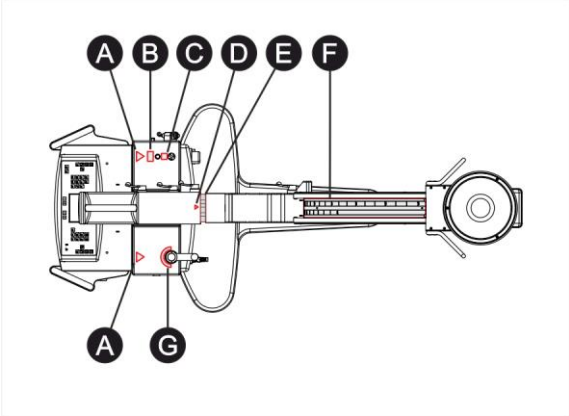


Pos.A - Dose meter printer connection label

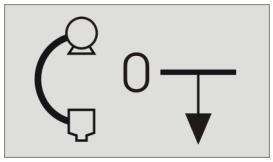


Pos.A - Laser radiations hazard warning (only if the laser accessory is present - optional device)

Pos.B - Hazard Warning Label x-ray exposure



Pos.A - Hands squashing hazard label

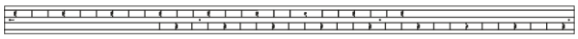


Pos.B - "Enable Down" pushbutton label to enable the arm extra run downwards

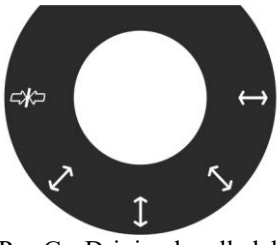
Pos.C - Emergency stop

Pos.D - Label indication of arm rotation around the horizontal axis

Pos.E - Graduated label of arm rotation around the horizontal axis

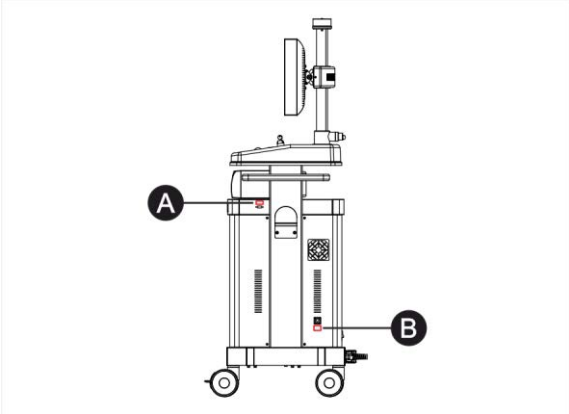


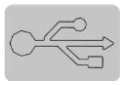
Pos.F - Graduated label of orbital arm rotation



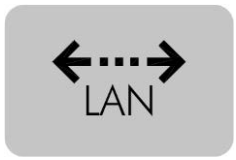
Pos.G - Driving handle label

2.10.2 Display station symbols

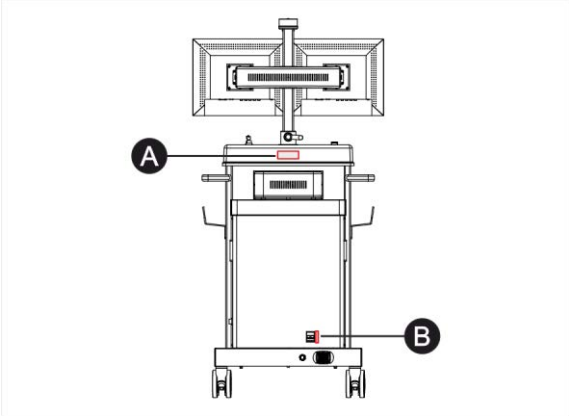


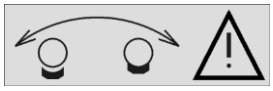


Pos.A - USB connection



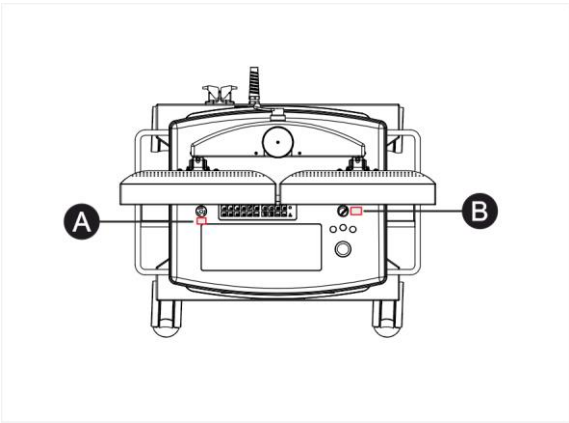
Pos.B - LAN connection



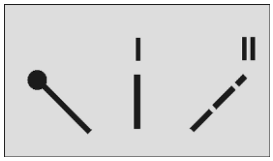


Pos.A - Monitors support lock/release label

Pos.B - MAIN label

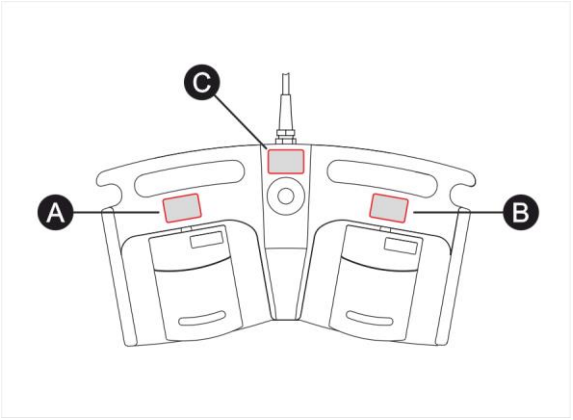


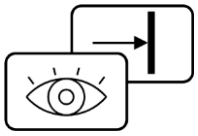
Pos.A - Emergency stop



Pos.B - ON key label

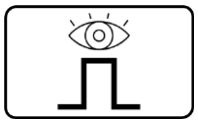
2.10.3 Fluoroscopy footswitch symbols





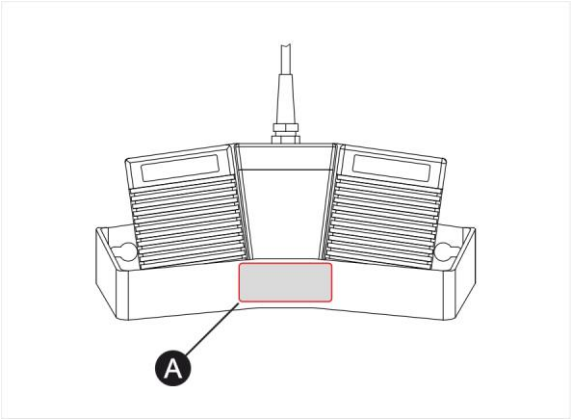
Pos. A - Fluoroscopy control + image storage

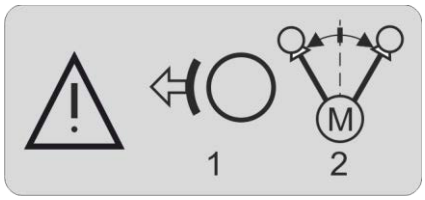
Pos. B - Pulsed fluoroscopy control



Pos. C - SNAPSHOT control

2.10.4 ±30° arm rotation footswitch symbols





Pos. A - ±30° arm rotation control

3 MAINTENANCE, CLEANLINESS AND DISPOSAL

3.1 Periodic maintenance

For this equipment it is necessary : a correct operation, a periodic maintenance and checks that the user must regularly perform and that are essential for the equipment to work safely, efficiently and reliably.

Periodic maintenance plan
The periodic maintenance can be performed only by trained and authorized personnel and it is widely described in the service documentation.

3.2 Regular checks performed by the user

3.2.1 Obligations for the user

The user of the equipment must perform the program of regular checks. Such checks are described in the table below.
The user of the equipment must ensure that all checks and their actions are performed satisfactorily before using the equipment for its intended purpose.

Interval	Object	Method
Daily	Defective lights, components, nameplates and damaged warning signals, main cables and connectors	Check
Daily	All cable and connectors (damage/breaking). Lack of oil and unusual noises in high voltage generator.	Check
Weekly	Check the locking and braking systems.	Check

3.2.2 Repairs

The equipment includes mechanical parts subjected to wear because of working.
The correct adjustment of electromechanical and electronic complexes affects the working, image quality, electrical safety and the exposure of the patient and the medical personnel to radiations.
The Manufacturer recommends that repairs must be performed by trained and authorized service personnel.

Defective components must be replaced with original spare parts.

3.3 Cleaning and disinfection

Only personnel trained in the management of cleaning and disinfection of medical devices is authorized to conduct such activities.
Perform regularly cleaning and disinfection operations of the equipment.
Below are the instructions.

Always disconnect the equipment from the power supply before proceeding with cleaning and disinfection operations in order to avoid electrical shocks.

Avoid the seepage of water and liquids because it can cause short-circuits or corrosion of metallic parts.

Cleaning and disinfection operations, even for the equipment and for the environment, must be in compliance with all laws and norms in force in the country where the equipment is installed.

Cleaning
Enameled parts and aluminum surfaces must be cleaned only with a damp cloth and a mild detergent and then with a dry woolen cloth. Never use scouring powders, solvents, abrasives detergents or polishing abrasive. Do not use a special detergent if its properties are not sure.
Chromed parts must be cleaned only with a dry woolen cloth. Do not use polishing abrasives. To protect the finish, use a nonabrasive wax.
Plastic surfaces must be cleaned only with soap and water. When using other cleaning agents (for example with a high alcohol content), the material can become opaque or can break.

Disinfection
The disinfection method used must be in compliance with all laws and norms in force for disinfection and protection against explosions in force in the country where the equipment is installed.
All parts of the equipment suitable for this type of treatment, accessories and connection cables included, can be disinfected with a damp cloth and a proper detergent. Never use disinfecting agents or corrosive sterilizers or solvents.
Do not use a special disinfecting or sterilizing agent if its properties are not sure.

Do not use inflammable disinfectant spray or potentially explosive. Such sprays create gas that can ignite, causing serious injuries or even death.

It is not recommended to disinfect using a spray in a room where there are medical products, because the gas can penetrate the product, causing short-circuits, corrosion of metallic parts or other damages the equipments.

If it is necessary to use non-inflammable and non-explosive sprays, first of all switch off and cool down the equipment.
In this way the vaporized spray can't be attracted by convention currents inside the equipment. Before starting spraying, it is necessary to cover carefully the product with plastic sheeting.
Once all traces of disinfecting spray disappear, it is possible to remove the protective plastic and directly disinfect or sterilize the equipment following the recommended instructions.
After using a spray the user must be sure that every single trace of gas has disappeared before starting up the equipment again.

3.4 Disposal

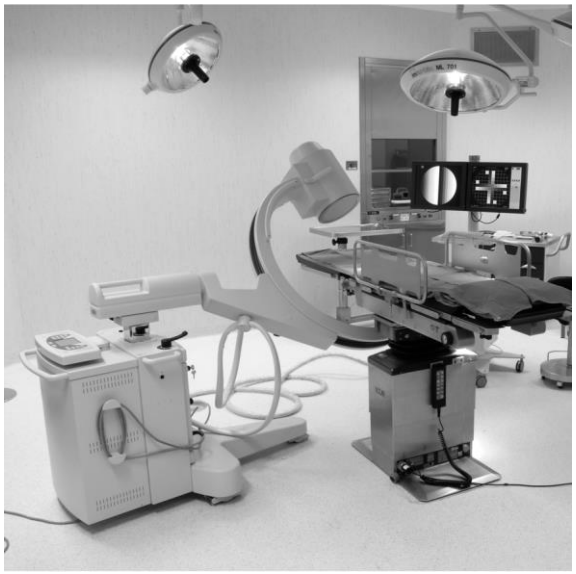
The manufacturer wants to make a contribution to environment defense and wants to guarantee a constantly safe and efficient use of this equipment by using a proper support, maintenance and training program.
If the equipment is used correctly and always subjected to proper maintenance, it doesn't represent an environmental risk. However it can include materials that can be potentially harmful for the environment if they are not properly disposed.
The use of such materials is essential for carrying out the equipment functions in compliance with legal requirements and so on.

Final disposal of the equipment
The final disposal is effected when the equipment has been used so that it is no longer usable for the intended purposes.
The return, proper disposal or recovery of this medical equipment must be done in compliance with the European WEEE (Waste Electrical and Electronic Equipment) and / or national requirements.

The equipment or parts of it mustn't be disposed as industrial or domestic waste, but they must be collected separately as special waste. The separate collection for the subsequent forwarding for recycling, treatment and environmentally compatible disposal, helps to avoid possible negative environmental and health effects and to promote recycling of the parts included in the equipment.
Illegal disposal of the equipment involves the application of administrative sanctions according to the current regulations of the country where the equipment is installed.
For information on how to dismantle the inoperative equipments comply with local legislation or contact an authorized representative of the Manufacturer.

4 COMPONENT IDENTIFICATION

4.1 Usability



This equipment is a highly optimized mobile System for surgical fluoroscopy. The optimization is the pursuit of the best compromise within the peculiar features of such an instrument : dimensions, weight, balancing, ease of manoeuvre, X-ray features, image quality, safety.

The use of this equipment must be strictly reserved to qualified, competent and trained personnel also informed about the risks associated to the use of ionizing radiations.

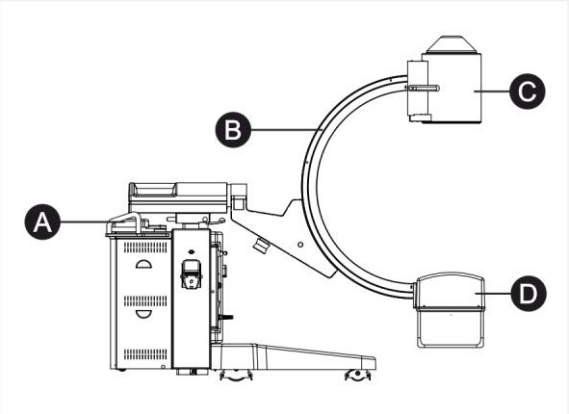
The large achievable distance of the SID axis from the C-arm stand, the noticeable motorized column elevation, the wide C-arm insertion and span spaces, the keyboard rotation, enable the max. operational flexibility and satisfy the need of the user in the operating theatre.

The display station allows the user to easily move inside and outside the operating theatre, with a small volume around the operating table, obtaining an excellent quality image in a restricted operating area.

4.2 Overview

The equipment is made up of two different parts: Mobile Stand with C-arm and Display Station:

4.2.1 Mobile stand with C-arm

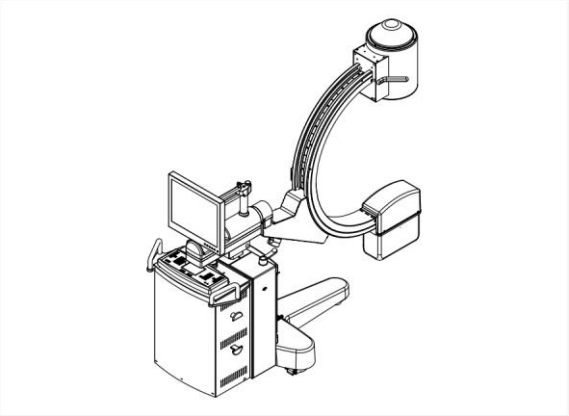


"C" arm stand composed by:

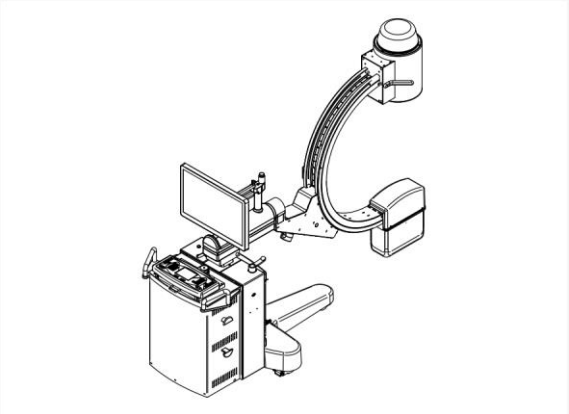
A - Control keyboard
B - "C" arm
C - Image intensifier
D - XR monobloc

4.2.2 Display Station

Compact version

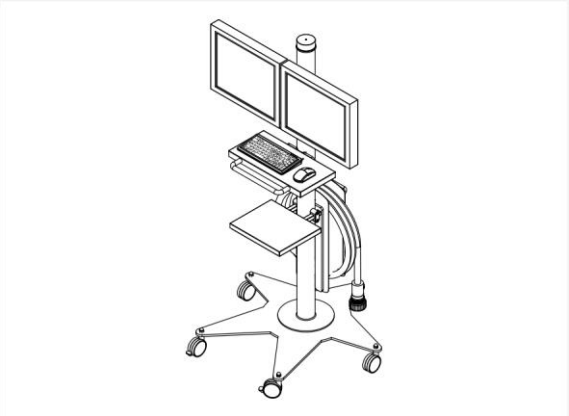


Display station with nr.1 orientable 19" LCD monitor, assembled directly on the mobile equipment for video systems 0,5K²

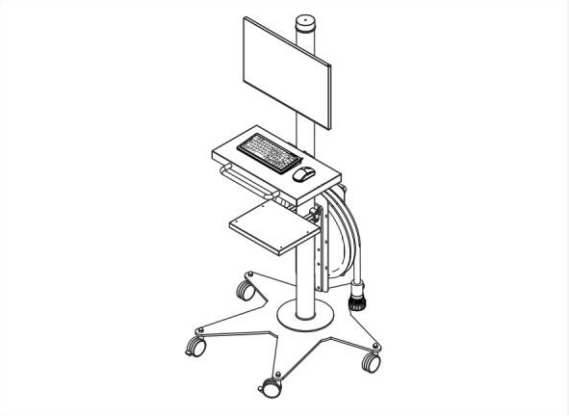


Display station with nr.1 orientable 24" LCD touchscreen monitor, assembled directly on the mobile equipment for video systems 1K²

Basic version

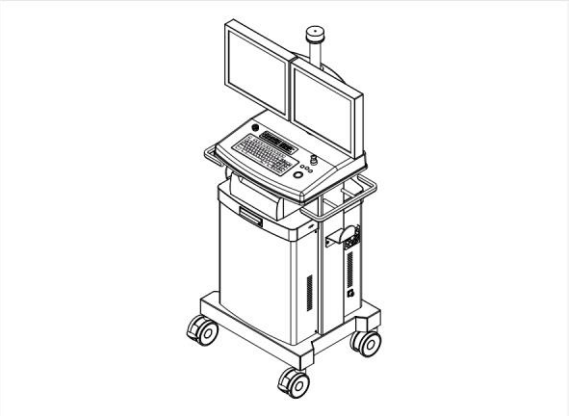


Display station with one/double 19" LCD monitor for video systems 0,5K²



Display station with one touch 24" LCD monitor for video systems 1K²

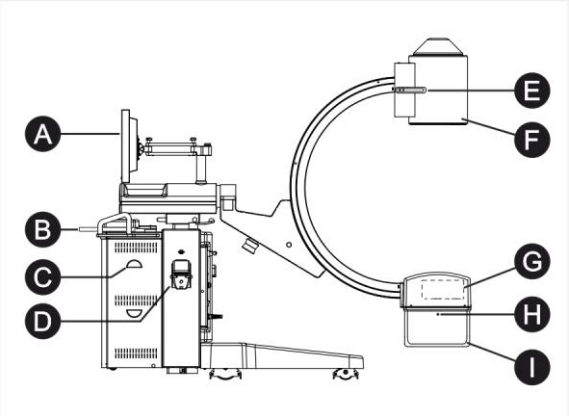
Premium version



Display station with two 19" LCD monitors for video systems 0,5K² and 1K²

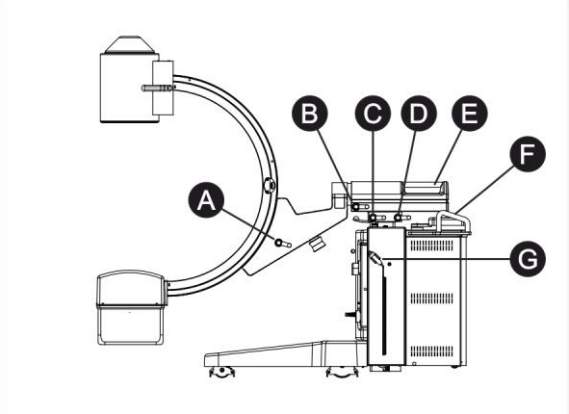
4.3 Mobile stand with C-arm

4.3.1 Mobile stand with 9" I.I. Tube

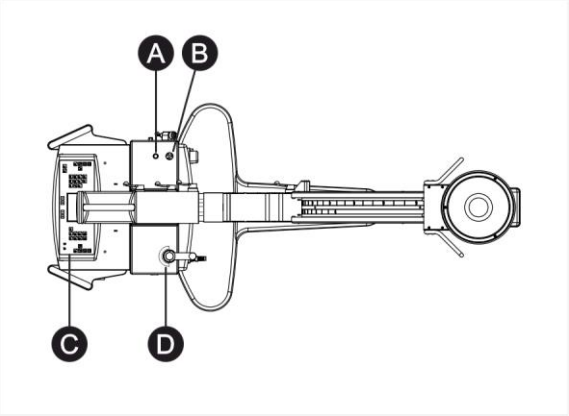


A - Monitor installed *
B - Alphanumeric keyboard *
C - Cable reel
D - Printer for dosimeter **
E - Handles for the arm sliding
F - Image Intensifier
G - Collimator
H - Focus position
I - Monobloc

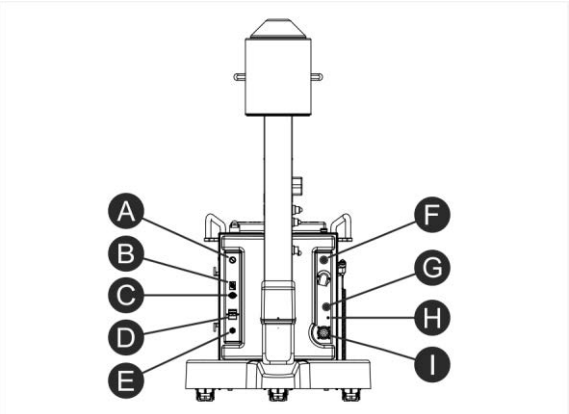
* present as per the configuration
** optional



A - Orbital arm rotation brake
B - Brake for the C-arm rotation around horizontal axis
C - Brake for the panning movement of the C-arm group
D - Brake for the horizontal C-arm group sliding
E - Handle for the horizontal C-arm group sliding
F - Handles for the movement of the C-arm stand
G - Handswitch for radiography / fluoroscopy control



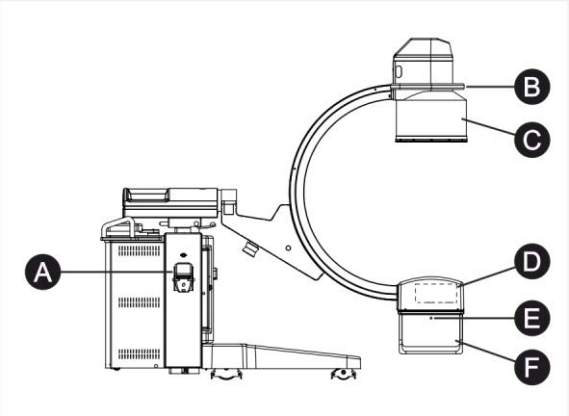
A - Enabling pushbutton for the arm extra travel downwards
B - Emergency push-button for UP/DOWN movement
C - Control panel
D - Driving handle and braking of the rear wheels



A - Switching-ON key *
B - Outlet for fluoroscopy control footswitch
C - Connection for external interlocks
D - Circuit breaker switch *
E - Power supply cable
F - Monitor cable installed *
G - Outlet for ±30° arm rotation control footswitch * / USB image transfer socket *
H - Equipotential node
I - Connector for the connecting cable between the mobile stand and the display station * / LAN Socket *

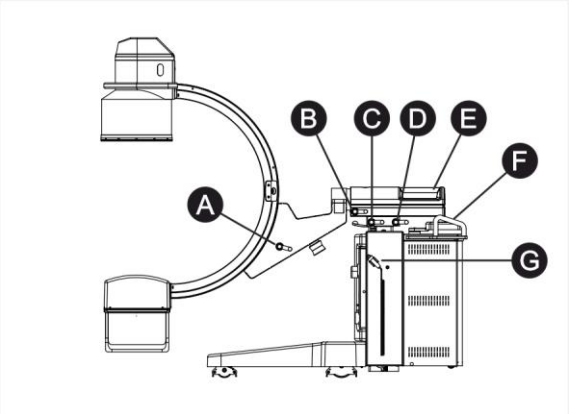
* present as per the configuration

4.3.2 Mobile stand with 12" I.I. Tube

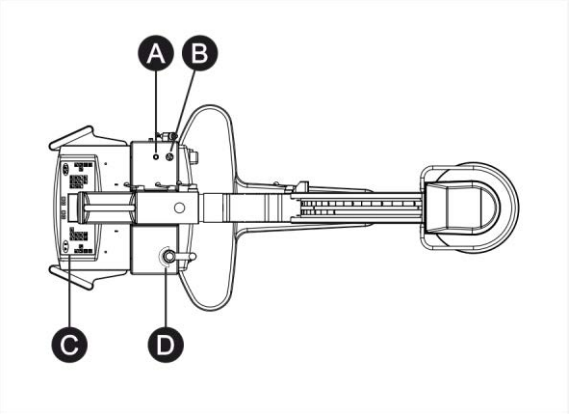


A - Printer for dosimeter **
B - Handle for C-arm sliding
C - Image Intensifier
D - Collimator
E - Focus position
F - Monobloc

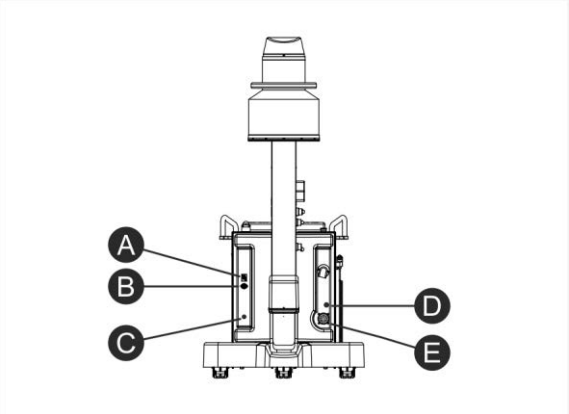
** optional



A - Orbital arm rotation brake
B - Brake for the arm rotation around the horizontal axis
C - Brake for the panning movement of the C-arm group
D - Brake for the horizontal sliding of the C-arm group
E - Handle for the horizontal sliding of the C-arm group
F - Handles for the mobile stand movement
G - Handswitch for radiography / fluoroscopy control

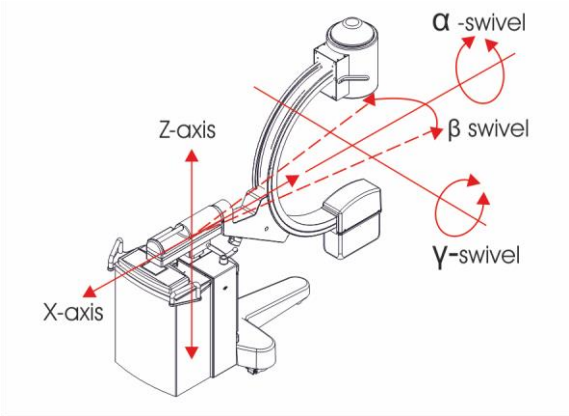


A - Enabling pushbutton for the arm extra travel downwards
B - Emergency pushbutton for the UP/DOWN movement
C - Control panel
D - Handle for driving and braking the rear wheels



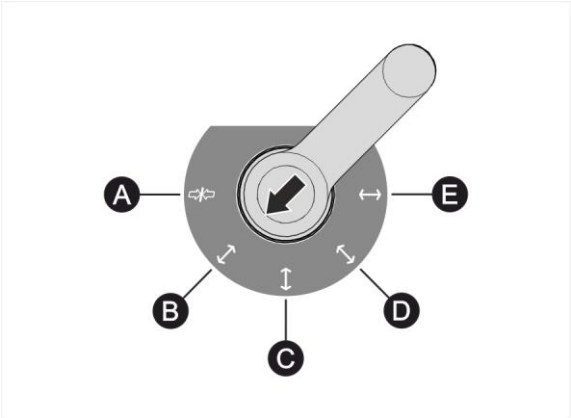
A - Outlet for fluoroscopy control footswitch
B - Connection for external interlocks
C - Power supply cable
D - Equipotential node
E - Connector for connecting cable between the mobile stand and the display station

4.3.3 "C"-arm movements



X-axis = horizontal movement
Z-axis = vertical movement
α-swivel = x-ray group rotation around X-axis
β-swivel = x-ray group rotation around Z axis
γ-swivel = x-ray group rotation around its axis

Driving handle and rear wheels braking

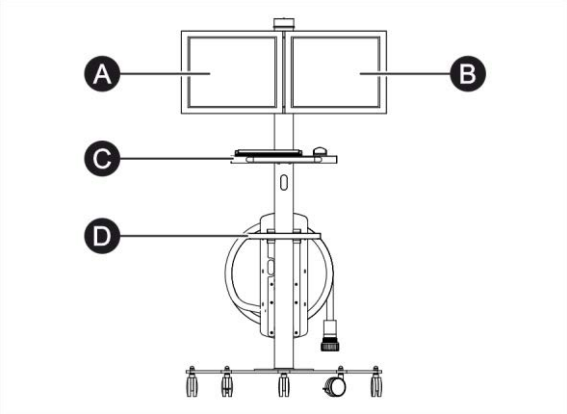


A- brake ON
B- oblique movement
C- free movement
D- oblique movement
E- right-left movement

4.4 Display station

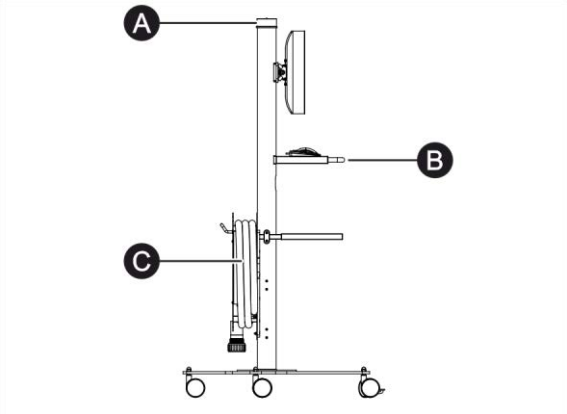
4.4.1 "Basic" display station

SBFM memory version



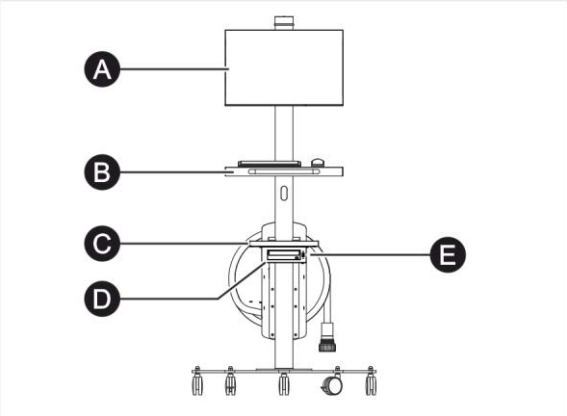
A - "Live" Monitor
B - Reference Monitor *
C - Accessories holder shelf
D - Accessories holder shelf

* present as per the configuration

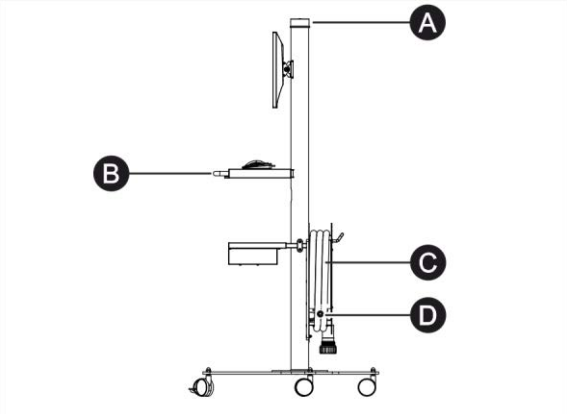


A - X-ray lamp
B - Handle for the movement of the display station
C - Cable reel

EYES memory version

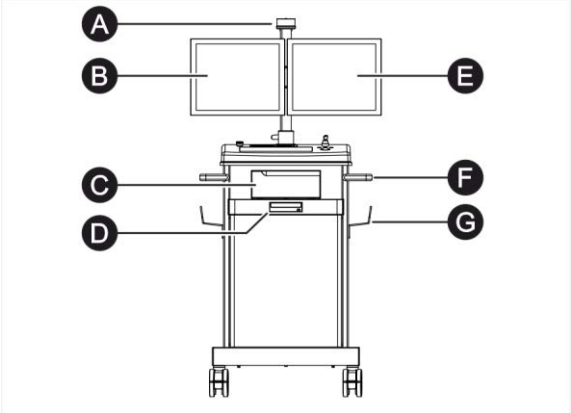


A - "Live" and reference Monitor
B - Accessories holder shelf
C - Accessories holder shelf
D - DVD writer
E - USB image transfer socket



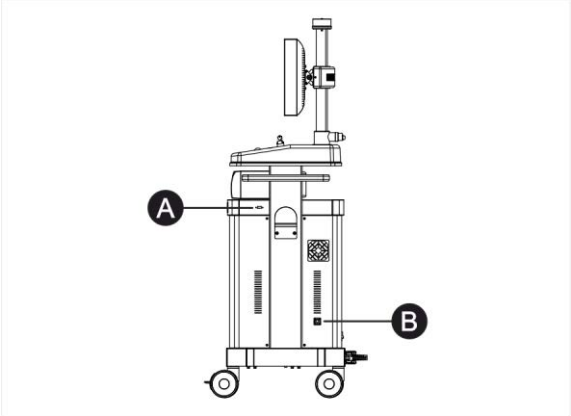
A - X-ray lamp
B - Handle for the movement of the display station
C - Cable reel
D - Socket for LAN connection

4.4.2 "Premium" display station

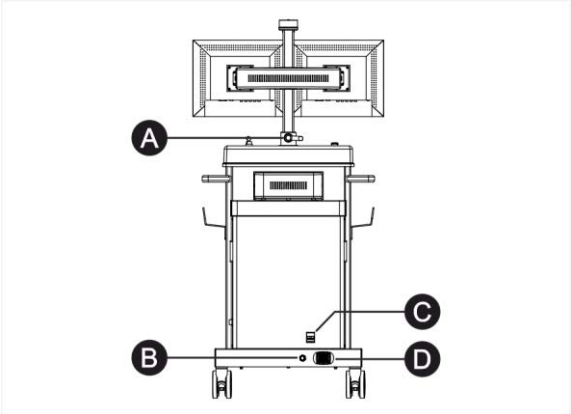


A - X-ray lamp
B - "Live" monitor
C - Thermal Printer **
D - DVD recorder
E - Reference monitor
F - Handles for the movement of the display station
G - Cable reel

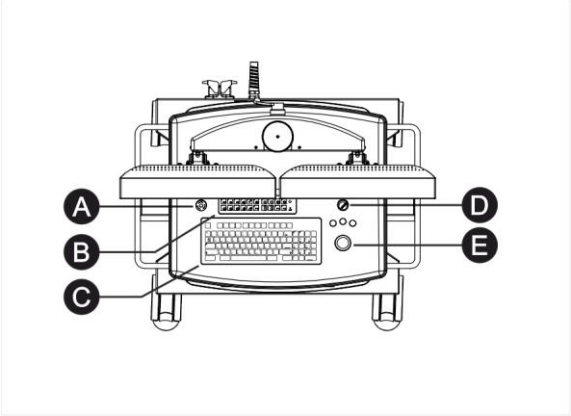
** optional



A - USB outlet for images transfer
B - Outlet for LAN connection



A - Monitor support rotation brake
B - Power supply cable
C - Circuit breaker switch
D - Connector for connecting cable between the display station and the mobile stand



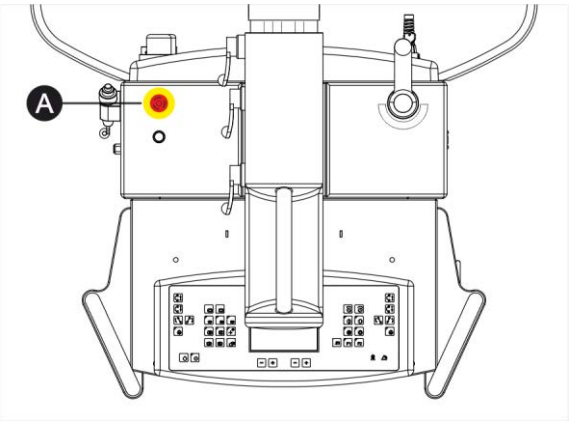
A - Emergency pushbutton
B - Remote control keyboard
C - Alphanumeric keyboard
D - Switching-ON key
E - Trackball

4.5 Safety devices

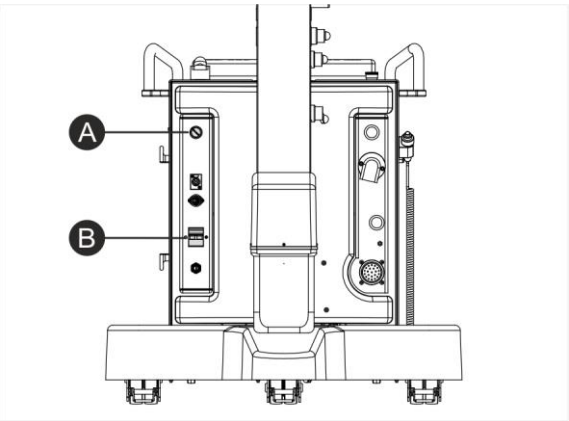
The position of the safety devices changes according to the display station configuration.

4.5.1 Position of the safety devices

Mobile C-arm stand



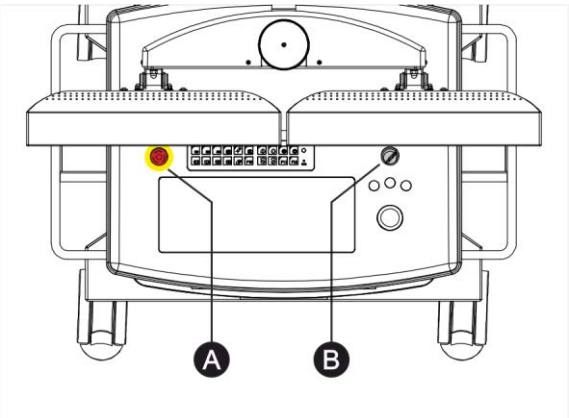
A - Emergency pushbutton



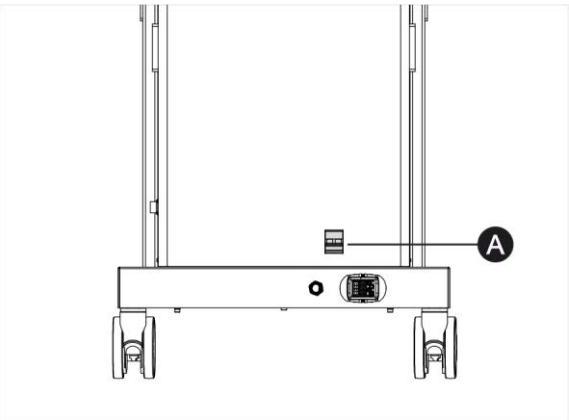
A Switching-ON key*
B Circuit breaker switch *

* present as per the configuration

"Premium" display station

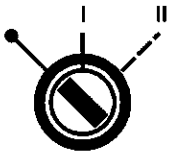


A - Mushroom emergency pushbutton
B - Safety key



A - Magnetothermic switch

ON key

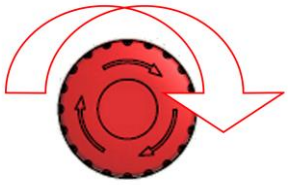


A removable ON key prevents the use from non-authorized personnel.
The key is motor type and it has three positions.

Position	Mnemonic	Description
Position 0	OFF	Position for key removal. Equipment OFF
Position I	WAIT	Stable position. Equipment supplied by the mains
Position II	START	Instable position. Equipment ON.

Emergency pushbutton

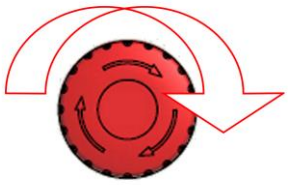
Activation of the emergency pushbutton on the C-arm stand



The mushroom emergency pushbutton on the C-arm stand stops the power supply to the motor of the arm UP-DOWN movement in case of danger.

1. Press the pushbutton to stop the movement.
On the display
"PRESSED UP/DOWN EMERGENCY" appears
2. Rotate clockwise the pushbutton to restore the movement and the use of the equipment.
3. Press the key "ALARM RESET" to delete the message.

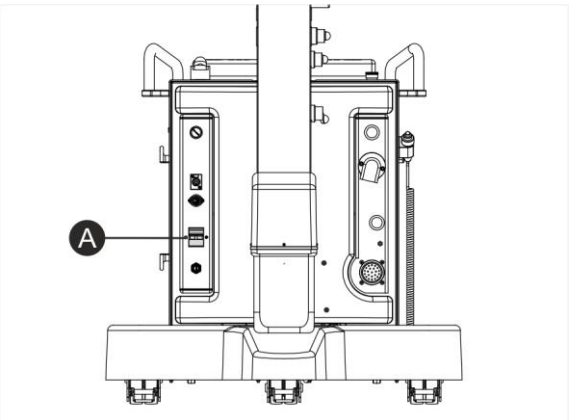
Activation of the emergency pushbutton on the display station



The mushroom emergency pushbutton on the display station stops the power supply to the whole equipment.

1. Press the pushbutton to stop the power supply.
2. Rotate clockwise the pushbutton to restore the use of the equipment.

Magnetothermic switch



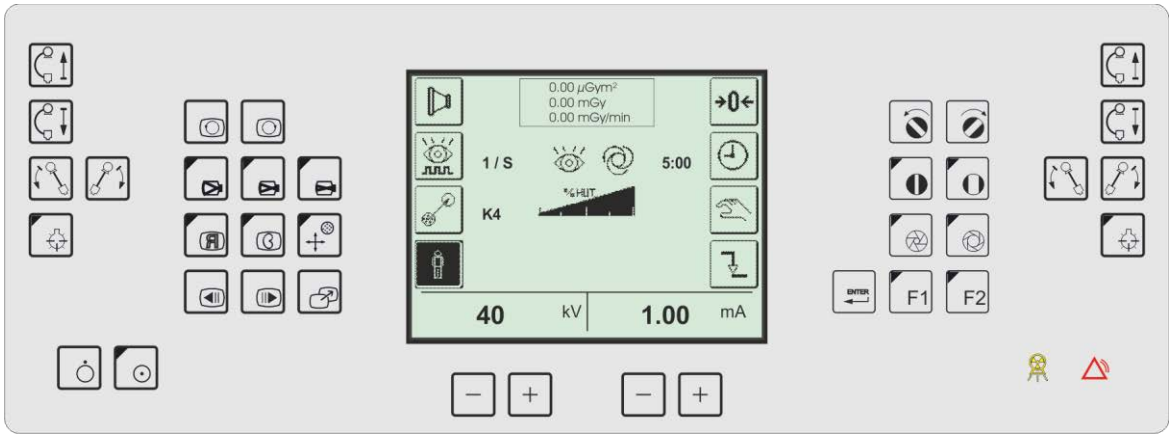
The equipment is protected by a magnetothermic switch (pos.A) against excessive fluctuations of the mains.

In case the magnetothermic switch intervenes, in order to reactivate the working of the equipment, it is enough to put again the switch control in "I" position.

4.6 Control Keyboards

4.6.1 Control keyboard on C-arm stand

All keys are membrane type. The keyboard group can rotate ±60° in respect of the central position. In the following figure the graphic and keys position are shown but not the colors of the keyboard.

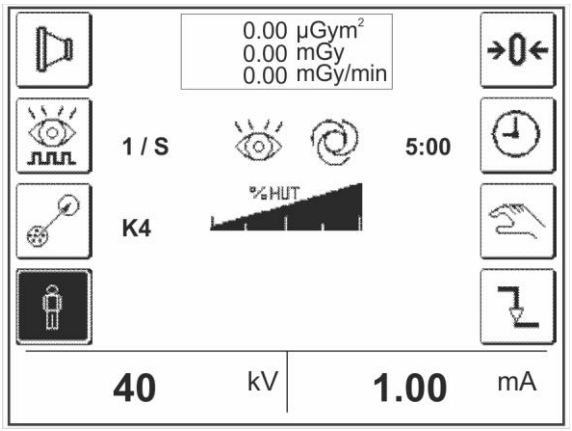


Key	Description	Key	Description
	Vertical arm movement		
	C-arm rotation (if available)		Laser targeting device OFF/ON
	Equipment OFF		Led for x-ray emission signal
	Equipment ON		Alarm signal
	Digital image rotation (1)		Shutters diaphragm rotation
	Image enlargement		Shutters diaphragm closing/opening
	Horizontal image reversal (2)		Iris diaphragm closing/opening
	Image edges enhancement (2) (3)	ENTER	ENTER + F1: "Utility Mode" selection
	Motion Detector (unavailable function)	F1	
	Stored images scrolling (2)	F2	Commutation between LIVE image and MEM image on single monitor.
	Image transfer from the live monitor to the memory monitor (4)		
− +	kV decrease / increase	− +	mA/mAs decrease / increase

(1) For SBFM memories series: by pressing at the same time the two rotation push-buttons for four seconds, there is the digital image rotation resetting.
(2) For RTP and HRP memories series: the functions are enabled only from the memory
(3) For EYES memories series: the function is enabled only from the memory
(4) For RTP, HRP and EYES memories series: the pushbutton stores the image. The image transfer is possible only from the memory.

4.6.2 Display

Alphanumeric touch-screen display 5,7" for x-ray parameters and warning/error messages.



The keys, so-called at "retention", are displayed:

 in positive on white background for the non-active function

 in negative on black background for the active function

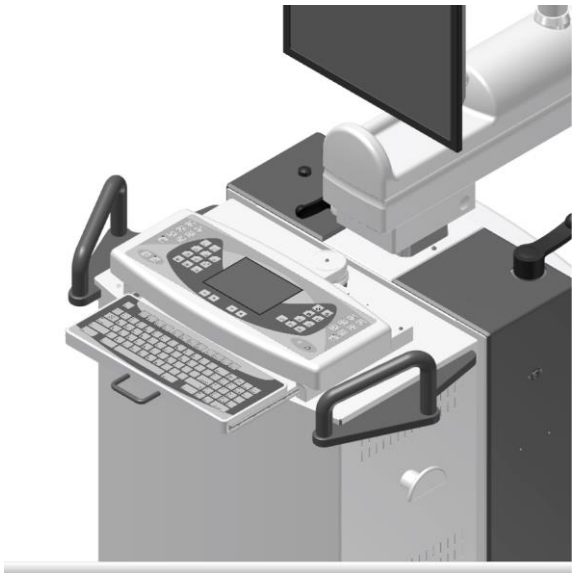
Note: the box with the dose indication is displayed only if the dosimeter is installed and in working condition.

4.6.3 Control keyboards on "Basic" display station

The memory series SBFM76 has not the keyboard.
The memories series SBFM78 have the alphanumeric keyboard for the patient data input.

Key	Description
F1	to insert PATIENT NAME (max 63 characters)
F10	to insert DATE and TIME
F5	for the activation of NEGATIVE function on Memory Monitor
HOME	displays the last image recently stored
END	displays the last image in the memory buffer
PAG UP	scrolling of stored images in increasing order
PAG DN	scrolling of stored images in decreasing order

The SBFM device has got the function that allows to delete completely the stored images.
=> Press at the same time for four seconds the keys "PG UP" and "PG DN".
The necessary time for the deletion changes from 10 s to 2 min.
The keyboard can be placed under the main keyboard of the equipment or on the highest shelf of the "Basic" display station.



Alphanumeric keyboard on C-arm stand

4.6.4 Control keyboards on "Premium" display station

On "Premium" display stations, there are a small keyboard that duplicates some controls present on the equipment keyboard and an alphanumeric keyboard with trackball for patient data input.
All keys are membrane type.

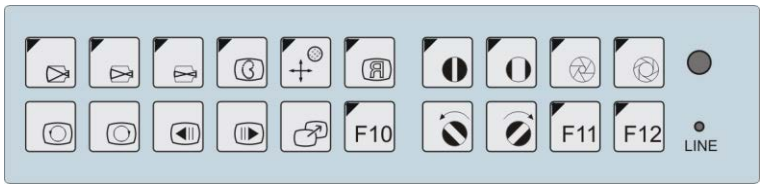


Image enlargement		Digital image rotation (1)	
Image edges enhancement (2) (3)		Stored images scrolling (2)	
Motion Detector (unavailable function)		Image transfer from the live monitor to the memory monitor (4)	
Image reversal on vertical axis (2)		F10	n.u.
Shutters diaphragm closing/opening		Shutters diaphragm rotation	
Iris diaphragm closing/opening		F11-F12	n.u.

(1) For SBFM memories series: by pressing at the same time the two rotation push-buttons for four seconds, there is the digital image rotation resetting.
(2) For RTP and HRP memories series: the functions are enabled only from the memory
(3) For EYES memories series: the function is enabled only from the memory
(4) For RTP, HRP and EYES memories series: the pushbutton stores the image. The image transfer is possible only from the memory.

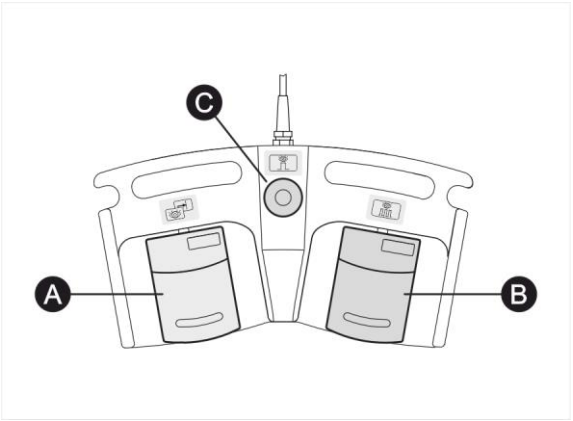
4.7 Audible signals

Signal	Description
1 BEEP (2)	Sound signal when any key is pressed.
3 BEEP	Sound signal of occurred x-ray emission with success in radiography mode
1 LOW BEEP	Alarm or malfunction (1 sec).

(2) It is possible to deactivate the audible signals or modify the volume (see par. **Utility Mode a pag. 90**)
It is not possible to modify the volume of the x-ray exposure signals.

4.8 Fluoroscopy control footswitch

The fluoroscopy control footswitch consists of a double-step pedal and two single-step ones.
The functions in the different modes are:



A - Left pedal (two steps):
Fluoroscopy Mode:
1° step: **fluoroscopy control**.
2° step: **image storage**; in continuous fluoroscopy the current image is stored.

B - **Right pedal (one step):**
The working mode changes according to the installed memory

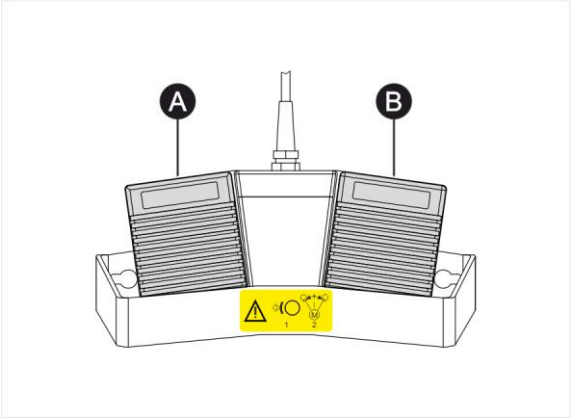
C - **Third pedal (one step):**
Fluoroscopy mode:
"snapshot" control, high-contrast exposure with reduced background noise.

4.9 Footswitch for C-arm rotation ±30°

Only for motorized version of the "C" arm rotation.

Before activating the footswitch for C-arm rotation ±30°, ensure that the arm rotation brake around the horizontal axis has been disabled.

The footswitch for the C-arm rotation consists in two pedals at single step. The functions are:

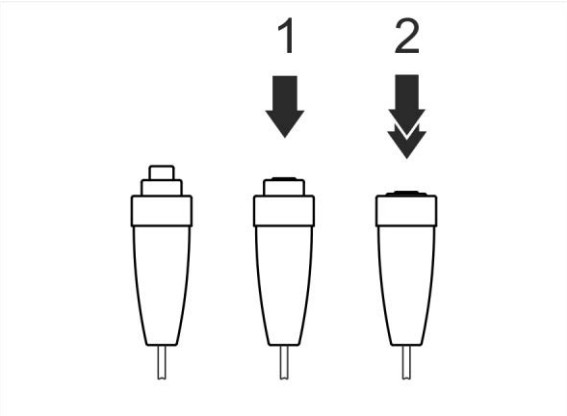


A - Left pedal:
Pedal for left rotation

B - Right pedal:
Pedal for right rotation

The rotation movement stops automatically in vertical position. In order to go on with the movement, release and press again the pedal.

4.10 Handswitch for radiography / fluoroscopy control



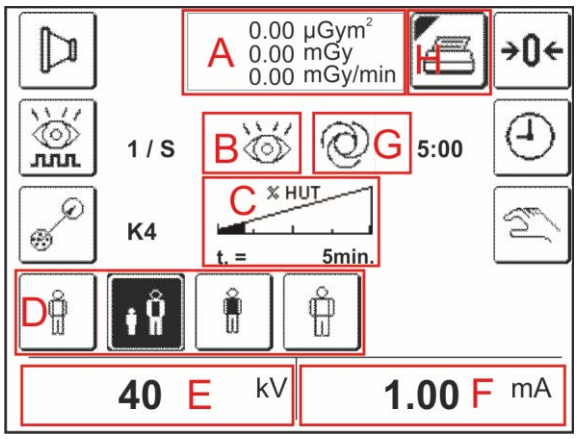
The control handswitch is composed by a two steps switch. According to the working mode, it controls different functions:

Radiography mode:
]1° step: **preparation control.**
2° step: **x-ray release control.**
It is possible to press at the same time the preparation and the x-ray release controls, with an emission delay due to the anode starting phase *(only for rotating anode version).*

Fluoroscopy mode:
]1° step: **fluoroscopy control.**
2° step: **image storage.**
Normally the fluoroscopy functions are enabled. In order to disable them, call Service.

5 MESSAGES

5.1 Operative messages



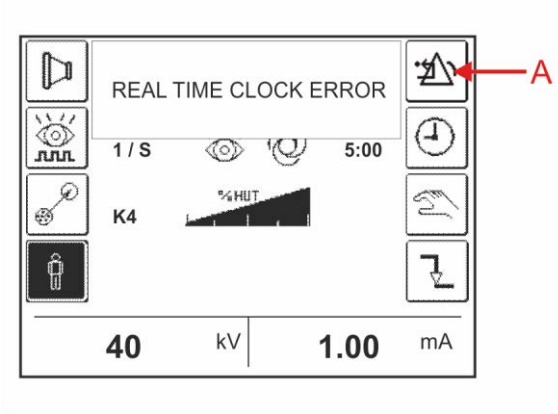
A - Dosimetric indications (only if dose meter is present and in working condition) / messages area.
B - RADIOGRAPHY / FLUOROSCOPY mode indication.
C - Thermal units indication (HUT).
D - Selection of the Anatomics Curve in Fluoroscopy: Standard / Paediatrics / Lungs / Standard for large patient *(only for rotating anode chamber 1K)*.
E - Indication of the set kV value. It changes in Automatic mode or, in Manual mode, by using the kV+ and kV- keys.
F - Indication of the mA value concerning the kV and the selected curve. During the exposure it indicates the measured mA value.
G - Indication of the AUTOMATIC / MANUAL mode
H - Dose printing key. It appears if the dosimeter is present and in working condition and if the printing mode in Utility Mode is selected.

Indication of the available thermal units (HUT) which are expressed in percentage from 0% (indicator completely white and spent HUT) to 100% (indicator completely black and available HUT).
When the residual HUT value allows a use of the equipment for less than five minutes, under the indicator also the residual time indication (t = …min) appears, estimated according to the used power. Simultaneously an acoustic alarm that cannot be modified is emitted.
When the residual HUT reach 0%, the x-rays emission block intervenes.
As the monobloc temperature decreases, the HUT are recovered.
The indication of the residual time disappears when the thermal units allow a use for more than five minutes.
It is possible to exceed the limit of 0% and proceed with the x-rays emission only in fluoroscopy mode till the intervention of the thermal monobloc safety.
This choice must be performed by authorized and qualified personnel and on direct request of the final user.

The dosimetric indications area is displayed only if the dosimetric chamber is installed and in working condition.
In the area the following is displayed:
the dose value is the value measured by the DAP chamber (µGym²)
The RAK value is the total dose accumulated calculated in the interventional reference point (mGy)
The value RAKR is the dose rate calculated in the interventional reference point (mGy/min)

Furthermore, the values RAK and RAKR are displayed in the corner down on the right of the monitor live image (only for memories series HRP and RTP).

5.2 Alarm messages



On the display the warning or error message appears in a proper box.
The message is displayed in the language used for the equipment configuration.

All the warning messages must be reset by the operator through the key ALARM RESET (A) next to the message.

Text	Meaning	Intervention
DOSIMETER NOT OK	The dosimeter does not reply.	Press the "ALARM RESET" key in order to go on working. Check that the dosimeter is not selected when it is not present on the equipment. Call Service to perform the necessary checks.
MAINTENANCE REQUIRED	At least eleven months are passed from the last performed planned maintenance.	Press the "ALARM RESET" key in order to go on working. Call Service to perform the planned maintenance.
REAL TIME CLOCK ERROR	The system clock does not work.	Press the "ALARM RESET" key in order to go on working. Warning! This function results particularly important for the calculation of the thermal units recovery. Call Service to perform the necessary checks.
EXHAUSTED THERMAL UNIT	The thermal capacity of the monobloc is exhausted.	Wait for the thermal units recovery.
EXHAUSTED XR TIME	Continuous fluoroscopy time exhausted (max 10min)	Release the footswitch and go on with the operation.
GENERATOR OFFLINE	The generator does not communicate with the central unit.	Switch the equipment OFF, wait for some seconds and switch ON again. In case the error persists, call Service.
CAN-BUS ERROR	Error in the field bus	Switch the equipment OFF, wait for some seconds and switch ON again. In case the error persists, call Service.
MEMORY CONTROLLER OFFLINE	The memory does not communicate with the central unit.	Switch the equipment OFF, wait for some seconds and switch ON again. In case the error persists, call Service.
MOTOR DRIVER COMMUNICATION *	The motor driver does not respond to the field bus	Press the "ALARM RESET" key in order to go on working (it is possible to go on with XR, if the I.I. field results to be free). In case the error persists, call Service.
FILAMENT ERROR	Problems found in the filament management.	Press the "ALARM RESET" key in order to go on working. If the error repeats and persists also at the next start-up, call Service.
KV ERROR	Error in the kV generation	Press the "ALARM RESET" key in order to go on working. If the error repeats and persists also at the next start-up, call Service.
mA OVERLOAD	Error in the mA reading (over the max. allowed limit)	Press the "ALARM RESET" key in order to go on working. If the error repeats and persists also at the next start-up, call

		Service.
THERMIC ALARM	The temperature of the monobloc has reached the max. allowed value.	Wait for the tube cooling
EMERGENCY UP/DOWN PUSHED	Pressed UP/DOWN emergency push-button.	Reset the correct working of the emergency push-button by turning it clockwise.
POWER SUPPLY ERROR	Wrong secondary power supply	Switch the equipment OFF, wait for some seconds and switch it ON again. In case the error persists, call Service.
FOOTSWITCH OR HANDSWITCH ERROR	Faulty or damaged footswitch or handswitch for the x-ray control	Disconnect and reconnect the footswitch. In case the error persists, call Service.
STARTER FAULT **	Error in the circuit of the rotating anode.	Switch the equipment OFF, wait for some seconds and switch it ON again. In case the error persists, call Service.
OPEN DOOR WARNING	For the equipment provided with the door control, the door to enter the room is open.	Check that the door is closed correctly. In case the error persists, call Service.
VIDEO SIGNAL NOT OK	The video signal is not present or it is not bright enough.	Switch the equipment OFF, wait for some seconds and switch it ON again. Check that the trolley is connected to the unit and that the BNC cables are properly connected to the monitors. In case the error persists, call Service.
UNAVAILABLE INVERTER POWER SUPPLY	Unavailable inverter power supply	Switch the equipment OFF, wait for some seconds and switch ON again. In case the error persists, call Service.
MAX. X-RAY TIME	The max. exposure time has been reached.	Press "ALARM RESET" key to go on, repeat x-rays. In case the error persists, call Service.
TIMEOUT	The preparation handswitch is held down for more than 15 seconds without performing x-rays.	Release the preparation handswitch and repeat the operation.
MANUAL X-RAY STOP	The x-ray hand switch has been released before the end of the exposure.	Press "ALARM RESET" key to go on and repeat the exposure.
MISSING PULSES	Control pulses lack from the memory	Press the "ALARM RESET" key in order to go on to work. In case the error persists, call Service.
CCA BUSY	Busy central unit control	Press the "ALARM RESET" key in order to go on to work. In case the error persists, call Service.

* Iris – Rotation – Shutters
** Only rotating anode

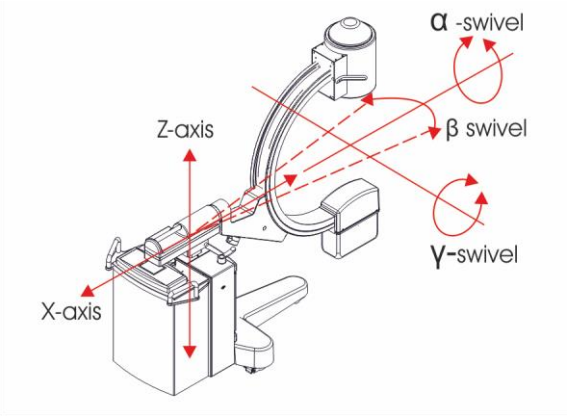
6 OPERATION

6.1 Transport

Tilting hazard.
Use and transport on inclined floors.
► Don't use the equipment on floors with inclination higher than 5°.
► Don't move the equipment on floors with inclination more than 10°.

Danger of damages and injuries during the equipment movement.
The uncontrolled movement of the equipment could cause damages to the operator, patient and personnel in proximity of it.
► The equipment must be moved only in the condition called "transportation" and with all the blocks of the movements activated.

Movement position



Move the equipment only if it is in "transport" position:

X-axis = horizontal movement all back
Z-axis = vertical movement all down
α-swivel = x-ray group rotation around 0° X axis
β-swivel = x-ray group rotation around 0° Z axis
γ-swivel = x-ray group rotation around its axis 0°

The equipment must be OFF, the mains plug removed from the outlet and the cable winded-up on the cable reel.
The display station, if present, must be disconnected from the C-arm Stand and the cables winded-up around the cable reel.

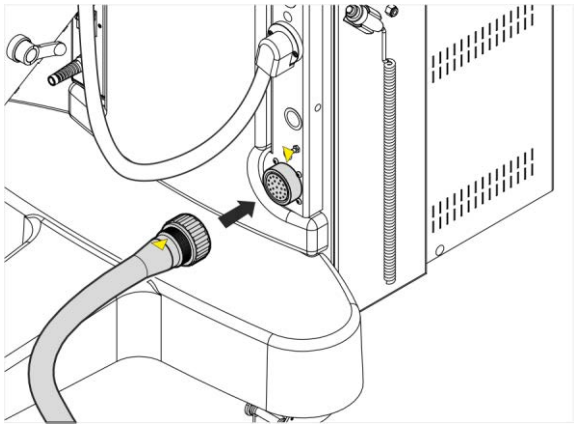
► Check that the arm movement brakes are all ON (locked).
► In order to make the movement easier, use the rotation of the rear wheels of the C-arm stand.

6.2 Display station connection

Potential risks
Damages to the connectors and equipment.
► Grip the plug to extract the connector
► Don't extract the plugs from the outlets by pulling the cable.
► Handle the connectors with care.

"Basic" display station

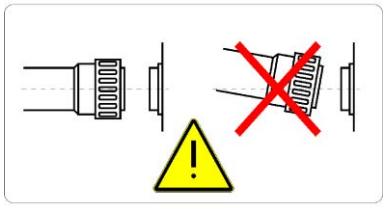
On the display station "Basic", the cable is sectionable from the C-arm stand side, while it is fixed permanently from the side of the display station.



The connection between the C-arm stand and the display station is through a multipolar connector with bayonet mount.

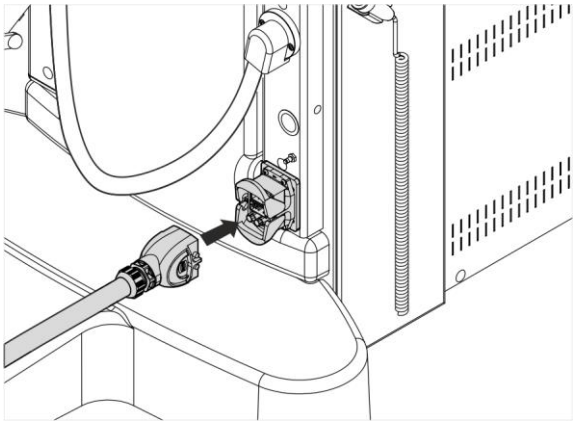
For a correct insertion of the connector:

1. grip the movable connector so that the yellow arrows present on the parts are aligned (point against point).
2. take care to insert the movable connector so that it is as much parallel as possible to the fixed connector. Avoid oblique insertions.
3. rotate clockwise the rubber ring nut of the movable connector till the snap that ensures the holding.

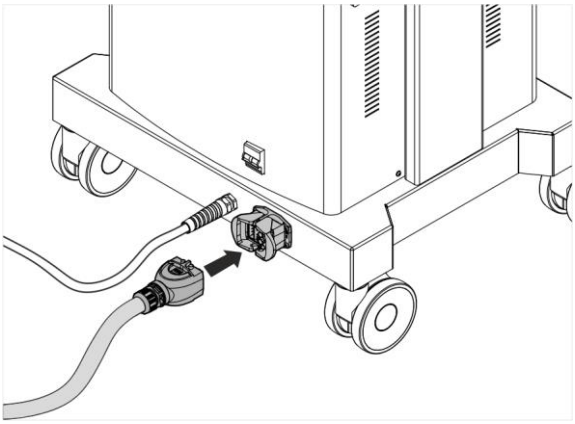


"Premium" display station

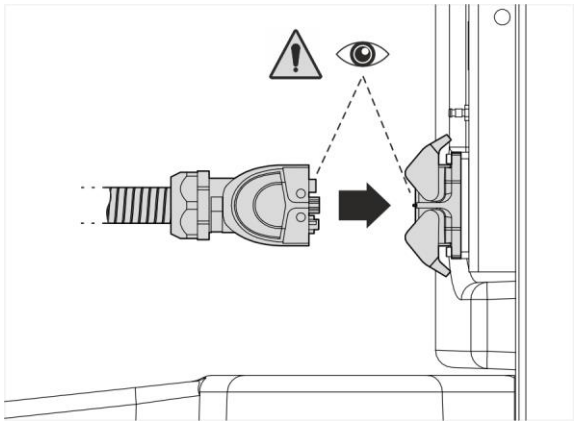
On the "Premium" display station, the cable is sectionable both from the side of the C-arm mobile stand and from the side of the display station.
The connection between mobile stand and display station is performed through connectors type Harting with locking levers.



mobile C-arm stand connection

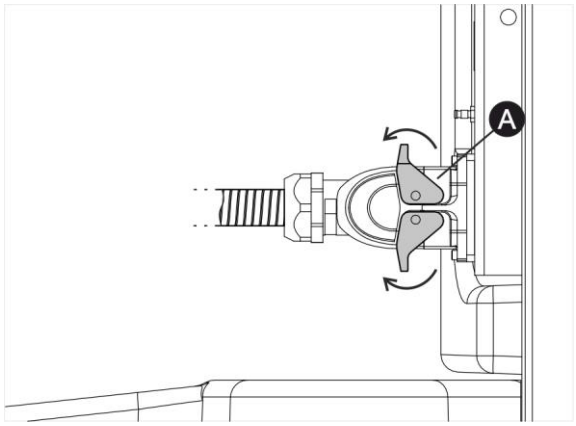


Display station connection



For a correct connection:

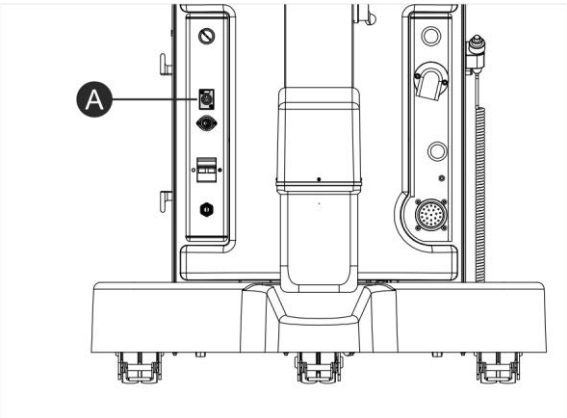
1. Take the connector and check the correct direction of the contacts.
2 . Insert the connector with care, by keeping it in line with the fixed connector to avoid damages to the contacts.



3. Use the two levers (A) to lock the connector.

6.3 Fluoroscopy footswitch connection

Potential risks
Damages to the connectors and equipment.
► Grip the plug to extract the connector
► Don't extract the plugs from the outlets by pulling the cable.
► Handle the connectors with care.



The connection of the fluoroscopy footswitch occurs through a connector with pressure mount.

1. Insert the connector of the footswitch in the proper outlet present on the C-arm stand (A).

6.4 Connection for External Interlocks

Potential risks
Damages to the connectors and equipment.
► Grip the plug to extract the connector
► Don't extract the plugs from the outlets by pulling the cable.
► Handle the connectors with care.

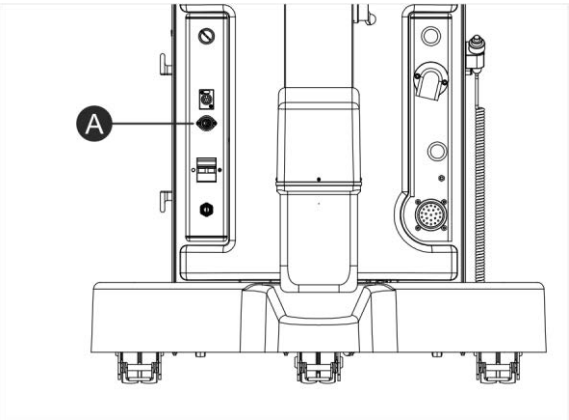
The prearrangement of the external signals wiring must be performed by qualified and authorized personnel.

It is possible to use the equipment as fixed position so that some warning signals are repeated outside the operating room.

In detail the repeated warning signals are for:

- a lamp that indicates the equipment ON
- a lamp that indicates the x-ray emission
- a door opening contact that stops the x-ray emission.

The connection occurs through a multipolar connector with locking on ring nut.



For the connection:

1. Switch the equipment OFF;
2. Remove the terminal board closing cap;
3. Insert the connector of "external interlocks" cable in the proper socket present on the C-arm stand (A);
4. Ensure that the connector is screwed tight.
5. Switch the equipment ON

In order to remove the connection:

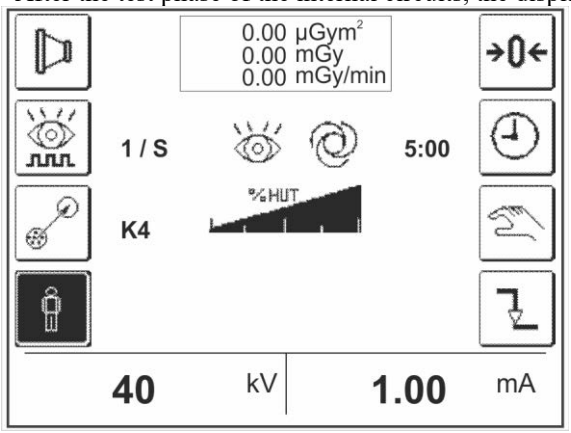
1. switch the equipment OFF
2. unscrew and remove the cable connector
3. apply again the closing cap in the terminal board.
4. switch the equipment ON

6.5 Start up

Damages to people or things
Use of the equipment by non authorized personnel.
► Never leave the equipment unguarded with ignition key inserted.
► Remove and keep the ignition key in a suitable and save place.

1. Uncoil the power supply cable from the cable reel and extend it completely.
2. Connect the power supply cable to a standard power supply outlet, by keeping the cable extended.
3. Put the magnetothermic switch in "I" position.
4. Insert the ON key and rotate it clockwise in "WAIT" position.
5. Rotate the ON key clockwise in "START" position and release it (the led of the ON push button lights up).
6. Press the ON push button of the equipment.

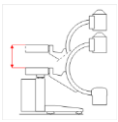
After the test phase of the internal circuits, the display shows the initial screen.



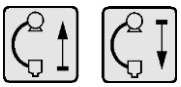
In the version with "Premium" display station the power supply cable, the circuit breaker switch, the ON key and the emergency pushbutton are on the display station.
The display station can be ON without being connected to the C-arm stand.
The connection cable with the C-arm stand can be connected/disconnected also with the supplied display station.

6.6 Positioning

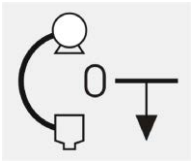
Damages to people or things.
Movement of the "C" arm with braking systems ON.
► Before performing a movement of the "C" arm, deactivate the relative braking system.
► Don't move the "C" arm with braking systems ON.



Adjust the arm height (motorized movement).

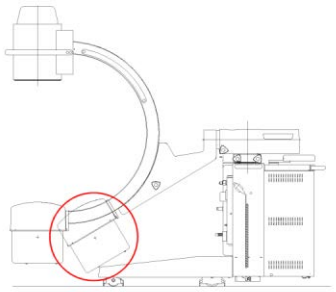


Use the control keys to change the position inside the travel.

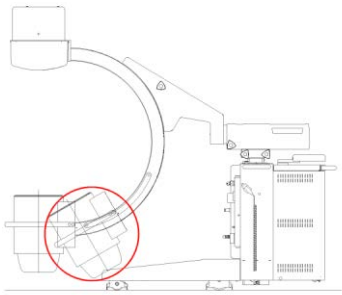


Use the Down key with the "Down Enable" key to perform the extra-run downwards.

In order to avoid collisions between the monobloc or I.I. tube with the front leg of the C-arm stand, the vertical run is limited downwards. It is possible to exceed this limit by pressing at the same time the down key placed on the control panel and the "Enable Down" push-button placed near the red emergency key. During this operation be careful to the monobloc or I.I. position in order to avoid collisions and damages to the equipment.



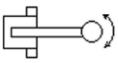
Monobloc collision hazard



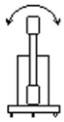
Tube Intensifier collision hazard

6.6.1 9" C-arm version positioning

Adjust the horizontal position (manual movement).



Perform the possible overview rotation of the C-arm (manual movement).



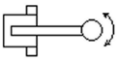
Manual rotation: Release the "0 position" lock. Adjust the C-arm rotation around the horizontal axis, the goniometric scale will indicate the rotation angle (manual movement).

Motorized rotation: press the enabling pushbutton. Only if the rotation angle is less than ±30° with respect to the vertical, the motorized transmission is enabled. Otherwise it is necessary to manually place back the C-arm within the ±30°.

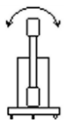
Release the "0 position" lock. Adjust the orbital position of the C-arm (manual movement).

6.6.2 12" C-arm version positioning

Adjust the horizontal position (manual movement).



Perform the possible overview rotation of the C-arm (manual movement).



Release the "0 position" lock. Adjust the C-arm rotation around the horizontal axis, the goniometric scale will indicate the rotation angle (manual movement).

Adjust the orbital position of the C-arm (manual movement).

When the positioning has been completed, check that all the braking systems are activated.

6.7 Use modes

Ionizing radiations.
The operations described below require the emission of ionizing radiations.
► Take the proper measures in order to avoid exposing any part of the body to direct or indirect radiations.

Radiation risk for the operating personnel
Presence of operators in non-protected areas
► The operating personnel must be protected from x-rays through a protection screen or similar protective measures during x-rays emission.

Excessive dose of radiations
X-rays emission time of the x-ray generator.
►The x-ray generator must be used only during the time necessary for the treatment.
► Treatment should be as short as possible, using the lowest dose possible to obtain the correct diagnostic information.

Excessive ionizing radiations.
Non-observance of the safety instructions.
► Doctors who use a x-ray equipment must be authorized and must be aware of medical issues.

Before performing any examination make sure that the residual exposure time indication is enough to the complete execution of the diagnostic research.

At the beginning of the work shift it is advisable to perform a tube heating cycle.
After a unit idle period of at least three months, perform a tube seasoning program.
Set the radiological data inserted in the following schedule.

	kV	mA/mAs	ON time	OFF time	to be repeated
Fluoroscopy	70	3mA	5'	5'	5 times
Radiography	70	12,5mAs	0,5 sec	30 sec	increase of 5kV till kVmax.

If, during the procedure, working irregularities or anomalies are found, it is necessary to stop it for at least half an hour and restart it later from the beginning.

6.8 Operating mode with memory series SBFM

Radiation risk for the operating personnel
Presence of operators in non-protected areas
► The operating personnel must be protected from x-rays through a protection screen or similar protective measures during x-rays emission.

Before performing any examination make sure that the residual exposure time indication is enough to the complete execution of the diagnostic research.

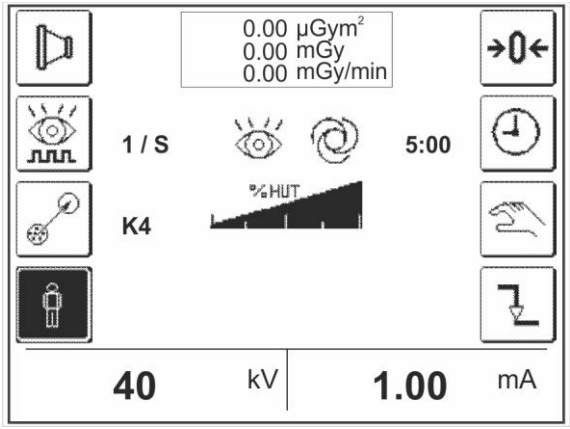
The intended operating modes for the equipment in combination of the memory series SBFM are:

- Continuous fluoroscopy (automatic and manual)
- Pulsed fluoroscopy (automatic and manual)
- Snap Shot
- Radiography
- Utility Mode

6.8.1 Automatic continuous fluoroscopy

Operating mode with memories series SBFM

Turn the equipment ON according to what described in § "**Accensione a pag. 52** ". After the test phase of the internal circuits and the software, the equipment is prearranged to work in automatic fluoroscopy.
The display appears as shown below:



To perform an exposure with this mode, please proceed as follow:

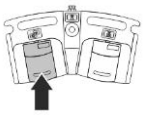
STANDARD ANATOMICS curve selection. When the function is selected, aside the key, the keys concerning the anatomic curves that can be selected appear.

When the key is selected, it appears in "negative". By selecting one of these curves, the equipment proposes proper kV-mA couples. It is not possible to modify the parameters

ANATOMY curve for Fine Anatomic Parts or pediatrics.

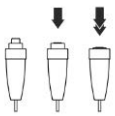
ANATOMY curve for lungs.

Select the required recursive filter. It is possible to modify the recursive filter even during the x-ray emission.



Press the left pedal of the x-ray control footswitch. After activating the x-ray control, the kV/mA values can be adapted automatically to the patient under examination in order to get the best possible image. By pressing completely the pedal (second step), the image is stored.

X-ray emission LEDs on the keyboard and on the display station lit.



The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

In the display the below listed functions are available :

Selection of the RADIOGRAPHY mode (|**Radiografia a pag. 85**)

Key for the resetting of the dose value indicated in the central box. The key is active only if the dosimeter is installed and in working condition. Hold down for at least two seconds to reset the displayed value.

5:00 

Indication of the residual Fluoroscopy time and the relative restoring key. The time indicates the effective time of load application[1].

0:00 

When 5 minutes (uninterrupted or cumulative) are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the recovery key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

X-ray stop after uninterrupted 10' of load application[1] (not cumulative). In the case where the stop has been performed, it is possible to go on with the load application[1] by releasing or activating again the fluoroscopy control.

Selection of MANUAL mode (|**Fluoroscopia continua manuale a pag. 65**)

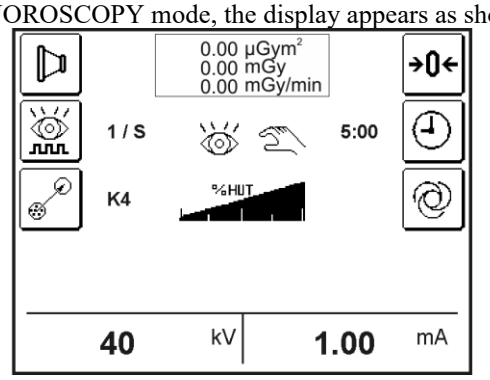
(1/2) mA curve selection. When the key is selected, the STANDARD curve with the halved mA values is used.

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

6.8.2 Manual continuous fluoroscopy

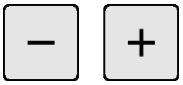
Operating mode with memories series SBFM

By entering MANUAL FLUOROSCOPY mode, the display appears as shown in the figure:



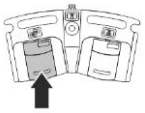
Manual Fluoroscopy Display

In order to perform an exposure with this mode, proceed as follows:



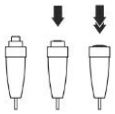
Set the required kV and mA value. The variation of the exposure parameters allows to modify the image quality at the discretion of the operator.

Select the required recursive filter. It is possible to modify the recursive filter even during the x-ray emission.



Press the left pedal to control the exposure. After activating the x-ray control, the kV/mA values can be set by the operator. The variation of the exposure parameters allows to modify the image quality at the discretion of the operator. The automatic control system of the image is disabled, By pressing completely the pedal (second step), the image is stored.

X-ray emission LEDs on the keyboard and on the display station lit.



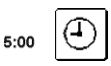
The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· 2° step: **image storage**.

In the display the below listed functions are available :

Selection of the RADIOGRAPHY mode (|**Radiografia a pag. 85**)

Key for the resetting of the dose value indicated in the central box. The key is active only if the dosimeter is installed and in working condition. Hold down for at least two seconds to reset the displayed value.



Indication of the residual Fluoroscopy time and the relative resetting key. The time indicates the effective load application time[1]

When 5 minutes (uninterrupted or cumulative) are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

X-ray stop after uninterrupted 10' of load application[1] (not cumulative). In the case where the stop has been performed, it is possible to go on with the load application[1] by releasing or activating again the fluoroscopy control.

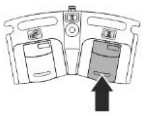
Selection of AUTOMATIC mode (|**Fluoroscopia continua automatica a pag. 63**)

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

6.8.3 Automatic and manual pulsed fluoroscopy

Operating mode with memories series SBFM

Selection of the PULSED FLUOROSCOPY frequency. By pressing the key the selection and the indication on the side change



Press the right pedal to control the exposure. After the kV balance time, the exposure with the frequency set on the display is performed (the cadence changes according to the features of the installed memory).

In MANUAL mode, the kV and mAs value must be set by the operator. The exposure parameters variation allows to modify the image quality at the discretion of the operator.

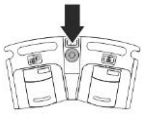
X-ray emission LEDs on the keyboard and on the monitor trolley lit.

6.8.4 Snapshot

Operating mode with memories series SBFM

No selection from the keyboard must be performed.

The "Snapshot" can be performed in Automatic and Manual Fluoroscopy mode without performing any additional choice on the keyboard.



Press the pedal of the X-ray control footswitch. After the kV balance time, an exposure of about 1 sec controlled directly from the equipment is performed. This exposure allows to get an image that is at high contrast and without background noise.

X-ray emission LEDs on the keyboard and on the monitor trolley lit.

6.9 Operating mode with memory series RTP

Radiation risk for the operating personnel
Presence of operators in non-protected areas
► The operating personnel must be protected from x-rays through a protection screen or similar protective measures during x-rays emission.

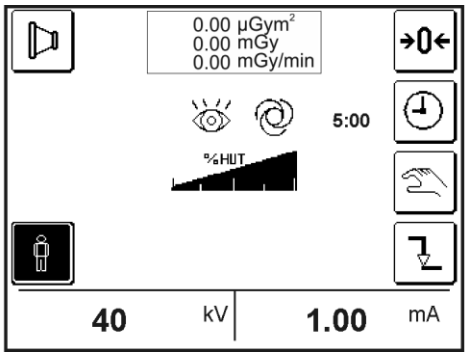
Before performing any examination make sure that the residual exposure time indication is enough to the complete execution of the diagnostic research.

The intended operating modes for the equipment in combination of the memory series RTP are:

- Continuous fluoroscopy (automatic and manual)
- Pulsed fluoroscopy (automatic and manual)
- Snap Shot
- Pulsed fluoroscopy with acquisition
- DSA (Digital subtraction angiography), manual mask
- DSA (Digital subtraction angiography), automatic mask
- Road Map
- Radiography
- Utility Mode

6.9.1 Automatic continuous fluoroscopy

Operating mode with memories series RTP
Turn the equipment ON according to what described in § "**Accensione a pag. 52** ". After the test phase of the internal circuits and the software, the equipment is prearranged to work in automatic fluoroscopy mode.
The display appears as shown in the figure:



Display - Automatic Fluoroscopy

In order to perform an exposure with this mode, proceed as follows:

Select the STANDARD ANATOMICS curve. When the function is selected, aside the key, the keys concerning the anatomic curves that can be selected appear.

When the key is selected, it appears in "negative". By selecting one of these curves, the equipment proposes proper kV-mA couples. It is not possible to modify the parameters

ANATOMY curve for Fine Anatomic Parts or pediatrics.

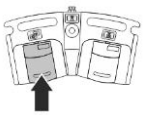
ANATOMY curve for lungs.

ANATOMY curve of sturdy patient. (function available only for equipment with rotating anode)

Select the continuous fluoroscopy mode in the memory menu on the display station.

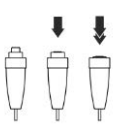
Select the required recursive filter (2, 4, 8, 16). It is possible to modify the recursive filter even during x-ray emission.

If required, select the Smart filter (On Off), it is possible to select the Smart filter even during the x-ray emission



Press the left pedal of the x-ray control footswitch. After activating the x-ray control, the kV/mA values can be adapted automatically to the patient under examination in order to get the best possible image. By pressing completely the pedal (second step), the image is stored.

X-ray emission LEDs on the keyboard and on the display station lit.



The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

In the display the following functions are available:

Selection of the RADIOGRAPHY mode (|**Radiografia a pag. 85**)

Key for the resetting of the dose value indicated in the central box. The key is active only if the dosimeter is installed and in working condition. Hold down for at least two seconds to reset the displayed value.

5:00 

Indication of the residual Fluoroscopy time and the relative resetting key. The time indicates the effective load application time[1]

0:00 

When 5 minutes (uninterrupted or cumulative) are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

X-ray emission stops after uninterrupted 10' of load application[1] (not cumulative). In the case where the stop has been performed, it is possible to go on with the load application[1] by releasing or activating again the fluoroscopy control.

Selection of the MANUAL mode (|**Fluoroscopia continua manuale a pag. 65**)

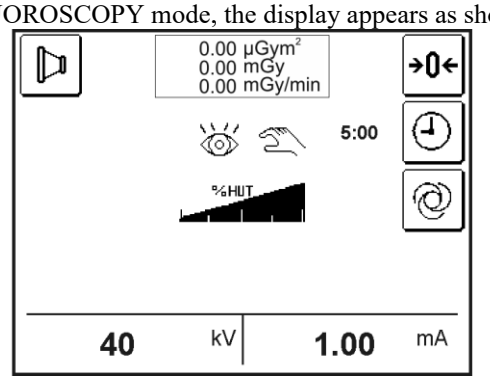
(1/2) mA curve selection. When the key is selected, the STANDARD curve with the halved mA values is used.

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

6.9.2 Manual continuous fluoroscopy

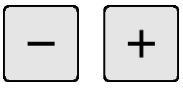
Operating mode with memories series RTP

By entering MANUAL FLUOROSCOPY mode, the display appears as shown in the figure:



Display - Manual Fluoroscopy

In order to perform an exposure with this mode, proceed as follows:

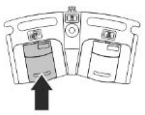


Set the required kV and mA values. The variation of the exposure parameters allows to modify the image quality at the discretion of the operator

Select the continuous fluoroscopy mode in the memory menu on the display station

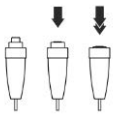
Select the required recursive filter (2, 4, 8, 16). It is possible to modify the recursive filter during the x-ray emission.

If required select the filter Smart (On Off), it is possible to select the Smart filter even during the x-ray emission.



Press the left pedal of the x-ray control footswitch. After activating the x-ray control, the kV/mA values can be set by the operator. The variation of the exposure parameters allows to modify the image quality at discretion of the operator. The automatic check system of the image is disabled. By pressing completely the pedal (second step), the image is stored.

X-ray emission LEDs on the keyboard and on the display station lit.



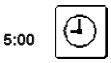
The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

In the display the following functions are available:

Selection of the RADIOGRAPHY mode (|**Radiografia a pag. 85**)

Key for the resetting of the dose value indicated in the central box. The key is active only if the dosimeter is installed and in working condition. Hold down for at least two seconds to reset the displayed value.



Indication of the residual Fluoroscopy time and the relative resetting key. The time indicates the effective x-ray passage and it is updated every second. When 5 minutes are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

When 5 minutes (uninterrupted or cumulative) are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

X-ray stop after uninterrupted 10' of load application[1] (not cumulative). In the case where the stop has been performed, it is possible to go on with the load application[1] by releasing or activating again the fluoroscopy control.

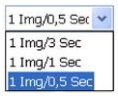
Selection of AUTOMATIC mode (|**Fluoroscopia continua automatica a pag. 63**)

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

6.9.3 Automatic and manual pulsed fluoroscopy

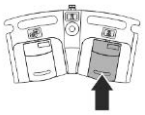
Operating mode with memories series RTP

Select the pulsed fluoroscopy mode on the memory menu on the display station



Select the pulsed fluoroscopy frequency on the memory menu on the display station.

If required select the filter Smart (On Off), it is possible to select the Smart filter even during the x-ray emission.



Press the right pedal to control the exposure. After the kV balance time, the exposure with the cadence set on the display is performed (the cadence changes according to the features of the installed memory).

In MANUAL mode, the kV and mAs value must be set by the operator. The exposure parameters variation allows to modify the image quality at the discretion of the operator.

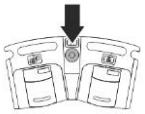
X-ray emission LEDs on the keyboard and on the display station lit.

6.9.4 Snapshot

Operating mode with memories series RTP

No selection from the keyboard must be performed.

The "Snapshot" can be performed in Automatic and Manual Fluoroscopy mode without performing any additional choice on the keyboard.



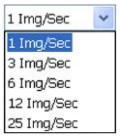
Press the pedal of the X-ray control footswitch. After the kV balance time, an exposure of about 1 sec controlled directly from the equipment is performed. This exposure allows to get an image that is at high contrast and without background noise.

X-ray emission LEDs on the keyboard and on the display station lit.

6.9.5 Pulsed fluoroscopy with acquisition

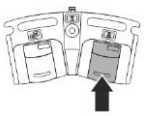
Operating mode with memories series RTP

Select the pulsed fluoroscopy mode with acquisition in the menu of the memory on the display station.



Select the acquisition frequency in the menu of the memory on the display station.

If required select the Smart filter (On Off), it is possible to select the Smart filter even during the x-ray emission.



Press the right pedal to control the exposure. After the kV balance time, the exposure with the cadence set on the display is performed.

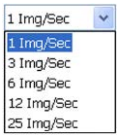
In MANUAL mode, the kV and mAs value must be set by the operator. The exposure parameters variation allows to modify the image quality at discretion of the operator.

X-ray emission LEDs on the keyboard and on the display station lit.

6.9.6 DSA, manual mask

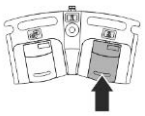
Operating mode with memories series RTP

Select the pulsed fluoroscopy mode with acquisition in the menu of the memory on the display station.



Select the acquisition frequency in the menu of the memory on the display station.

If required select the Smart filter (On Off), it is possible to select the Smart filter even during the x-ray emission.



Press the right pedal to control the exposure. After the kV balance time, the exposure with the cadence set on the display is performed (the cadence changes according to the features of the installed memory).

In MANUAL mode, the kV and mAs value must be set by the operator. The exposure parameters variation allows to modify the image quality at the discretion of the operator.

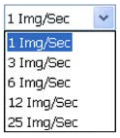
During the x-ray emission, press the MASK key, the last acquired frame is captured as mask. The memory performs the subtraction operation between the mask and the images successively acquired.

X-ray emission LEDs on the keyboard and on the display station lit.

6.9.7 DSA, automatic mask

Operating mode with memories series RTP

Select the pulse fluoroscopy mode with acquisition in the menu of the memory on the display station.

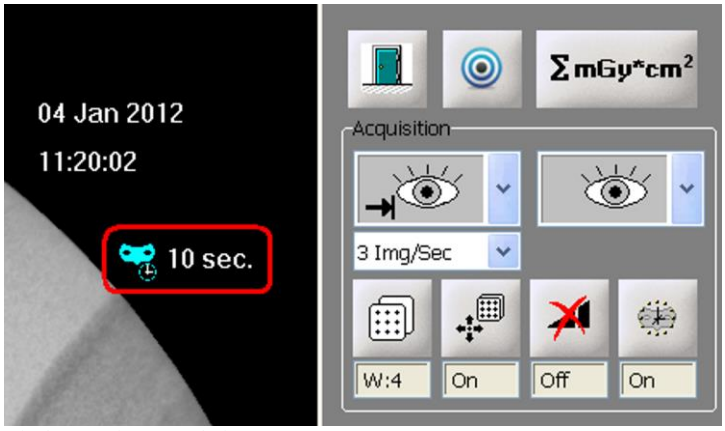


Select the acquisition frequency in the menu of the memory on the display station.

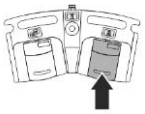
If required select the Smart filter (On Off), it is possible to select the Smart filter even during the x-ray emission.

If the memory configuration allows it, the automask key appears. When the acquisition function of the automatic mask is disabled a red cross appears on the pushbutton. To enable the function click on the pushbutton.

When the automatic acquisition of the mask is enabled it is possible to set the mask time by clicking on the icon that appears in the x-ray circle.



Display Monitor - Mask time



Press the right pedal to control the exposure. After the kV balance time, the exposure with the frequency set on the display is performed (the frequency changes according to the features of the installed memory).

In MANUAL mode, the kV and mAs value must be set by the operator. The exposure parameters variation allows to modify the image quality at the discretion of the operator.

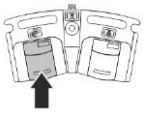
X-ray emission LEDs on the keyboard and on the display station lit.

Once the mask time is finished, the memory will automatically acquire the mask, then it will subtract the mask to the images successively acquired.

6.9.8 Road Map

Operating mode with memories series RTP

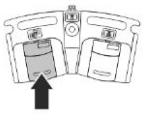
Select the Road Map mode in the menu of the memory on the display station.



Press the left pedal to control the exposure. After the kV balance time, the Road Map is performed.

X-ray emission LEDs on the keyboard and on the display station lit.

In this mode, after a waiting time set in the memory setup, the processor acquires the images in real time without renewing the points that had a negative intensity variation.



By pressing again the left pedal the system automatically performs the subtraction between the images in real time and the previously stored mask. The only highlighted points are the ones referring to the spreading map of the contrast medium; the introduction of catheters is extremely easy because they are perfectly displayed in overlay to the vessels.

During this phase it is possible to store the images by pressing the single storing key from the menu of the memory or by using the key on the display station.

6.10 Operating mode with memory series EYES

Radiation risk for the operating personnel
Presence of operators in non-protected areas
► The operating personnel must be protected from x-rays through a protection screen or similar protective measures during x-rays emission.

Before performing any examination make sure that the residual exposure time indication is enough to the complete execution of the diagnostic research.

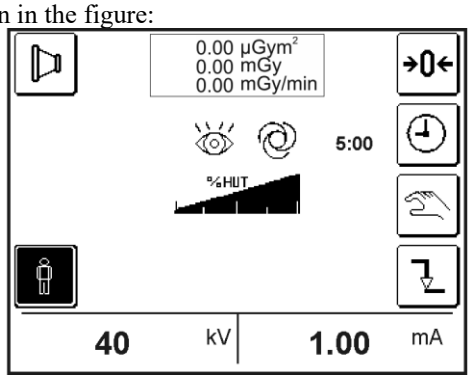
The intended operating modes for the equipment in combination of the memory series EYES are:

- Continuous fluoroscopy (automatic and manual)
- Pulsed fluoroscopy (automatic and manual)
- Snap Shot
- Radiography
- Utility Mode

6.10.1 Automatic continuous fluoroscopy

Operating mode with memories series EYES

Turn the equipment ON according to what described in § "**Accensione a pag. 52** ". After the test phase of the internal circuits and the software, the equipment is prearranged to work in automatic fluoroscopy mode.
The display appears as shown in the figure:



Display - Automatic Fluoroscopy

In order to perform an exposure with this mode, proceed as follows:

Select the STANDARD ANATOMICS curve. When the function is selected, aside the key, the keys concerning the anatomic curves that can be selected appear.

When the key is selected, it appears in "negative". By selecting one of these curves, the equipment proposes proper kV-mA couples. It is not possible to modify the parameters

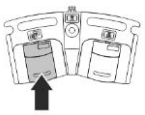
ANATOMY curve for Fine Anatomic Parts or pediatrics.

ANATOMY curve for lungs.

ANATOMY curve of sturdy patient. (function available only for equipment with rotating anode)

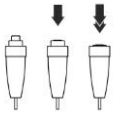
Select the required recursive filter (2, 4, 8, 16). It is possible to modify the recursive filter even during x-ray emission.

If required, select the Smart filter (On Off), it is possible to select the Smart filter even during the x-ray emission



Press the left pedal of the x-ray control footswitch. After activating the x-ray control, the kV/mA values can be adapted automatically to the patient under examination in order to get the best possible image. By pressing completely the pedal (second step), the image is stored.

X-ray emission LEDs on the keyboard and on the display station lit.



The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

In the display the following functions are available:

Selection of the RADIOGRAPHY mode (|**Radiografia a pag. 85**)

Key for the resetting of the dose value indicated in the central box. The key is active only if the dosimeter is installed and in working condition. Hold down for at least two seconds to reset the displayed value.

5:00 

Indication of the residual Fluoroscopy time and the relative resetting key. The time indicates the effective load application time[1]

0:00 

When 5 minutes (uninterrupted or cumulative) are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

X-ray emission stops after uninterrupted 10' of load application[1] (not cumulative). In the case where the stop has been performed, it is possible to go on with the load application[1] by releasing or activating again the fluoroscopy control.

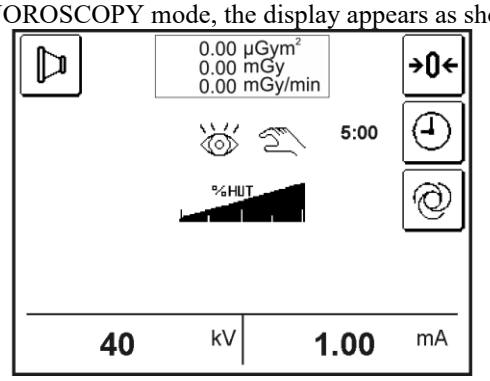
Selection of the MANUAL mode (|**Fluoroscopia continua manuale a pag. 65**)

(1/2) mA curve selection. When the key is selected, the STANDARD curve with the halved mA values is used.

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

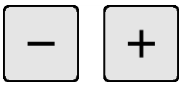
6.10.2 Manual continuous fluoroscopy

Operating mode with memories series EYES
By entering MANUAL FLUOROSCOPY mode, the display appears as shown in the figure:



Display - Manual Fluoroscopy

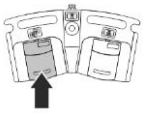
In order to perform an exposure with this mode, proceed as follows:



Set the required kV and mA values. The variation of the exposure parameters allows to modify the image quality at the discretion of the operator

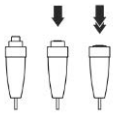
Select the required recursive filter (2, 4, 8, 16). It is possible to modify the recursive filter during the x-ray emission.

If required select the filter Smart (On Off), it is possible to select the Smart filter even during the x-ray emission.



Press the left pedal of the x-ray control footswitch. After activating the x-ray control, the kV/mA values can be set by the operator. The variation of the exposure parameters allows to modify the image quality at discretion of the operator. The automatic check system of the image is disabled. By pressing completely the pedal (second step), the image is stored.

X-ray emission LEDs on the keyboard and on the display station lit.



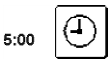
The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

In the display the following functions are available:

Selection of the RADIOGRAPHY mode (|**Radiografia a pag. 85**)

Key for the resetting of the dose value indicated in the central box. The key is active only if the dosimeter is installed and in working condition. Hold down for at least two seconds to reset the displayed value.



Indication of the residual Fluoroscopy time and the relative resetting key. The time indicates the effective x-ray passage and it is updated every second. When 5 minutes are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

When 5 minutes (uninterrupted or cumulative) are expired, the key is crossed and the audible indicator intervenes. At any minute, it is possible to press the reset key by taking the time back to the initial 5 minutes and by stopping the audible signal, if it is in working condition.

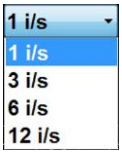
X-ray stop after uninterrupted 10' of load application[1] (not cumulative). In the case where the stop has been performed, it is possible to go on with the load application[1] by releasing or activating again the fluoroscopy control.

Selection of AUTOMATIC mode (|**Fluoroscopia continua automatica a pag. 63**)

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

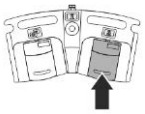
6.10.3 Automatic and manual pulsed fluoroscopy

Operating mode with memories series EYES



Select the pulsed fluoroscopy frequency on the memory menu on the display station.

If required select the filter Smart (On Off), it is possible to select the Smart filter even during the x-ray emission.



Press the right pedal to control the exposure. After the kV balance time, the exposure with the cadence set on the display is performed (the cadence changes according to the features of the installed memory).

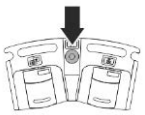
In MANUAL mode, the kV and mAs value must be set by the operator. The exposure parameters variation allows to modify the image quality at the discretion of the operator.

X-ray emission LEDs on the keyboard and on the display station lit.

6.10.4 Snapshot

Operating mode with memories series EYES
No selection from the keyboard must be performed.

The "Snapshot" can be performed in Automatic and Manual Fluoroscopy mode without performing any additional choice on the keyboard.



Press the pedal of the X-ray control footswitch. After the kV balance time, an exposure of about 1 sec controlled directly from the equipment is performed. This exposure allows to get an image that is at high contrast and without background noise.

X-ray emission LEDs on the keyboard and on the display station lit.

6.11 Operating mode with memory series HRP

Radiation risk for the operating personnel
Presence of operators in non-protected areas
► The operating personnel must be protected from x-rays through a protection screen or similar protective measures during x-rays emission.

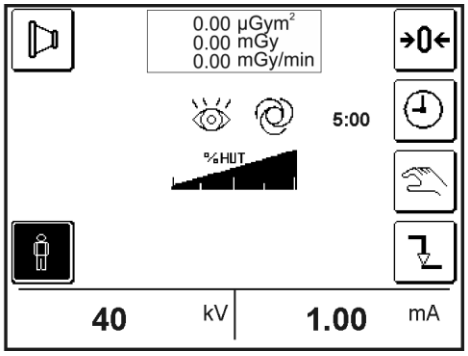
Before performing any examination make sure that the residual exposure time indication is enough to the complete execution of the diagnostic research.

The intended operating modes for the equipment in combination of the memory series HRP are:

- Continuous fluoroscopy (automatic and manual)
- Snap Shot
- Automatic and manual HCF "High Contrast Fluoro"
- Pulsed fluorography with acquisition
- DSA (Digital subtraction angiography), manual mask
- DSA (Digital subtraction angiography), automatic mask
- Road Map
- Radiography
- Utility Mode

6.11.1 Automatic continuous fluoroscopy

Operating mode with memories series HRP
Turn the equipment ON.
After the test phase of the internal circuits and the software, the equipment is prearranged for the working in automatic fluoroscopy.
The display appears as shown below:



Display - Automatic continuous fluoroscopy

In order to perform an exposure with this mode, proceed as follows:

Select STANDARD ANATOMICS curve. When the function is selected, aside the key, the keys concerning the anatomic curves that can be selected appear.

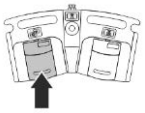
When the key is selected, it appears in "negative". By selecting one of these curves, the equipment proposes proper kV-mA couples. It is not possible to modify the parameters

ANATOMY curve for Fine Anatomic Parts or pediatrics.

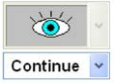
ANATOMY curve for lungs.

Select continuous fluoroscopy mode in the memory menu on the display station.

Select the required recursive filter (1, 2, 4, 8, 16). It is possible to modify the recursive filter even during the x-ray emission.

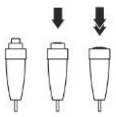


Press the left pedal of the x-ray control footswitch. After activating the x-ray control, the kV/mA values are adapted automatically to the patient under examination in order to get the best possible image. By pressing completely the pedal (second step), the image is stored.



While pressing the left footswitch, the memory automatically displays the continuous fluoroscopy symbol.

X-ray emission LEDs on the keyboard and on the display station lit.



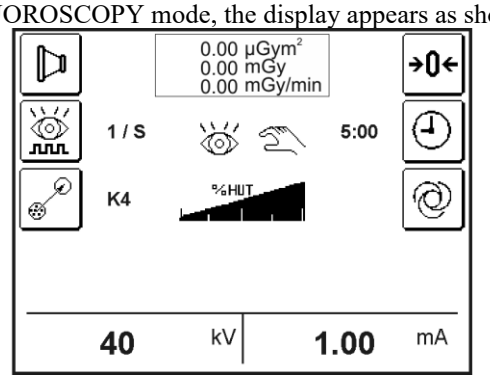
The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

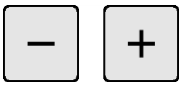
6.11.2 Manual continuous fluoroscopy

Operating mode with memories series HRP

By entering MANUAL FLUOROSCOPY mode, the display appears as shown in the figure:

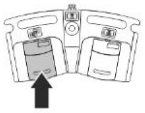


Display - Manual continuous fluoroscopy

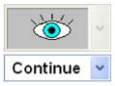


Set the required kV and mA value. The variation of the exposure parameters allows to modify the image quality at the discretion of the operator.

Select the required recursive filter (1, 2, 4, 8, 16). It is possible to modify the recursive filter even during the x-ray emission.

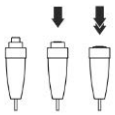


Press the left pedal to control the exposure. After activating the x-ray control, the kV/mA values can be set by the operator. The variation of the exposure parameters allows to modify the image quality at discretion of the operator. The automatic check system of the image is disabled. By pressing completely the pedal (second step), the image is stored.



While pressing the left footswitch, the memory automatically displays the continuous fluoroscopy symbol.

X-ray emission LEDs on the keyboard and on the display station lit.



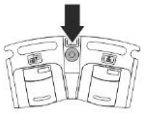
The same functions of Fluoroscopy, both Automatic and Manual, and Storage can be performed also with the x-ray handswitch (if it is prearranged):

· **1° step: fluoroscopy control**
· **2° step: image storage.**

6.11.3 Snapshot

Operating mode with memories series HRP
No selection from the keyboard must be performed.

The "Snapshot" can be performed in Automatic and Manual Fluoroscopy mode without performing any additional choice on the keyboard.



Press the central pedal of the X-ray control footswitch. After the kV balance time, an exposure of about 1 sec controlled directly by the equipment is performed. This exposure allows to get an image that is at high contrast and without background noise.

X-ray emission LEDs on the keyboard and on the display station lit.

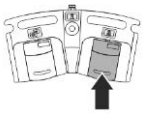
6.11.4 Automatic and manual HCF "High Contrast Fluoro"

Operating mode only with memories series HRP

On the C-arm touch screen select the HCF (High contrast Fluoro) mode

Select the required mA value (15 or 30 mA)

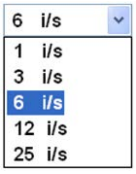
Select the required anatomical board (The four anatomical listed in the figure are only indicative)



Press the right pedal to control the exposure. After the kV balance time, the exposure with cadence set on the anatomical board is performed.

By pressing the right pedal the memory automatically displays the HCF fluoroscopy symbol with frame rate and recursive filter, set in memory setup (anatomical board)

X-ray emission LEDs on the keyboard and on the display station lit.



During the exposure it is possible to select a frame rate different than the default one in the anatomical board.

It is possible to change the recursive filter among the available ones according to the selected frame rate.

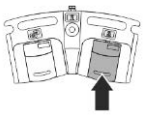
6.11.5 Pulsed fluoroscopy with acquisition

Operating mode with memories series HRP

On the C-arm touch screen select the pulsed fluorography mode with acquisition.

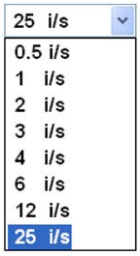
Select the required mA value (15, 30.45 or 60 mA)

Select the required anatomical board (The four anatomical listed in the figure are only indicative)



Press the right pedal to control the exposure. After the kV balance time, the exposure with cadence set on the anatomical board is performed.

By pressing the right pedal the memory automatically displays the pulsed fluoroscopy symbol with frame rate and recursive filter, set in the anatomical board



During the exposure it is possible to select a frame rate different than the default one in the anatomical board.

X-ray emission LEDs on the keyboard and on the display station lit.

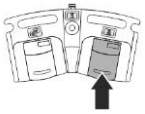
6.11.6 DSA, manual mask

Operating mode with memories series HRP

On the C-arm touch screen select the pulsed fluorography mode with acquisition.

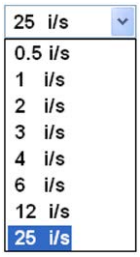
Select the required mA value (15, 30.45 or 60 mA)

Select the required anatomical board (The four anatomical listed in the figure are only indicative). Note : the anatomical board selected must have the DSA function enabled.



Press the right pedal to control the exposure. After the kV balance time, the exposure with cadence set on the anatomical board is performed.

By pressing the right pedal the memory automatically displays the pulsed fluorography symbol with frame rate and recursive filter, set in memory setup (anatomical board)



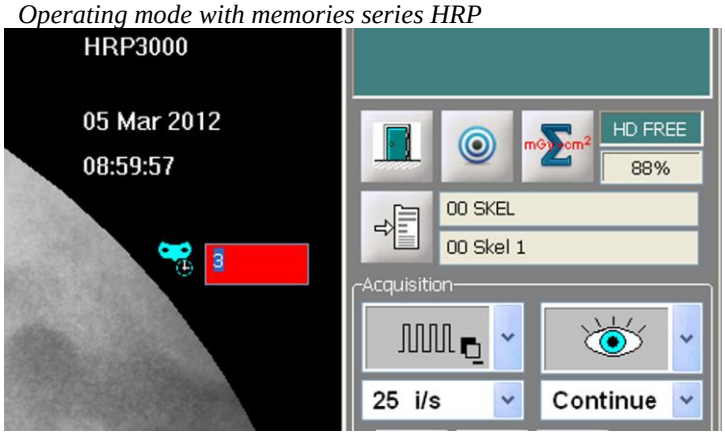
During the exposure it is possible to select a frame rate different than the default one in the anatomical board.

During the x-ray emission, press the MASK key, the last acquired frame is captured as mask. The memory performs the subtraction operation between the mask and the images successively acquired.

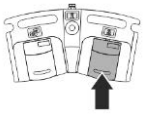
X-ray emission LEDs on the keyboard and on the display station lit.

6.11.7 DSA, automatic mask

Operating mode with memories series HRP

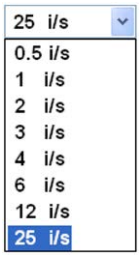


The selected anatomical board has set the automatic acquisition of the mask. It is possible to set a mask time by clicking on the icon that appears in the x-ray circle, as shown in the following image.



Press the right pedal to control the exposure. After the kV balance time, the exposure with cadence set is performed.

By pressing the right pedal the memory automatically displays the pulsed fluorography symbol with subtraction and with the related frame rate and recursive filter, set in the anatomical board



During the exposure it is possible to select a frame rate different than the default one in the anatomical board.

Once the automatic mask time set is finished, the memory will automatically acquire the mask, then it will subtract the mask to the successively acquired images, by storing them automatically

X-ray emission LEDs on the keyboard and on the display station lit.

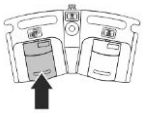
Once the mask time is finished, the memory will automatically acquire the mask, then it will subtract the mask to the images successively acquired.

6.11.8 Road Map

Operating mode with memories series HRP

Select the Road Map mode in the menu of the memory on the display station.

Select the required anatomical board (The four anatomicals listed in the figure are only indicative). Note : the anatomical board selected must have the DSA function enabled.

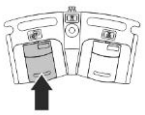


Press the left pedal to control the exposure. After the kV balance time, the road map is performed.

X-ray emission LEDs on thekeyboard and on the display station lit.

In this mode, after a waiting time set in the memory setup, the processor acquires the images in real time without renewing the points that had an negative intensity variation. The injection of the contrast medium determines the construction of the road map of the liquid through the vessels; once released the left pedal the obtained image is automatically stored

Once released the pedal, the icon of the memory menu on the display station changes in order to indicate that the mask has been acquired and that it will be subtracted at the next pressing of the pedal.



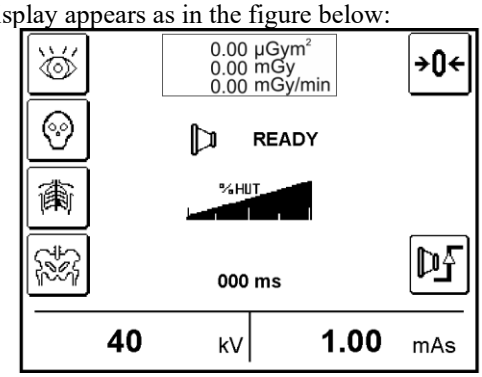
By pressing again the left pedal the system automatically performs the subtraction between the images in real time and the previously stored mask. The only highlighted points are the ones referring to the spreading map of the contrast medium; the introduction of catheters results extremely easier because they are perfectly displayed in overlay to the vessels.

During this phase it is possible to store the images by pressing the single storing key from the menu of the memory or by using the key on the display station.

6.12 Mode for all memories

6.12.1 Radiography

Select Radiography. The display appears as in the figure below:



Key for the FLUOROSCOPY mode selection

Key for the APR 1 mode selection. (Head)

Key for the APR 2 mode selection. (Spinal column)

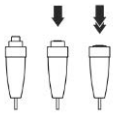
Key for the APR 3 mode selection. (Pelvis)

The chosen APR program proposes the default exposure parameters (kV, mAs, focus). The proposed data can be modified according to the requirements.

HiPower Radiography selection key . It appears only if the set mAs are lower than 2,2mAs.

Put the cassette holder at the input of the I.I. tube by coupling the two fixed locks and by locking the knob, insert the loaded x-ray cassette.

Set the kV and mAs parameters by operating on the relative increase and decrease keys placed under the indication of the value selected on the display.



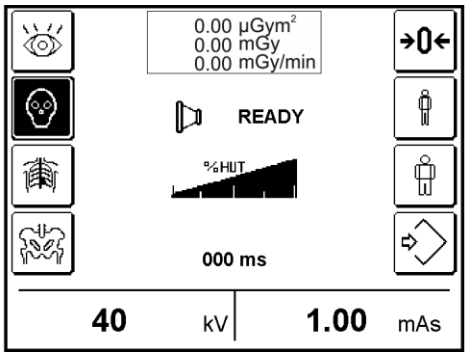
Use the whole length of the extensible cable to move away as much as possible from the irradiated area. Press the x-ray handswitch and hold it down till the end of the exposure.

X-ray emission LEDs on the keyboard and on the display station lit.

At the end of the exposure the performed exposure time is displayed.

6.12.2 APR radiography

By selecting the wished APR program, the relative key appears in negative and, on the right side of the screen, the keys concerning the selection of "slim patient" and "sturdy patient" appear. The data suggested for a medium-build patient are indicated as default.



Indication of the selected APR program.

Key to select the APR values for slim patient (visible only if an APR program is selected).

Key to select the APR values for sturdy patient (visible only if an APR program is selected).

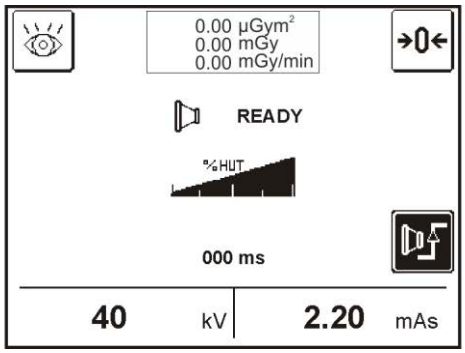
When the prearrangement for slim or sturdy patient is selected, the icon of the key in "negative" appears.

Data storage key

The proposed data can be modified at pleasure by the user. If the storage function is enabled in the USER SETUP menu (§|**Utility Mode a pag. 90**), the modified values can be stored through the relative key. In case the modified data are not stored, at next return in Radiography mode, the default data will be re-proposed.

6.12.3 HiPower radiography

By selecting HiPower radiography, the relative key appears in negative, the keys concerning the APR programs disappear and the mAs are limited to a value lower than 2,2mAs. The kV can be set without limitations.

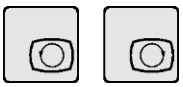


In this mode it is possible to perform a radiography at 5kW with rotating anode and at 3,5kW with fixed anode.

6.12.4 During the exam

During every fluoroscopy exam, it is possible:

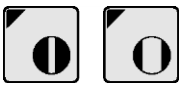
Select a different image enlargement.

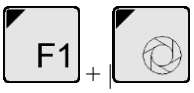


Rotate the image position.

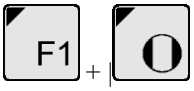
Overturn horizontally the image.

Enlarge or reduce in size the irradiated area through the iris diaphragm or the parallel shutters diaphragm.

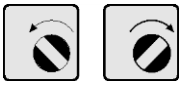




Open completely the iris diaphragm automatically.

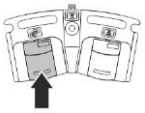


Open completely the shutter diaphragm automatically.



Rotate the position of the parallel shutters diaphragm

Alternate the various fluoroscopy modes simply by passing from a pedal to the other one of the fluoroscopy footswitch.

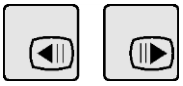


Store the current image in continuous fluoroscopy, by pressing the left pedal at the second step of the fluoroscopy footswitch.

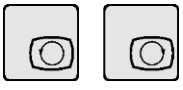
Store the current image in pulsed fluoroscopy, by pressing the storage key.

6.12.5 After the exam

After every exam of fluoroscopy, it is possible:



Review the stored images.



Rotate the image position.

Overturn horizontally the image.

For additional images processing, refer to the user's manual of the memory installed on the equipment.

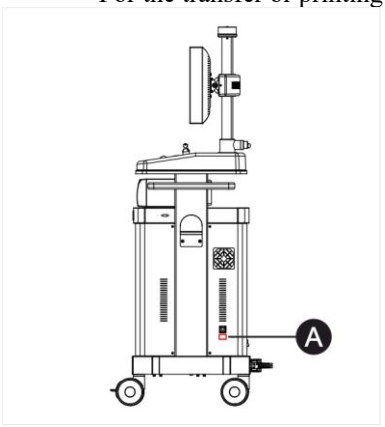
6.12.6 Images transfer to external network

In case of equipment provided with DTU (Dicom Transmission Unit), it is possible to transfer the images to a network printer or to a central file for the possible filing or processing.

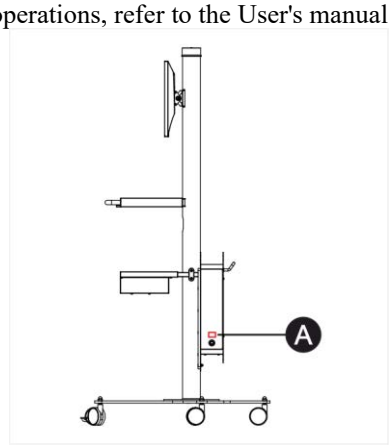
Transmission via cable (LAN)

Connect the equipment to the network through a connecting cable with terminals RJ-45 (non-supplied).

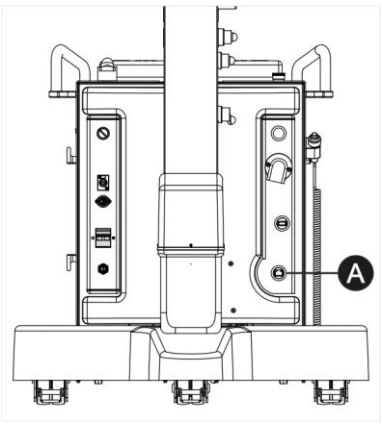
For the transfer or printing operations, refer to the User's manual of DTU.



LAN plug (A) position on the "Premium" trolley



LAN plug (A) position on the "Basic" trolley (available according to configuration)



LAN plug (A) position on the "Compact" display station (available according to configuration)

Wi-Fi Transmission (Optional only on HRP and RTP)

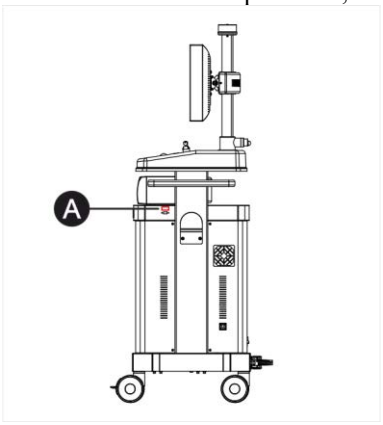
If the network adapter is installed on the equipment and the Wi-Fi network is available, it is possible to transfer the images without cable in Wireless mode.

For the operations of transfer or printing, refer to the User's Manual of DTU.

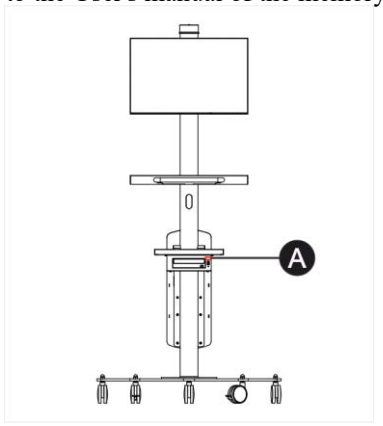
6.12.7 Images transfer on USB support

With memories series EYES, RTP and HRP, it is possible to transfer the images on external USB support.

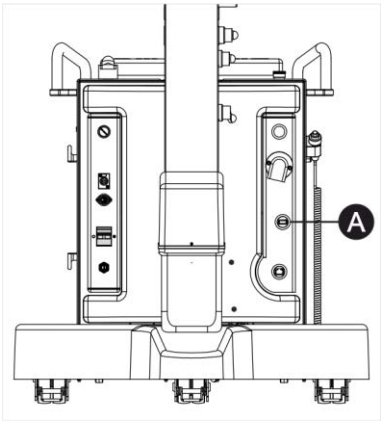
For transfer operations, refer to the User's manual of the memory.



USB plug (A) position on the "Premium" trolley



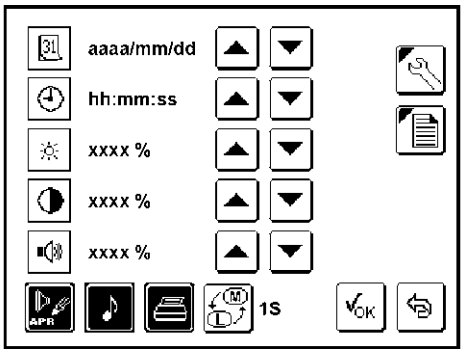
USB plug (A) position on the "Basic" trolley (available according to configuration)



USB plug (A) position on the "Compact" display station (available according to configuration)

6.12.8 Utility Mode

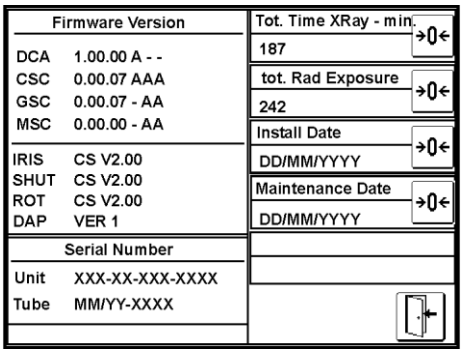
Utility Mode is a particular use mode to set some equipment parameters. It is accessible to the final user at any minute from the Automatic Continuous Fluoroscopy mode.



1. Press the key F1 and, by holding it down, press the key ENTER.

Key	Name	Description
	DATE	System date (yyyy/mm/dd format). It can be modified with the keys INC-DEC next to the icon.
	TIME	System time (hh:mm:ss format). It can be modified with the keys INC-DEC next to the icon.
	BRIGHTNESS	Display brightness adjustment (from 0 to 100%). It can be modified by the INC-DEC keys next to the icon.
	CONTRAST	Display contrast adjustment (from 0 to 100%). It can be modified by the INC-DEC keys next to the icon.
	VOLUME	Intensity of the buzzer volume (from 0 to 100%). It can be modified with the keys INC-DEC next to the icon. It is not possible to modify the volume of the x-ray passage signals.
APR	APR	Storage of the values associated to the APR exams. The activated function is indicated by the key in negative.
	CLICK	Enabling of the sound matched to the press of every key. The activated function is indicated by the key in negative.
	PRINT	Enabling of the dose printing. The activated function is indicated by the key in negative.
	FLIP	Selection of the commutating time between LIVE image and MEM image on single monitor (only for SBFM). It can be set from 1s to 5s, beyond infinite time ("…s") for applications with DVD recorder.
	SERVICE	Area reserved to service personnel.
	REPORT	Page with the firmware parameters display, serial number and data for service (see next page).
OK	OK	Key of modifications confirmation and exit from USER SETUP.
	ANNULLA	Key to exit from UTILITY MODE without saving the modifications.
	INC-DEC	Keys to increase and decrease the value displayed on the left.

Utility Mode - Report



The report screen is a particular screen accessible to the user in only reading mode. It does not include the data necessary to the normal equipment use.

Unit s/n	Indication of the unit serial number.
Monobloc s/n	Indication of the monobloc serial number.
Firmware Version	Indication of the firmware versions loaded on the equipment.
Serial Number	Indication of the monobloc and x-ray tube serial number.
Tot. Time Xray – min.	Counter of the total time (expressed in minutes) of the exposures in fluoroscopy mode with relative resetting key.
Tot. Rad Esposure	Counter of the total exposures number in Radiography mode with relative resetting key.
Install date	Equipment installation date with relative resetting key. Datum inserted at the moment of the equipment installation.
Maintenance Date	Limit date foreseen for the equipment maintenance with relative resetting key. Datum automatically calculated by the equipment according to the installation date or the date of the last maintenance (foreseen yearly).
→0←	Key of resetting/activation. The activation/resetting keys are not accessible to the final user. For the possible data resetting it is necessary the intervention of Service.
	Key to exit from the display.

6.13 Shutdown procedure

Damages to people or things
Use of the equipment by non authorized personnel.
► Never leave the equipment unguarded with ignition key inserted.
► Remove and keep the ignition key in a suitable and save place.

Potential risks
Damages to the connectors and equipment.
► Grip the plug to extract the connector
► Don't extract the plugs from the outlets by pulling the cable.
► Handle the connectors with care.

Potential risks
Malfunction and damages to the equipment
► Don't disconnect the connecting cable between the C-arm stand/display station with the equipment ON
►Don't remove the plug from the mains outlet when the equipment is ON.

Potential risks
Data loss
Malfunction of Dicom Transmission Unit (DTU)
► Perform the shutdown of the DTU before turning OFF or removing the power supply to the equipment.
► Switch the equipment OFF only after finishing the shutdown procedure of DTU.

1. At the end of the exams, position the C-arm stand in transport position.
2. Press the OFF key to switch the equipment OFF.
3. Turn the switching ON key in OFF position, remove it and keep it in a safe place.
4. Disconnect the mains cable and wind-up it on the proper supports.

Only for the version with display station:
5. Disconnect the connecting cable of the C-arm stand/display station and wind-up it on the proper supports of the display station.
6. Park the display station by engaging the wheels brakes .

7 TECHNICAL DATA

7.1 Electrical data

Features	Data
Power Supply	230 Vac ±10% standard monophase 105 / 115 / 125 / 220 / 240 Vac ±10% monophase on request
Frequency	50/60 Hz ±5 Hz
Absorbed current	see following schedule
Line compensation	Automatic
Line resistance	<0,4 Ω @230Vac < 0,2 Ω @115Vac
Standard mains plug	16 A @230 Vac
Supply cable	8 m
Insulation class	Class I with applied parts type B
Use conditions	Continuous working with intermitting load
Classification according to the liquids seepage	IPx0
Safety in presence of inflammable anesthetic gases	The equipment is not type AP or APG

Absorbed current

	Fixed anode version	Rotating anode version
in fluoroscopy	4,5 A @ 230 Vac - 7,5 A @ 115 Vac	5 A @ 230 Vac - 10 A @ 115 Vac
in radiography	20 A @ 230 Vac - 28 A @ 115 Vac	20 A @ 230 Vac - 30 A @ 115 Vac
in stand-by	1,0 A @ 230 Vac - 1,7 A @ 115 Vac	1,0 A @ 230 Vac - 2,0 A @ 115 Vac

7.2 Environmental conditions

Environmental Factor	In normal use	Warehouse and transport
Temperature	from 10 °C to 40 °C	from -25°C to 70°C
Relative humidity	from 30 % to 75 % non-condensing	from 10% to 90% non-condensing
Pressure	from 700 hPa to 1060 hPa	from 500 hPa to 1060 hPa

7.3 Total equipment filtration

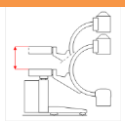
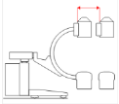
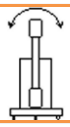
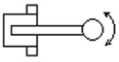
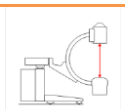
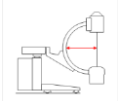
Description	Data	
Monobloc	1,4 mmAl	
Additional permanent filter	1 mmAl	
Collimator	0 mmAl	
Monobloc cover	0,1 mmAl	
Total filtration of monobloc group		2,5 mm Al
Additional permanent DAPMeter filtration	0,3 mmAl	
Total filtration		2,8 mmAl

For the HRP memories, additional permanent filter of 0,05 mm Cu.

7.4 Mechanical data

7.4.1 C-arm stand 9"

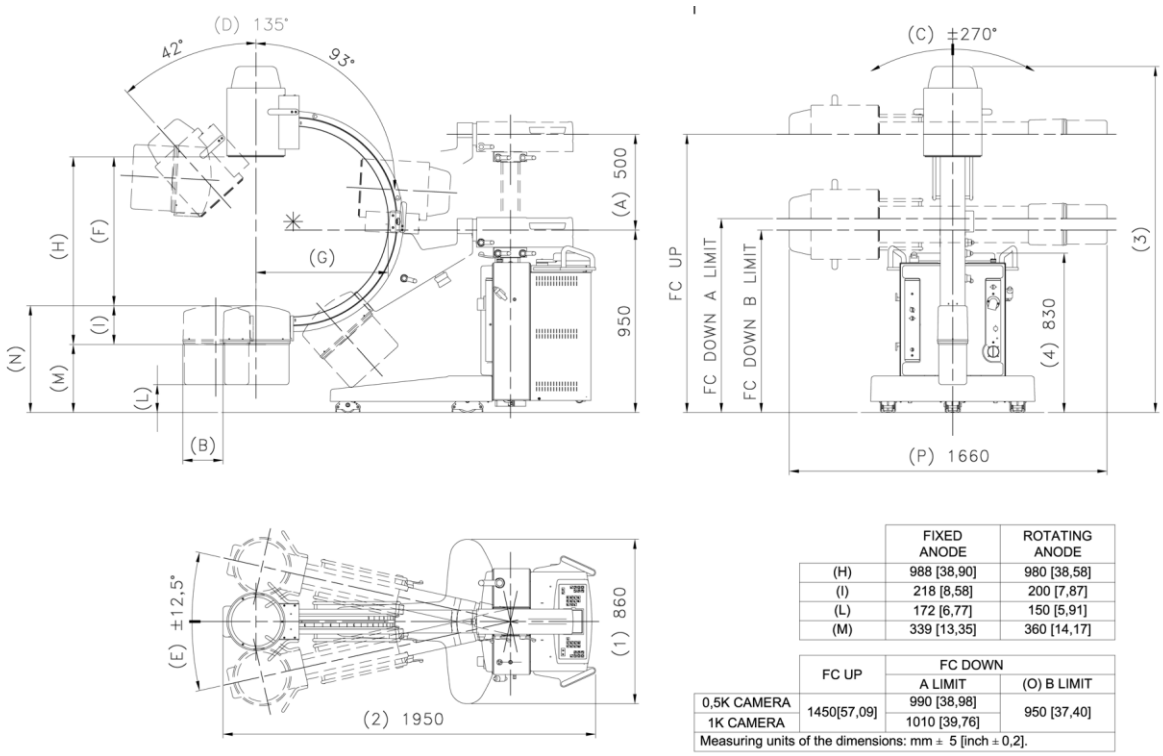
Dimensions in transport position		Data
Width	(1)	860 mm (33,9 in)
Depth	(2)	1950 mm (76,8 in)
Height	(3)	1810 mm (7,3 in) (camera 1k)
		1780 mm (70,1 in) (camera 0,5k)
Control console height	(4)	830 mm (32.7 in)

Description			Data
Vertical run		(A)	Total run 500 mm (19,69 in), motorized in 60 sec
Horizontal run		(B)	Manual, 210 mm (8,27 in)
Arm rotation around the horizontal axis		(C)	Manual rotation, ±270°, motorized rotation ±30° (optional)
Orbital rotation		(D)	Manual, 135° (+93° ÷ - 42°)
Arm group overview		(E)	Manual, ±12,5°
Useful space		(F)	770 mm (30,31 in)
Arm depth		(G)	690 mm (27,17 in)

Description		Fixed Anode Data	Rotating Anode Data
S.I.D.	(H)	988 mm (38,90 in)	980 mm (38,6 in)
Focus-skin distance	(I)	218 mm (8,58 in)	200 mm (7,9 in)
Min. distance from floor	(L)	172 mm (6,77 in)	150 mm (5,9 in)
Floor-focus distance	(M)	339 mm (13,35 in)	360 mm (14,2 in)
Floor-skin distance	(N)	557 mm (21,93 in)	560 mm (22,0 in)
Min. II center-floor distance in oblique projection	(O)	954 mm (37,56 in)	950 mm (37,4 in)
Width in oblique projection	(P)	1603 mm (63,11in)	1660 mm (65,4 in)

Description	Data
Equipment movement	Rear drive wheels with manual control from the operator, front castor. Manual parking brake.
Rear wheels diameter	125 x 40 mm (4,92 x 1,57 in)
Front wheels diameter	80 x 30 mm (3,15 x 1,18 in)
Protection against the cables squeezing	Cable pusher on all wheels of the C-arm stand.

Description	Fixed Anode Version	Rotating Anode Version
Weight	340 kg (749,57 lb)	360 Kg (793,66 lb)



	FIXED ANODE	ROTATING ANODE
(H)	988 [38,90]	980 [38,58]
(I)	218 [8,58]	200 [7,87]
(L)	172 [6,77]	150 [5,91]
(M)	339 [13,35]	360 [14,17]

	FC UP	FC DOWN	
		A LIMIT	(O) B LIMIT
0,5K CAMERA	1450[57,09]	990 [38,98]	950 [37,40]
1K CAMERA		1010 [39,76]	

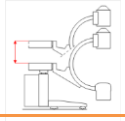
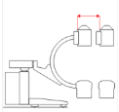
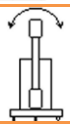
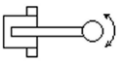
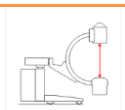
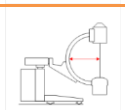
Measuring units of the dimensions: mm ± 5 [inch ± 0,2].

Overall dimensions 9"

All dimensions are in mm. Linear tolerances ±5 mm, angular ±1°

7.4.2 C-arm stand 12"

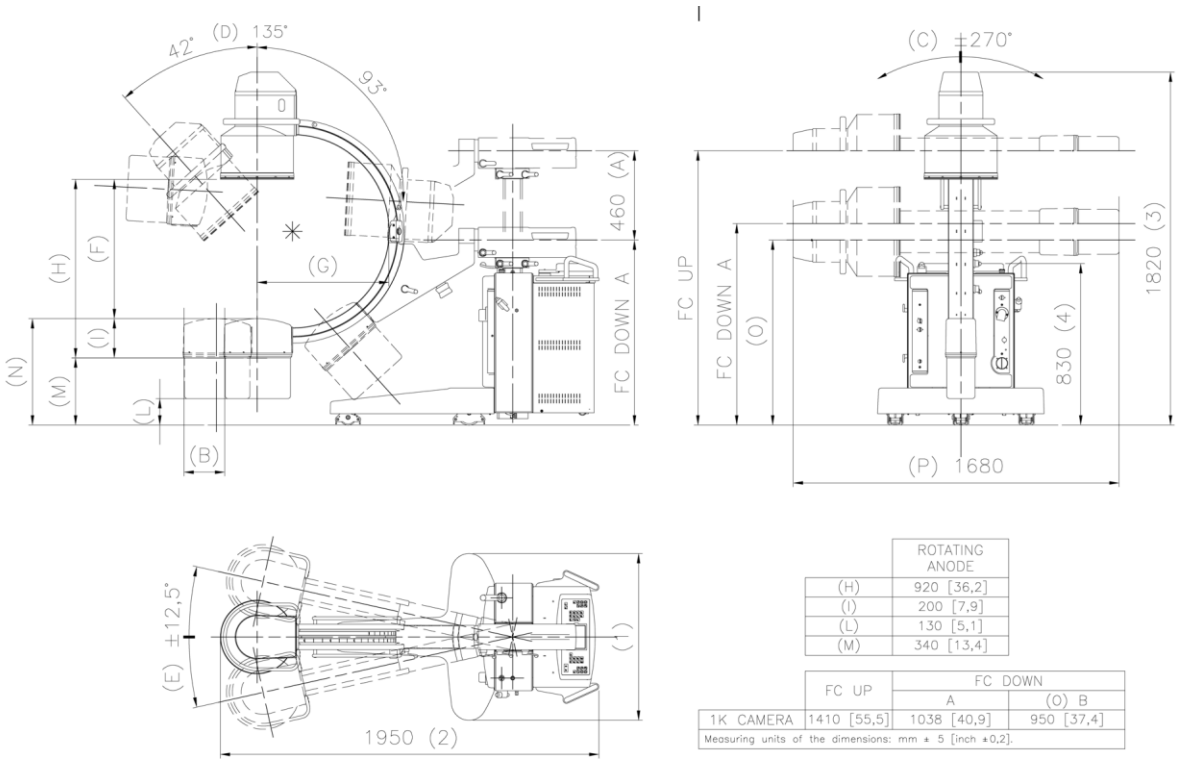
Dimensions in transport position		Data
Width	(1)	860 mm (33,9 in)
Depth	(2)	1950 mm (76,8 in)
Heigth	(3)	1820 mm (71,73 in)
Control console heigth	(4)	830 mm (32.7 in)

Description			
Vertical run		(A)	Total run 460 mm (18,1 in), motorized in 55 sec
Horizontal run		(B)	Manual, 210 mm (8,27 in)
Arm rotation around the horizontal axis		(C)	Manual rotation, ±270°, motorized rotation ±30° (optional)
Orbital rotation		(D)	Manual, 135° (+93° ÷ - 42°)
Arm group overview		(E)	Manual, ±12,5°
Useful space		(F)	720 mm (28,35 in)
Arm depth		(G)	690 mm (27,2 in)

Description		Rotating Anode Data
S.I.D.	(H)	920 mm (36,22 in)
Focus-skin distance	(I)	200 mm (7,87 in)
Min. distance from floor	(L)	130 mm (5,12 in)
Floor-focus distance	(M)	340 mm (13,39 in)
Floor-skin distance	(N)	540 mm (21,26 in)
Min. II center-floor distance in oblique projection	(O)	950 mm (37,40 in)
Width in oblique projection	(P)	1680 mm (66,14 in)

Description	Data
Equipment movement	Rear driving wheels with manual control by the operator, front castor. Manual parking brake.
Mobile stand - Rear wheels dimension	125 x 40 mm (4,92 x 1,57 in)
Mobile stand - Front wheels dimension	80 x 30 mm (3,15 x 1,18 in)
Protection against the cables squashing	Core hitch on all the C-arm stand wheels.

Description	Data
Weight	360 kg (793,66 lb)



	ROTATING ANODE
(H)	920 [36,2]
(I)	200 [7,9]
(L)	130 [5,1]
(M)	340 [13,4]

	FC UP	FC DOWN	
		A	(O) B
1K CAMERA	1410 [55,5]	1038 [40,9]	950 [37,4]

Measuring units of the dimensions: mm ± 5 [inch ±0,2].

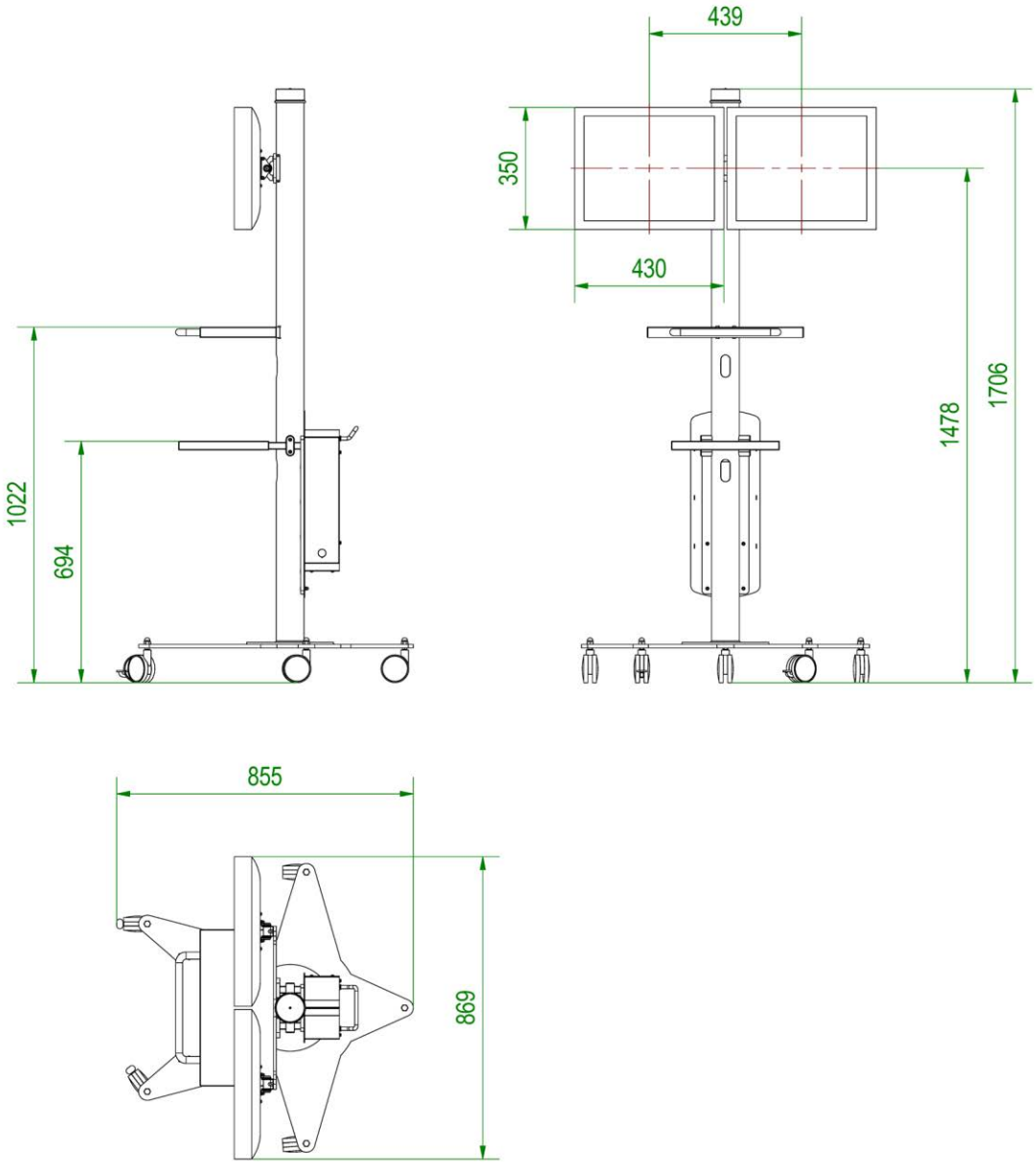
Overall dimensions 12"

All dimensions are in mm. Linear tolerances ±5 mm, angular ±1°

7.4.3 "Basic" display station

C" arm version: Litho with SBFM memory

Damage to people or things.
Overload of the display station shelves.
► Observe the load limits.
► Load limit for the upper shelf: 2 Kg
► Load limit for the lower shelf: 10 Kg

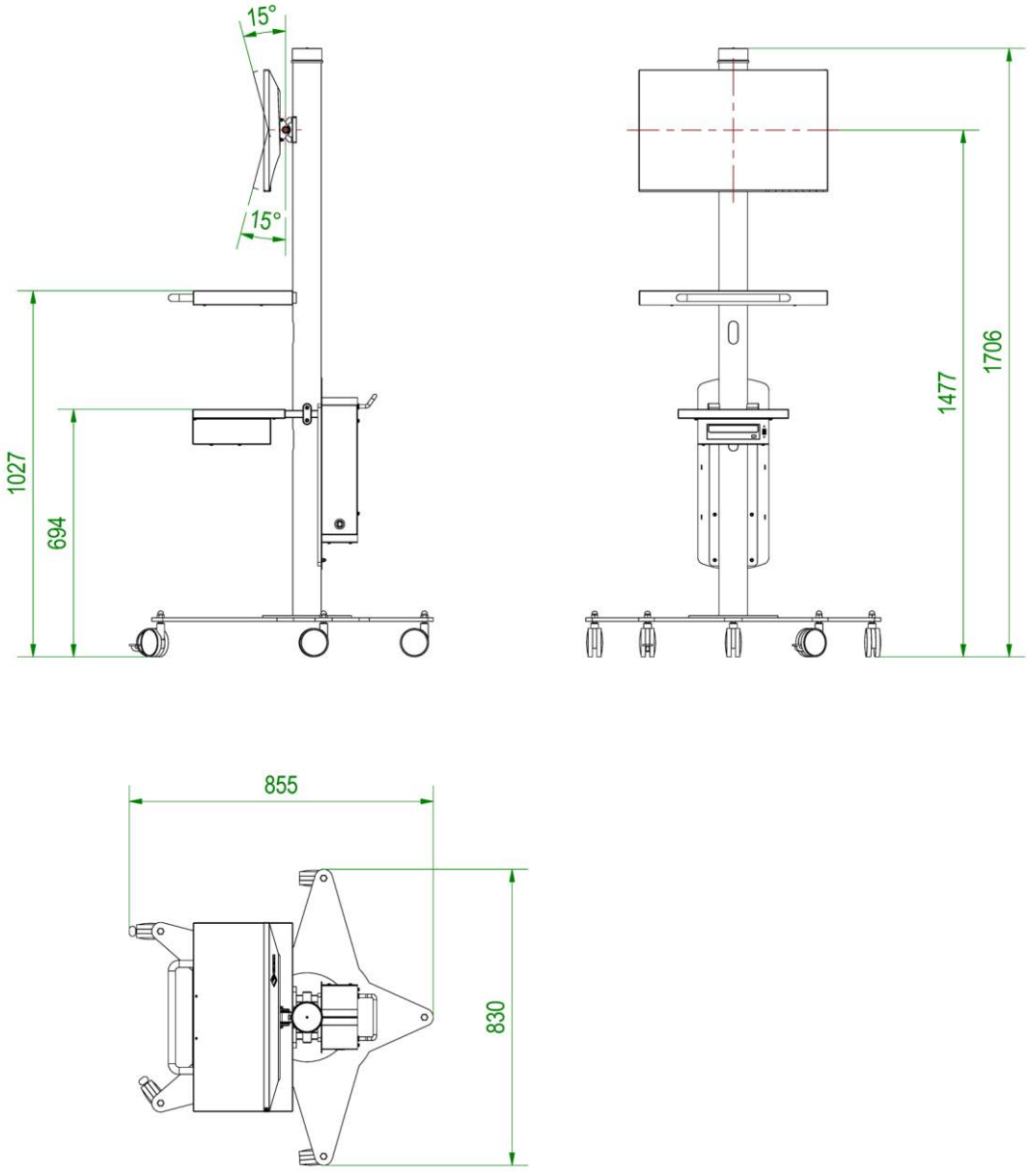


All dimensions are in mm. Linear tolerances ±5 mm, angular ±1°

7.4.4 "Basic" display station

C" arm version: 9" with EYES memory

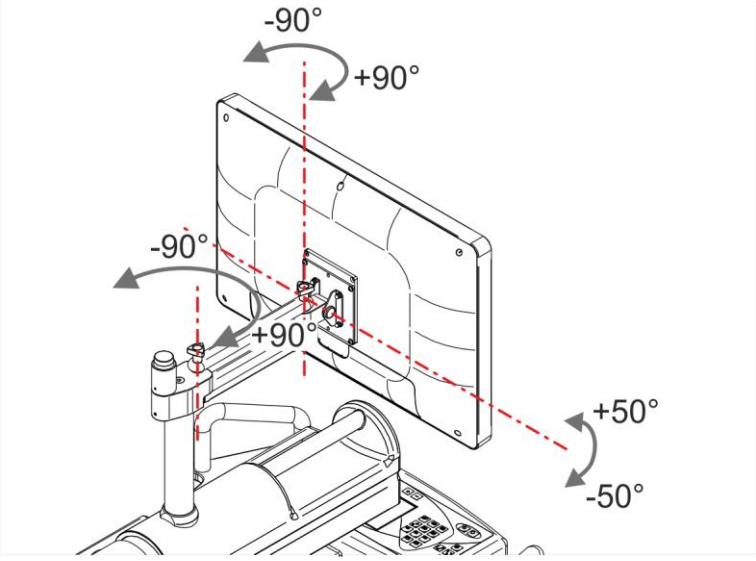
Damage to people or things.
Overload of the display station shelves.
► Observe the load limits.
► Load limit for the upper shelf: 2 Kg
► Load limit for the lower shelf: 10 Kg



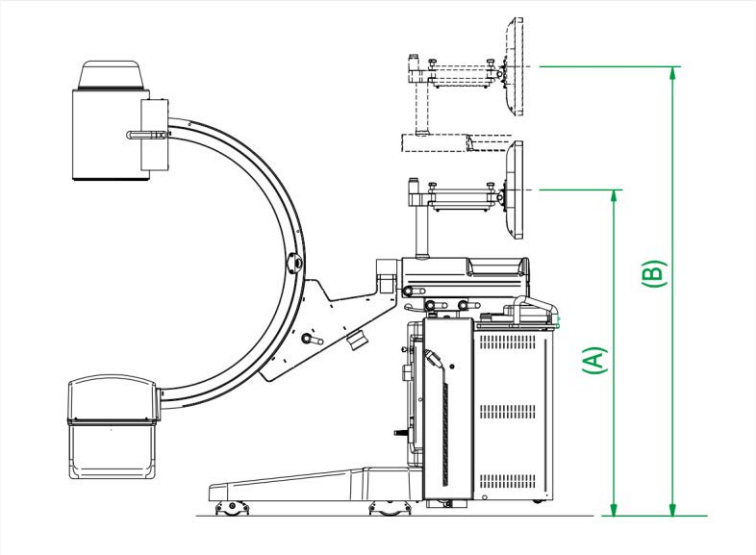
All dimensions are in mm. Linear tolerances ±5 mm, angular ±1°

7.4.5 "Compact" display station

C" arm version: 9" with EYES memory



Monitor support movements

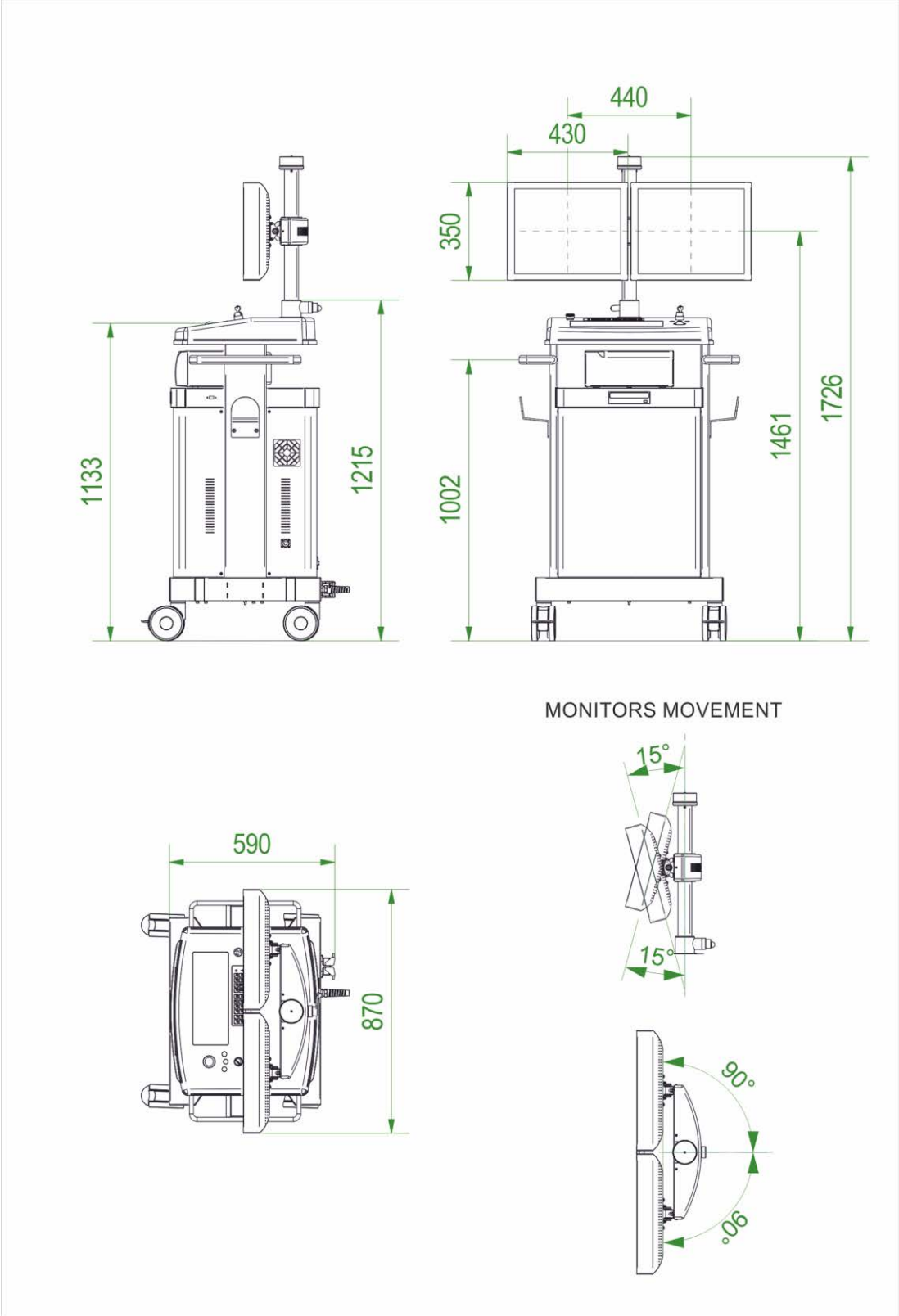


Height from monitor center 24 "to the floor:

(A) - 1290 mm
(B) - 1790 mm with column at maximum excursion

All dimensions are in mm. Linear tolerances ±5 mm, angular ±1°

7.4.6 "Premium" display station dimensions



All dimensions are in mm. Linear tolerances ±5 mm, angular ±1°

7.5 User's interface and languages

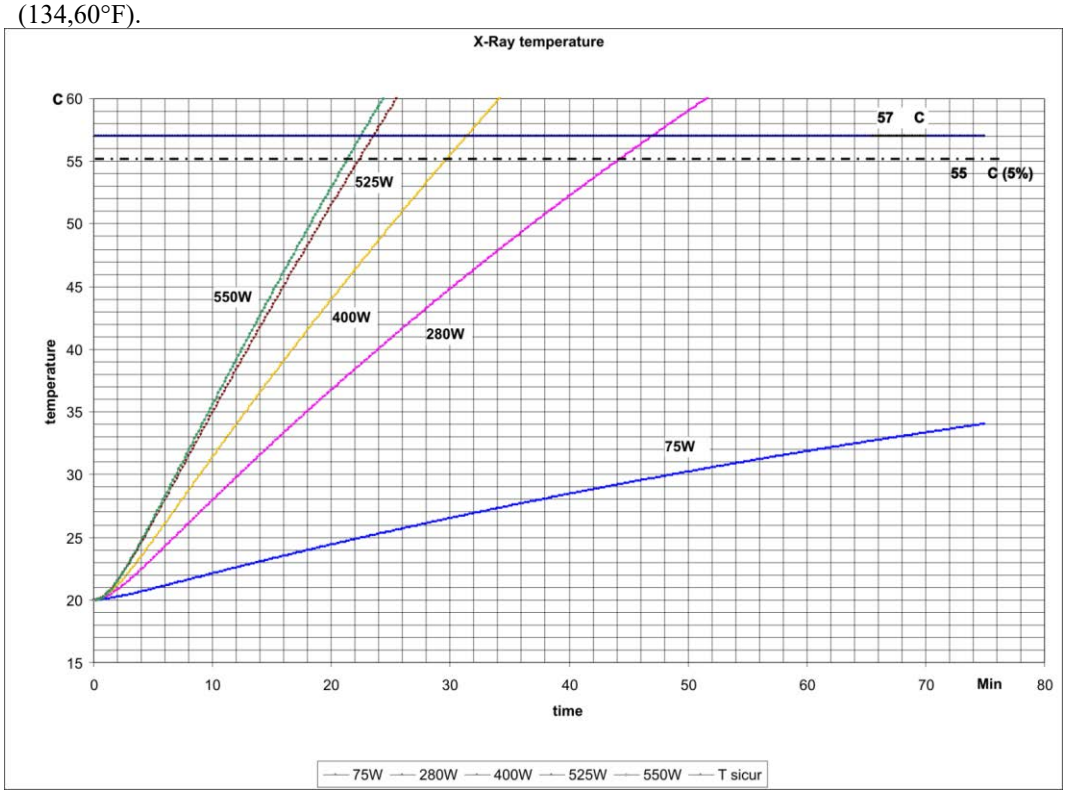
Description	Data
User's interface	Membrane keyboard with touch-screen 5.7" LCD display for all the operative parameters and error messages. Microprocessor management . Keyboard can be rotated of ±60°
Selectable languages	Italian, English, French. German, Spanish, Russian (selection by set-up)

7.6 Radiological data

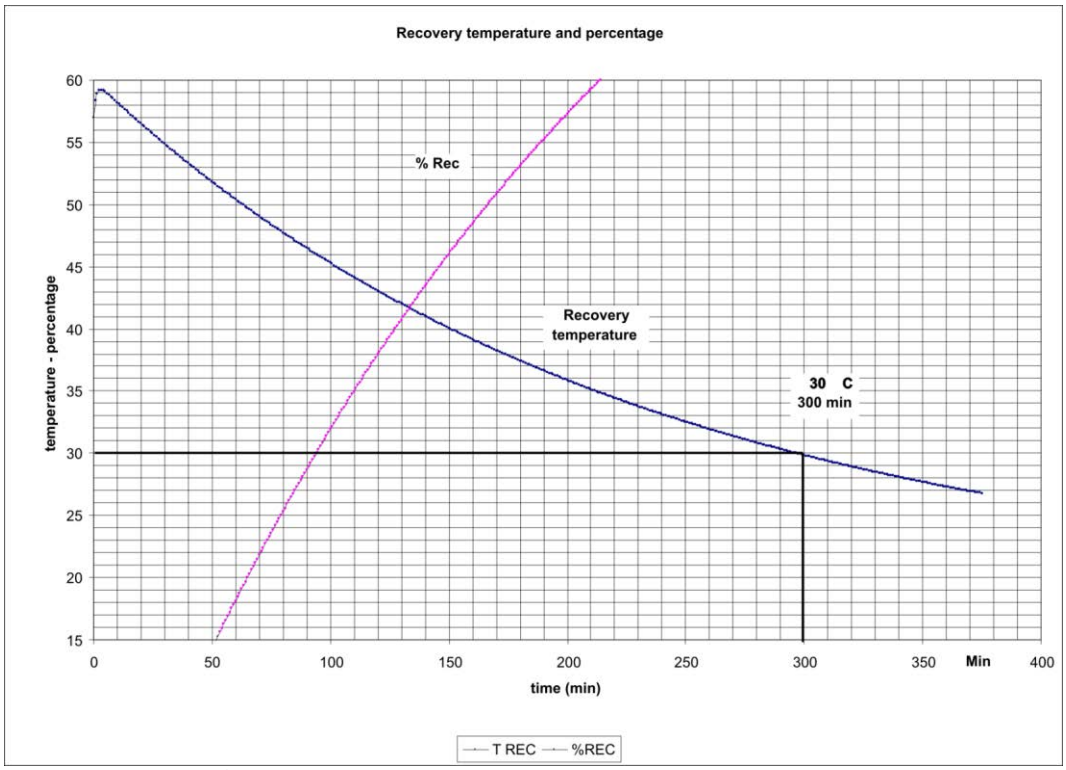
Fixed anode monobloc

Description	Fixed anode version
Generator, power in DC current	2,5 kW @100kV (100 kV, 25 mA, 100 ms)
Generator, max power in DC current	3,5 kW (100 kV, 35 mA) mAs < 2,2 @230 Vac
	2,5 kW (100 kV, 25 mA)mAs < 2,2 @115 Vac
Max high voltage (fluoroscopy and radiography)	110 kVp
Inverter frequency	40 kHz
Max. current in continuous fluoroscopy	8,0 mA (standard curve)
Max. current in "SNAPSHOT" fluoroscopy	10 mA
Max. current in radiography	25 mA @115Vac - 35mA @230Vac
Max. mAs in radiography	90 mAs @115Vac - 125mAs @230Vac
Max. fluoroscopy time at 75W (75kV-1mA)	continuous
Max. fluoroscopy time at 280W (80kV-3,5A)	44 min
Max. fluoroscopy time at 400W (100kV-4mA)	29 min
Max. fluoroscopy time at 525W (70kV-7,5mA)	24 min
Max. fluoroscopy time at 550W (110kV-5mA)	21 min
Max. fluoroscopy time	H.U Safety after 21 min of fluoroscopy @110kV, 5mA (550W).
Cooling at 30°	300 min

The values indicated in the graph refer to the trends calculated from the software safety procedures that are preventive concerning the bimetallic contact inside the monobloc that indicates the achievement of 57°C (134,60°F).



Fluoroscopy time

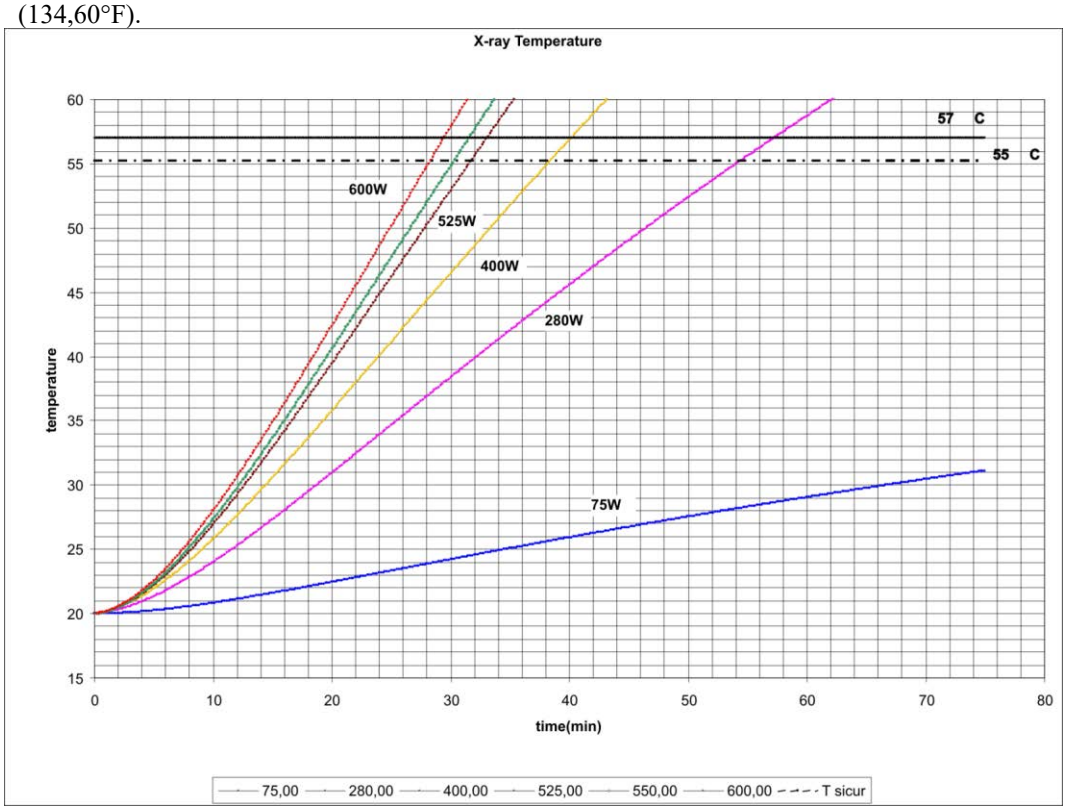


Recovery temperature and percentage

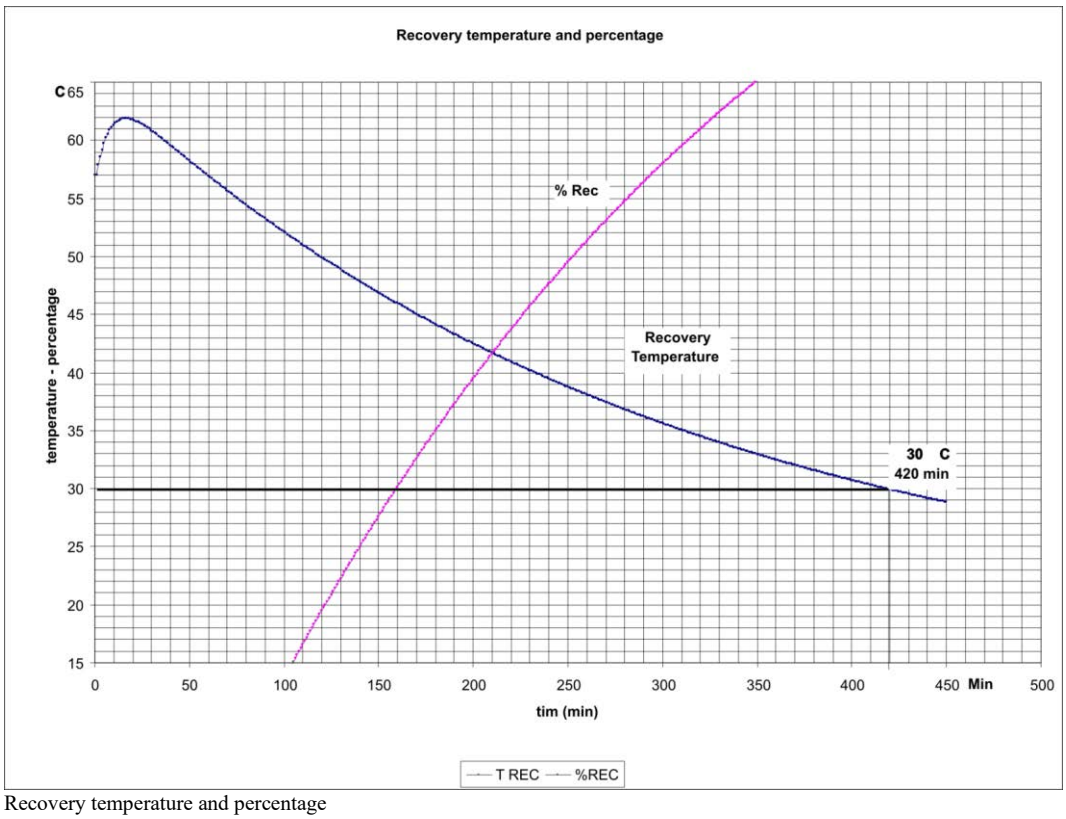
Rotating anode monobloc

Description	Rotating anode version
Generator, power in DC current	2,5 kW @100 kV (100 kV, 25 mA, 100 ms)
Generator, max power in DC current	5 kW (100 kV, 50 mA) mAs < 2,2 @230 Vac;
	3,5 kW (100 kV, 35 mA)mAs < 2,2 @115 Vac
Generator, max power in DC current (only with HRP)	max 7,2kW (120 kV 60 mA, pulse mode 25 fps)
Max high voltage (fluoroscopy and radiography)	120 kVp
Inverter Frequency	40 kHz
Max. current in continuous fluoroscopy	8,0 mA (standard curve) - 15 mA (RTP and EYES memory)
Max current in HCF with HRP	30 mA
Max. current in "SNAPSHOT" fluoroscopy	12 mA (0,5K camera) - 30 mA (1K camera)
Max current in pulsed fluorography with HRP "SNAPSHOT"	60 mA @ 230 Vac – 45 mA @115 Vac
Max current in digital graphy-mode with HRP	60 mA @ 230 Vac – 45 mA @115 Vac
Max. current in radiography	35 mA @115 Vac - 50 mA @230 Vac
Max. mAs in radiography	90 mAs @115Vac - 125mAs @230 Vac
Max. fluoroscopy time at 75 W (75 kV-1 mA)	continuous
Max. fluoroscopy time at 280 W (80 kV-3,5 A)	54 min
Max. fluoroscopy time at 400 W (100 kV-4 mA)	38 min
Max. fluoroscopy time at 525 W (70 kV-7,5 mA)	31 min
Max. fluoroscopy time at 600 W (120 kV-5 mA)	28 min
Max. fluoroscopy time	H.U Safety after 28 min of fluoroscopy @120 kV, 5 mA (600 W).
Cooling at 30°	420 min

The values indicated in the graph refer to the trends calculated from the software safety procedures that are preventive concerning the bimetallic contact inside the monobloc that indicates the achievement of 57 °C (134,60°F).



Fluoroscopy time



Recovery temperature and percentage

7.7 Exposure mode: fluoroscopy

7.7.1 Continuous fluoroscopy

Description	Fixed Anode Version
Small focus (IEC 336)	0,5 mm
kV variation range	40 - 110 kV
mA variation range	0,25 - 8 mA
kV-mA relationship	Standard: 40 kV / 0,5 mA, 80 kV / 7,6 mA , 110 kV / 8 mA
Safety timer	Audible alarm after 5' of uninterrupted or cumulative load application[1]. X-ray stop after uninterrupted 10' of load application[1] (not cumulative).

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

Description	Rotating Anode Version
Small focus (IEC 336)	0,3 mm
kV variation range	40 - 120 kV
mA variation range	0,25 - 8 mA (15 mA with RTP and EYES memory)
kV-mA relationship	Standard: 40 kV / 0,5 mA, 80 kV / 7,6 mA, 120 kV / 8 mA
Safety timer	Audible alarm after 5' of uninterrupted or cumulative load application[1]. X-ray stop after uninterrupted 10' of load application[1] (not cumulative).

[1] defined as electricity provisions to the x-ray tube anode (IEC 60601-2-54).

7.7.2 Pulsed fluoroscopy

0,5K² Camera

Description	Fixed Anode Version
Small focus (IEC 336)	0,5 mm
Exposure frequency (selectable from console)	2 imm/sec, 1 imm/sec, 1 imm/2 sec, 1 imm/3 sec, 1 imm/5 sec (with SBFM memory) 2 imm/sec, 1 imm/sec, 1 imm/3 sec (with RTP memory)
Xr flash time	Min. time for the best image quality

Other features as per Continuous Fluoroscopy

Description	Rotating Anode Version
Small focus (IEC 336)	0,3 mm
Exposure frequency (selectable from console)	2 imm/sec, 1 imm/sec, 1 imm/2sec, 1 imm/3 sec, 1 imm/5 sec (with SBFM memory) 2 imm/sec, 1 imm/2 sec, 1 imm/3 sec (with RTP memory)
Xr flash time	Min. time for the best image quality

Other features as per Continuous Fluoroscopy

1K² Camera

Description	Fixed Anode Version
Small focus (IEC 336)	0,5mm
Exposure frequency (selectable from console)	2/sec, 1/sec, 1/3sec (with RTP memory) 12/sec, 6/sec, 3/sec, 1/sec (with EYES memory)
Xr flash time	Min. time for the best image quality

Other features as per Continuous Fluoroscopy

Description	Rotating Anode Version
Small focus (IEC 336)	0,3 mm
Exposure frequency (selectable from console)	2/sec, 1/sec, 1/3sec (wiht RTP memory) 12/sec, 6/sec, 3/sec, 1/sec (with EYES memory)
Xr flash time	Min. time for the best image quality

Other features as per Continuous Fluoroscopy

7.7.3 HCF Fluoroscopy (HRP memory)

Description	Data
Exposure frequency (selectable from console	From 1 img/sec to 25 img/sec (according to the selected 'Average' weight).
Xr flash time	Min. time for the best image quality.
Focus	0,6 mm Large Focus
mA variation range	15/30 mA
Images acquisition	Performed by integrating the selected images number in the memory set-up.
Images storage	Manual

Other features as per Continuous Fluoroscopy

7.7.4 Pulsed fluorography (HRP memory)

Other features as per Continuous Fluoroscopy

Description	Data
Exposure frequency (selectable from memory)	From 1 img/sec to 25 img/sec (according to the selected 'Average' weight).
mA variation range	15 / 30 / 45 / 60 mA @ 230Vac, 15 / 30 / 45 mA @ 115 Vac
Focus	0,6 mm Large Focus
Xr flash time	Min. time for the best image quality.
Images acquisition	Integration of 16 continuous readings.
Images storage	Automatic storage into the RAM memory or in nonvolatile memory.

7.7.5 Snapshot Fluoroscopy

0,5K² Camera

Description	Fixed Anode Version
mA variation range	1-10 mA
Xr flash time	< 1sec

Acquisition obtained from the integration of 16 continuative readings.
Automatic storage in non-volatile RAM memory according to the memory.
Other features as per Continuous Fluoroscopy

Description	Rotating Anode Version
mA variation range	1-12 mA
Xr flash time	< 1sec

Acquisition obtained from the integration of 16 continuative readings.
Automatic storage in non-volatile RAM memory according to the memory.
Other features as per Continuous Fluoroscopy

1K² Camera

Description	Fixed Anode Version
mA variation range	1-10 mA
Xr flash time	< 1 sec

Acquisition obtained from the integration of 16 continuative readings.
Automatic storage in non-volatile RAM memory according to the memory.
Other features as per Continuous Fluoroscopy

Description	Rotating Anode Version
mA variation range	2,5-30 mA
ma variation range (with HRP)	60 mA @230 Vac - 45 mA @ 115 Vac
Xr flash time	< 1 sec

Acquisition obtained from the integration of 16 continuative readings.
Automatic storage in non-volatile RAM memory according to the memory.
Other features as per Continuous Fluoroscopy

7.7.6 (1/2) mA Fluoroscopy

Description	Fixed Anode Version
mA variation range	0,25 - 4 mA
kV-mA relationship	40 kV / 0,25 mA, 80 kV / 3,8 mA, 110 kV / 4 mA

Other features as per Continuous Fluoroscopy

Description	Rotating Anode Version
mA variation range	0,25 - 4 mA
kV-mA relationship	40 kV / 0,25 mA, 80 kV / 3,8 mA, 120 kV / 4 mA

Other features as per Continuous Fluoroscopy

7.7.7 APR Fluoroscopy

APR programs suggested and preloaded by the manufacturer on the equipment represent only recommendations to be applied to the patient in order to optimize the operation and result of the examination.
kV and mAs values set at the factory in APR programs cannot be modified by the user.

0,5K² Camera

Description	Fixed Anode Version
APR Standard	40 kV / 0,5 mA, 80 kV / 7,6 mA, 110 kV / 8 mA
APR 1 (Fine anatomic parts or for pediatric use)	40 kV / 0,7 mA, 80 kV / 6,4 mA, 110 kV / 6,6 mA
APR 2 (lungs)	40 kV / 0,5 mA, 80 kV / 7 mA, 110 kV / 6 mA

The curves cannot be modified by the operator.

Description	Rotating Anode Version
APR Standard	40 kV / 0,5 mA, 80 kV / 7,6 mA, 120 kV / 8 mA
APR 1 (Fine anatomic parts or for pediatric use)	40 kV / 0,7 mA, 80 kV / 6,4 mA, 120 kV / 6,6 mA
APR 2 (lungs)	40 kV / 0,5 mA, 80 kV / 7 mA, 120 kV / 5,5 mA

The curves cannot be modified by the operator.

1K² Camera

Description	Fixed Anode Version
APR Standard	40 kV / 0,5 mA, 80 kV / 7,6 mA, 110 kV / 8 mA
APR 1 (Fine anatomic parts or for pediatric use)	40 kV / 0,7 mA, 80 kV / 6,4 mA, 110 kV / 6,6 mA
APR 2 (lungs)	40 kV / 0,5 mA, 80 kV / 7 mA, 110 kV / 6 mA

The curves cannot be modified by the operator.

Description	Rotating Anode Version
APR Standard	40 kV / 0,5 mA, 80 kV / 7,6 mA, 120 kV / 8 mA
APR 1 (Fine anatomic parts or for pediatric use)	40 kV / 0,7 mA, 80 kV / 6,4 mA, 120 kV / 6,6 mA
APR 2 (lungs)	40 kV / 0,5 mA, 80 kV / 7 mA, 120 kV / 5,5 mA
APR 3 (Sturdy patient)	40 kV / 1 mA, 70 kV / 15 mA, 120 kV / 9 mA

The curves cannot be modified by the operator.

kV-mA relationship of camera 0,5K²

	Standard	Dose¹	mA(1/2)	Dose¹		Dose¹		Dose¹	Snapshot
kV	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA
40	0.50	9,0	0.25	5,5	0.70	12,1	0.50	9,1	1.00
50	2.50	68,27	1.25	39,56	2.40	65,33	1.00	33,79	4.00
60	5.00	197,4	2.50	109,3	4.20	169,4	3.00	126,9	7.00
70	7.50	398,2	3.75	218,7	5.60	307,1	5.00	279,3	10.0
80	7.60	530,5	3.80	293,7	6.40	455,4	7.00	493,5	10.0
90	7.70	676,1	3.85	379,2	6.40	577,3	6.50	583,9	9.00
100	7.80	840,8	3.90	478,4	6.40	710,2	6.25	697,8	8.00
110	8.00	1029	4.00	593,1	6.60	875,6	6.00	812,5	8.00

¹ The dose measure (in µGy/s) has been performed in compliance with IEC 60601-1-3 § 5.2.4.2. and 60601-2-54 §203.5.2.4.5.101.
For more information about the dose measurement and the test setup, refer to paragraph
Informazioni dosimetriche a pag. 139.

Rotating Anode Version

	Standard	Dose¹	mA(1/2)	Dose¹		Dose¹		Dose¹	Snapshot
kV	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA
40	0.50	9,0	0.25	5,5	0.70	12,1	0.50	9,1	1.00
50	2.50	68,27	1.25	39,56	2.40	65,33	1.00	33,79	4.00
60	5.00	197,4	2.50	109,3	4.20	169,4	3.00	126,9	7.00
70	7.50	398,2	3.75	218,7	5.60	307,1	5.00	279,3	10.0
80	7.60	530,5	3.80	293,7	6.40	455,4	7.00	493,5	12.0
90	7.70	676,1	3.85	379,2	6.40	577,3	6.50	583,9	12.0
100	7.80	840,8	3.90	478,4	6.40	710,2	6.25	697,8	11.0
110	8.00	1029	4.00	593,1	6.60	875,6	6.00	812,5	10.0
120	8.00	1211	4.00	705,0	6.60	1031	5.50	899,2	9.00

¹ The dose measure (in µGy/s) has been performed in compliance with IEC 60601-1-3 § 5.2.4.2. and 60601-2-54 §203.5.2.4.5.101.
For more information about the dose measurement and the test setup, refer to paragraph
Informazioni dosimetriche a pag. 139.

kV-mA relationship of camera 1K[2]

Fixed anode version

	Standard	Dose[1]	mA (1/2)	Dose[1]		Dose[1]		Dose[1]	Snapshot
kV	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA
40	0.50	9,0	0.25	5,5	0.70	12,1	0.50	9,1	1.00
50	2.50	68,27	1.25	39,56	2.40	65,33	1.00	33,79	4.00
60	5.00	197,4	2.50	109,3	4.20	169,4	3.00	126,9	7.00
70	7.50	398,2	3.75	218,7	5.60	307,1	5.00	279,3	10.0
80	7.60	530,5	3.80	293,7	6.40	455,4	7.00	493,5	10.0
90	7.70	676,1	3.85	379,2	6.40	577,3	6.50	583,9	9.00
100	7.80	840,8	3.90	478,4	6.40	710,2	6.25	697,8	8.00
110	8.00	1029	4.00	593,1	6.60	875,6	6.00	812,5	8.00

[1] The dose measure (in µGy/s) has been performed in compliance with IEC 60601-1-3 § 5.2.4.2. and 60601-2-54 §203.5.2.4.5.101.
For more information about the dose measurement and the test setup, refer to paragraph
Informazioni dosimetriche a pag. 139.

Rotating Anode Version

	Standard	Dose[1]	mA (1/2)	Dose[1]		Dose[1]		Dose[1]		Dose[1]	Snapshot	Snapshot[2]
kV	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA	µGy/s	mA	mA
40	0.50	9,0	0.25	5,5	0.70	12,1	0.50	9,1	1.00	16,18	2.50	60
50	2.50	68,27	1.25	39,56	2.40	65,33	1.00	33,79	4.00	103,1	7.50	60
60	5.00	197,4	2.50	109,3	4.20	169,4	3.00	126,9	10.0	394,3	15.0	60
70	7.50	398,2	3.75	218,7	5.60	307,1	5.00	279,3	15.0	813,4	25.0	60
80	7.60	530,5	3.80	293,7	6.40	455,4	7.00	493,5	15.0	1051	30.0	60
90	7.70	676,1	3.85	379,2	6.40	577,3	6.50	583,9	13.0	1160	25.0	60
100	7.80	840,8	3.90	478,4	6.40	710,2	6.25	697,8	12.0	1311	20.0	60
110	8.00	1029	4.00	593,1	6.60	875,6	6.00	812,5	11.0	1440	15.0	60
120	8.00	1211	4.00	705,0	6.60	1031	5.50	899,2	10.0	1580	10.0	60

[1] The dose measure (in µGy/s) has been performed in compliance with IEC 60601-1-3 § 5.2.4.2. and 60601-2-54 §203.5.2.4.5.101.
For more information about the dose measurement and the test setup, refer to paragraph
Informazioni dosimetriche a pag. 139.
[2] with memory HRP

7.8 Exposure mode: radiography

7.8.1 Two points technique, kV and mAs selection

Equipment with mains voltage at 230Vac

Description	Fixed Anode Version
Large Focus (IEC 336)	1,5 mm
kVp range	40 - 110 kV
mA range	25 mA fixed from 40 kV to 100 kV; 22 mA at 110 kV
mAs range	1 – 125 mAs from 40 to 100 kV, 1 – 100 mAs from 101 to 110kV in 42 steps, curve R'20
HiRad mA range (mAs < 2,2)	35 mA fixed from 40 kV to 100 kV; 31 mA at 110 kV
HiRad Exposure times range	28-90 msec
Exposure times range	0,04 - 5 sec
Duty cycle	Calculated according to the anode dissipation

Description	Rotating Anode Version
Large Focus (IEC 336)	0,6 mm
kVp range	40 - 120 kV
mA range	25 mA fixed from 40 kV to 100 kV; 20 mA at 120 kV
mAs range	1 – 125 mAs from 40 to 100 kV, 1 – 100 mAs from 101 to 120 kV at 42 steps, curve R'20
HiRad mA range (mAs < 2,2)	50 mA fixed from 40 kV to 100 kV; 30 mA at 120 kV
HiRad Exposure times range	20 - 64 msec
Exposure times range	0,04 - 5 sec
Duty cycle	Calculated according to the anode dissipation

Equipment with mains voltage at 115 Vac

Description	Fixed Anode Version
Large Focus (IEC 336)	1,5 mm
kVp range	40 - 110 kV
mA range	18 mA fixed from 40 kV to 100 kV; 16 mA at 110 kV
mAs range	1 – 90 mAs from 40 to 100 kV, 1 – 80 mAs from 101 to 110 kV
HiRad mA range (mAs < 2,2)	25 mA fixed from 40 kV to 100 kV; 22 mA at 110 kV
HiRad exposure times range	40-128 msec
Exposure times range	0,04-5 sec
Duty cycle	Calculated according to the anode dissipation

Description	Rotating Anode Version
Large Focus (IEC 336)	0,6 mm
kVp range	40 - 120 kV
mA range	18 mA from 40 kV to 100 kV; 15 mA at 120 kV
mAs range	1 – 90 mAs from 40 to 100 kV, 1 – 71 mAs from 101 to 120 kV
HiRad mA range (mAs < 2,2)	35 mA fixed from 40 kV to 100 kV; 20 mA at 120 kV
HiRad exposure times range	28 - 90 msec
Exposure times range	0,04 - 5 sec
Duty cycle	Calculated according to the anode dissipation

7.8.2 APR Radiography

APR programs suggested and preloaded by the manufacturer on the equipment represent only recommendations to be applied to the patient in order to optimize the operation and result of the examination.
kV and mAs values set at the factory in APR programs can be stored only if, during the equipment configuration, this possibility has been set (by authorized personnel only).

	Description	Norm	Dose[1]		Dose[1]		Dose[1]
		Set	mGy		mGy		mGy
	APR 1 (Head)	77 kV - 56 mAs	6,769	74 kV - 45 mAs	5,026	80 kV - 71 mAs	9,261
	APR 2 (Lungs)	110 kV - 11 mAs	2,462	107 kV - 9 mAs	1,911	110 kV - 14 mAs	3,154
	APR 3 (Pelvis)	85 kV - 22 mAs	3,153	82 kV - 28 mAs	3,777	88 kV - 18 mAs	2,741

[1] The dose measurement (in mGy) has been performed in compliance with IEC 60601-1-3 § 5.2.4.2. and 60601-2-54 §203.5.2.4.5.101 Skin dose level.

For more information about the dose measurement and the test setup, refer to paragraph **Informazioni dosimetriche a pag. 139**.

7.9 X-ray group

7.9.1 Fixed anode x-ray group

I-40S 3,5 RF Monobloc

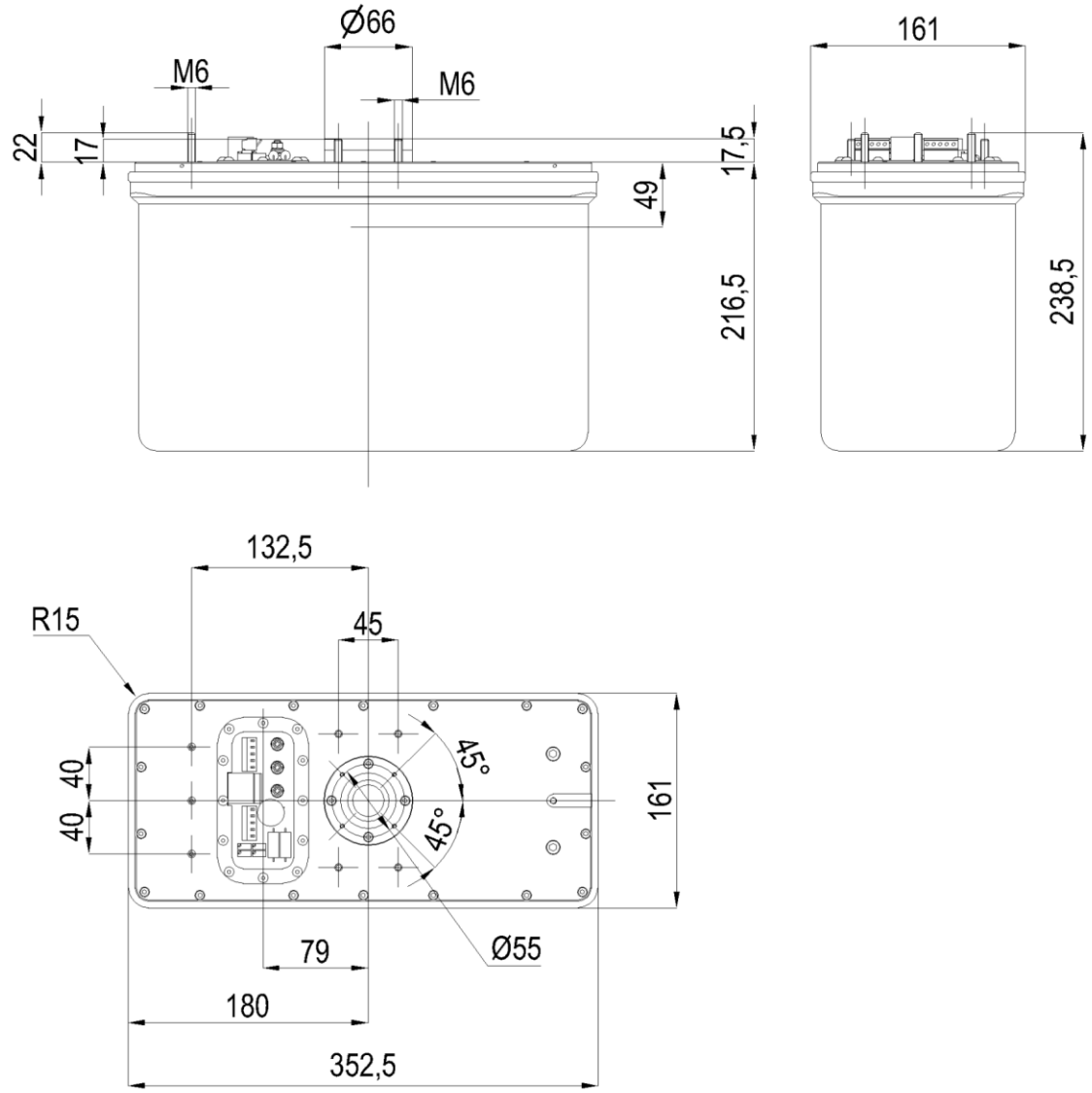
Description	Data
Monobloc model	I-40S 3,5 RF
Max. power (100kV – 35mA) (IEC 60601-1)	3,5 kW
Max. tube voltage	110 kV
Ripple at the max. power	<2%
kV Rise time at max. power	<1 ms
Mechanical housing features	
Half-value layer @75kV	2,0 mmAl
Min. inherent filtration @75kV	1,4 mmAl
Weight	15,5 kg (34,17 lb)
Thermal housing features	
Available thermal capacity (RX)	590 kJ (790 kHU)
Total thermal capacity	900 kJ (1215 kHU)
Thermal safety	60°C ±5°C
Compensation lung	410 cm^3 (25.015 cubic inch)
Continuous thermal dissipation	80 W, 109 HU/sec, 6400 HU/min
X-ray tube filament power supply - Max current (rms)	500 mA
Leakage radiation (IEC 60601-1-3)	<1 mGy/h

In case it is not used for more than three months, proceed to the tube reset by performing some exposures with the x-ray data indicated in the following schedule:

	kV	mA/mAs	time ON	time OFF	to be repeated
Fluoros	70	3mA	5'	5'	5 times
Radiog	70	12,5mAs	0,5 sec	30 sec	Increase of 5kV till kVmax.

If during the procedure some working irregularities or anomalies are found, it is necessary to stop it for at least half an hour and start it again from the beginning.

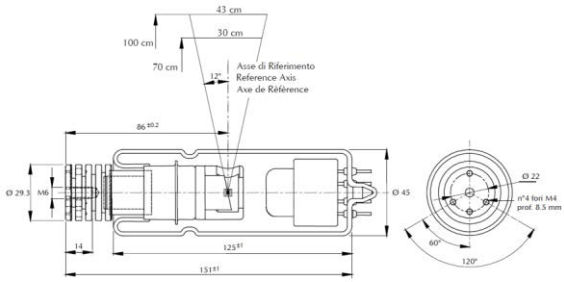
Dimensions



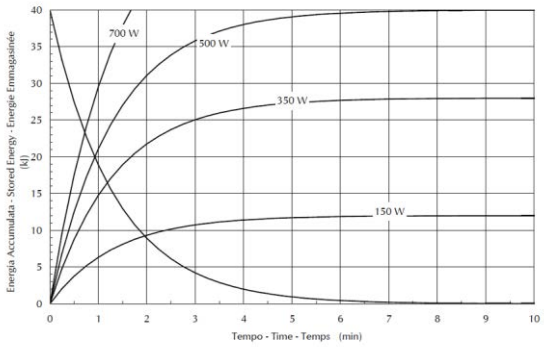
All dimensions are in mm

Fixed Anode X-Ray Insert - IAE F112

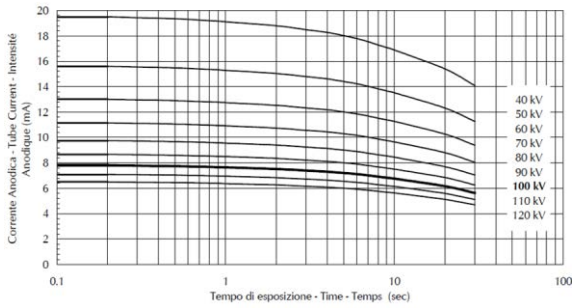
Description	Data
Nominal high voltage	120 kV
Max. filament current	4,3 A
Nominal focus dimension: small focus	0,5 mm
Nominal focus dimension: large focus	1,5 mm
Nominal anodic power: small focus	780 W
Nominal anodic power: large focus	4200 W
Anode material	Tungsten
Anode inclination angle	12°
Thermal anode capacity	40 kJ (54 kHU)
Anode continuous thermal dissipation	500 W (670 HU/sec)
Min. inherent filtration	0,9 mm Al
Tube material	Glass



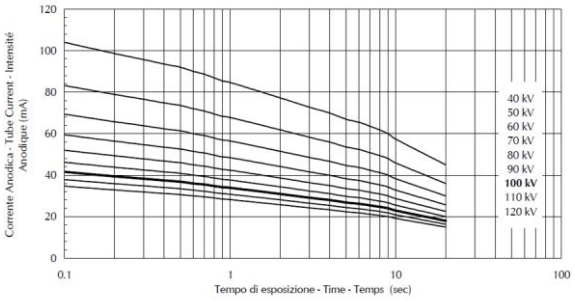
Mechanical dimensions



Thermal anode feature



Load curves, small focus



Load curves, large focus

7.9.2 Rotating anode x-ray group

I-40R 5 RF Monobloc

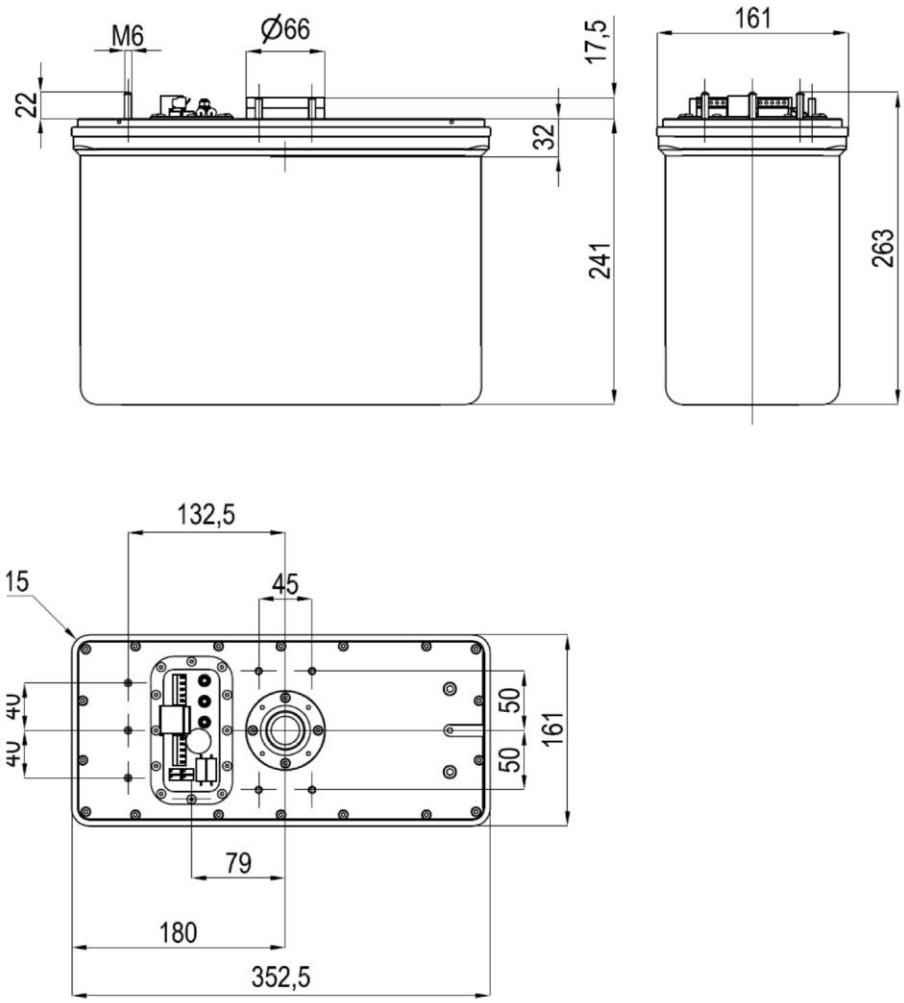
Description	Data
Monobloc model	I-40R 5 RF
Max. power (100kV – 50mA) (IEC 60601-1)	5 kW
Max. tube voltage	120 kV
Ripple at the max. power	<2%
kV Rise time at max. power	<1 ms
Mechanical housing features	
Half-value layer @75kV	2,0 mmAl
Min. inherent filtration @75kV	1,4 mmAl
Weight	19 kg (41,89 lb)
Thermal housing features	
Available thermal capacity (RX)	650 kJ (870 kHU)
Total thermal capacity	940 kJ (1259 kHU)
Thermal safety	60 °C ±5 °C
Compensation lung	410 cm³ (25.015 cubic inch)
Continuous thermal dissipation	85 W, 115 HU/sec, 6900 HU/min
X-ray tube filament power supply - Max. current ((RMS)	500 mA
Leakage radiation (IEC 60601-1-3)	<1 mGy/h

In case it is not used for more than three months, proceed to the tube reset in the following way:

	kV	mA/mAs	time ON	time OFF	to be repeated
Fluoros	70	3 mA	5'	5'	5 times
Radiog	70	12,5 mAs	0,5 sec	30 sec	increase of 5kV till kVmax

If during the procedure some working irregularities or anomalies are found, it is necessary to stop it for at least half an hour and start it again from the beginning.

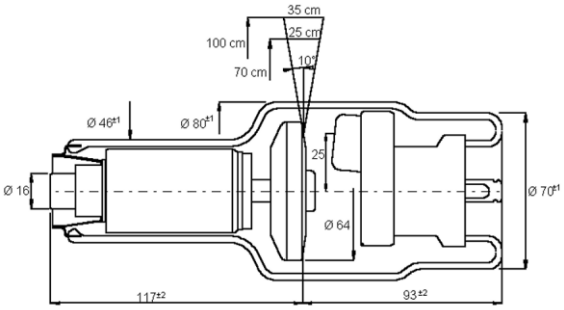
Dimensions



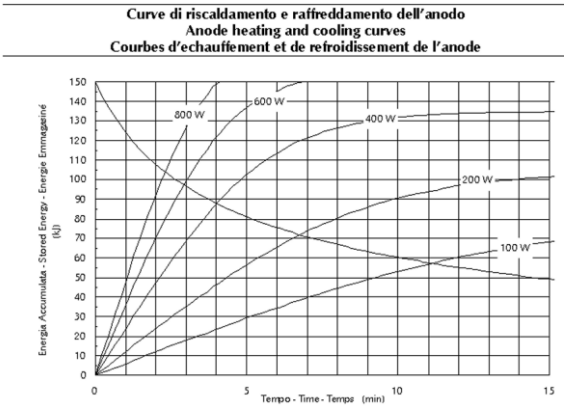
All dimensions are in mm

X-Ray insert model IAE X20P 0,3-0,6

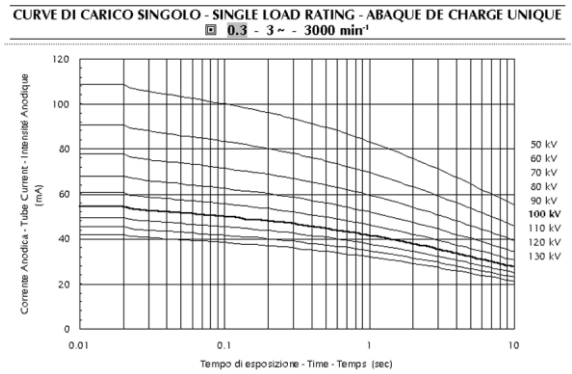
Description	Data
Max. peak voltage	120 kVP
Max. filament current	5,4 A
Nominal focus dimension: small focus	0,3 mm
Nominal focus dimension: large focus	0,6 mm
Nominal anodic power: small focus	5 kW
Nominal anodic power: large focus	17 kW
Anode material	Rhenium / Tungsten / Molybdenum
Anodic diameter	64 mm
Anode inclination angle	10°
Thermal anode capacity	150 kJ (200kHU)
Anode continuous thermal dissipation	300 W (24kHU/min, 18 kJ/min)
Anode max. thermal dissipation	500 W (800 kHU/min)
Min. inherent filtration	0,7 mm Al
Tube material	glass
Speed of rotation of the anode	3000 rpm



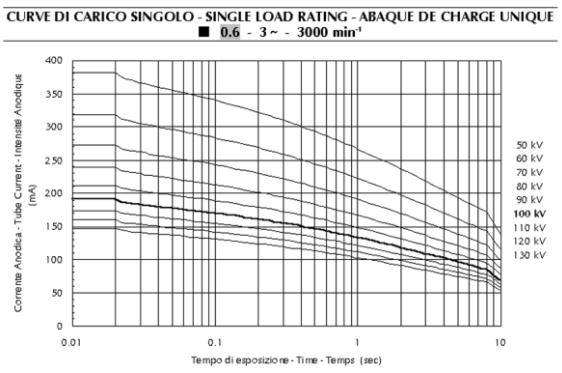
Mechanical dimensions



Anode heating and collision curves



0,3mm focus load curves



0,6mm focus load curves

7.10 Collimator

Description	Data
Model with iris	R605/027F/DASM
Model with iris and parallel shutters (with 9" I.I.)	R605/027E/DASM
Model with iris and parallel shutters (with 12" I.I.)	R605/027G/DASM
Fields dimension (DF 100cm- 39"): round field delimitation	5 ± 23 cm
Fields dimension (DF 100cm- 39"): elliptical field delimitation	0 ± 23 cm
Leakage radiation (EN60601-1-3)	< 1 mGy/h
Inherent filtration (EN60601-1-3)	0 mm
Classification EN60601-1 par.6:	
Protection against electrical hazards	Class I
Protection against direct and indirect contacts	equipment with applied part Type B
Protection against water seepage	common protection (IPXO)

7.11 Image intensifier

7.11.1 Image Intensifier 9" (1)

Description	Triple 9/6/4"
Brand	Thales
Model	TH 9428 HP2H542 VR13
Fields Number	3
Nominal Input Diameter	230 mm (9,06 in)
Output Image Diameter	20 mm (0,79 in)
Output Window Thickness	3,6 mm (0,14 in)
Useful Input Field Size	215/160/120 mm (8,46/6,30/4,72 in)
Typical Resolution (Central)	48/56/64 lp/cm
Conversion Factor (Cd/m-2/mR/s-1)	240/120/60
Contrast Ratio	23:1/25:1/30:1
Integral Image Distortion	4% / 2% / 1%
Differential Distortion at 90% radius	15% / 6% / 3%
DQE at 59.5 keV	65%
"All metal" Technology	Yes
Input Screen "Hi-Res."	Yes
MTF at 10 Lp/cm	60/65/70%
MTF at 20 Lp/cm	25/30/40%
Low frequency drop LDF	7/6/5%

(1) According to IEC standard IEC from 1262-1 to 1262-6

7.11.2 Toshiba Image Intensifier 9" (2)

Description	Data
Brand	Toshiba
Model	E5764SDS-T1
Fields Number	3 (9" /6" /4.5")
Output Image Diameter	20 ± 0.5 mm
Useful Input Field Size	230 mm min./ 160 ±5 mm/ 120 ±5 mm
Typical Resolution (Central)	48 / 56 / 66 Lp/cm
Conversion Factor (Cd/m-2/mR/s-1)	28 (cd/m2)/(µGy/s)
Contrast Ratio (10% area)	25
Contrast Ratio (10 mm dia.)	16
DQE a 59.5 keV	65 %

(2) According to IEC standard IEC from 1262- 5

7.11.3 Image Intensifier 12" (1)

Description	Triple 12/9/6"
Brand	Thales
Model	TH 9432 QX H686 VR13
Fields Number	3
Nominal Input Diameter	320 mm (12,59 in)
Output Image Diameter	25 mm (0,98 in)
Output Window Thickness	14 mm (0,55 in)
Useful Input Field Size	290 / 215 / 160 mm (11,41 / 8,46 / 6,30 in)
Typical Resolution (Central)	48 / 54 / 62 lp/cm
Conversion Factor (Cd/m-2/mR/s-1)	320 / 160 / 80
Contrast Ratio	36:1/ >36:1/ >36:1
Integral Image Distortion	8% / 5% / 3%
Differential Distortion at 90% radius	30% / 12% / 6%
DQE at 59.5 keV	65%
"All metal" Technology	Yes
Input Screen "Hi-Res."	Yes
MTF at 10 Lp/cm	60/65/70%
MTF at 20 Lp/cm	25/30/40%
Low frequency drop LDF	7/6/5%

(1) According to IEC standard IEC from 1262-1 to 1262-6

7.11.4 Fixed Antiscattering Grid

Description	Data
Line rate	60 l/cm
Ratio	10 : 1
Focus	100 cm
Material	Fiber interspacer and carbon cover

7.12 TV chain

7.12.1 TV Camera CCD 0,5K x 0,5K

Description	Data
Camera technology	CCD at low persistence of ½" (470.000pixels)
Video standard	CCIR 625/50Hz interlaced with matrix 752x 582 pixels
Aspect ratio	4:3
Band width	20 MHz ± 3 dB
Signal-noise ratio	65 dB
Resolution	20 lines-pairs (on 6" image intensifier)
Gamma correction	0,4 or 1
Automatic video level compensation	Yes
Dynamic contrast Shading	Yes
Video output A/D converter	10 bit

7.12.2 Camera TV with CCD 1K x 1K Thales

Description	Data
Model	Thales L103, L108, L115
Camera technology	CCD interline progressive scanning
Iris	Motorized and Manual
Image resolution	1000 x 1000 pixels
Signal-noise ratio	62 dB
Digital video out	12 bits
Max frame rate	30 fps
Min expusure time	33 ms @ 1000 x 1000
Sensibility	Motorized lens: > 64 LSB/Cd/m2 Manual lens: 18 LSB/Cd/m2
Iris opening range	Motorized lens: da F/1.5 a F/11 Manual lens: da F/2.8 a F/11
CCD errors in operative nomal condition	Correct

7.12.3 Camera TV with CCD 1K x 1K mvBlueCOUGAR

Description	Data
Model	mvBlueCOUGAR-X122G
Resolution	1280 x 960
Mpixels	1.2
Max. frame rate	31 Hz
Binning	8/2/8/2
Shutter type	Global
Sensore size	1/3"
Pixel size	3.75 x 3.75 µm
Readout type	Progressive
Exposure time	10 µs - 20 s
ADC resolution / output	14 bit → 14, 12, 8 bit
EMVA1288	Yes
Trigger (HW /SW)	Yes
Pipelined global shutter in trigger mode	Yes

7.13 Image processor

7.13.1 SBFM Memories

Features	SBFM 76/0	SBFM78/330	SBFM 78/2700
Model	SBFM76/0	SBFM 78/330	SBFM 78/2700
Images number	L.I.H. Only Ram image	L.I.H. +330 (nonvolatile images)	L.I.H. + 2700 (nonvolatile images)
Image format	768x576x12 bits 50Hz 256 gray level	768x576x12 bit 50Hz 256 grey levels	768x576x12 bit 50Hz 256 grey levels
A/D Converter	8 bits	10 bit	10 bit
D/A Converter	8 bits	8 bit	8 bit
Sampling frequency	15 MHZ	15 MHZ	15 MHZ
Monitors number	1	2	2
Recursive Filter, noises reduction, OFF,2,4,8,16	YES 0,2,4,8,16	YES 0,2,4,8,16	YES 0,2,4,8,16
Digital rotation in real time	YES	YES	YES
Vertical image Inversion	YES, in combination with the rotation	YES, in combination with the rotation	YES, in combination with the rotation
Horizontal image inversion	YES	YES	YES
Grey scale Inversion	NO	YES	YES
Frame rate fps acquisition	Single store image	Single store image	Single store image
Image edge (EDGE)	YES	YES	YES
Patient data editing	NO	YES	YES
Video input	Composite Video signal standard CCIR 1Vpp end 75 Ohm	Composite Video signal standard CCIR 1Vpp end 75 Ohm	Composite Video signal standard CCIR 1Vpp end 75 Ohm
Video output	BNC, Standard CCIR 1 Vpp composite video signal 75 Ohm termination	BNC, Standard CCIR 1 Vpp composite video signal 75 Ohm termination	BNC, Composite Video signal standard CCIR 1Vpp end 75 Ohm
Power supply	20V to 36V dc	20V to 36V dc	20V to 36V dc
Dimensions	BOX (26x10,2x6,5cm) [10.24x4.02x2.56 in]	BOX (26x10,2x6,5) [10.24x4.02x2.56 in]	BOX (26x10,2x6,5) [10.24x4.02x2.56 in]

7.13.2 RTP Memory

Features	Data
Images acquirement	CCD Digital camera 1024x1024 up to12 bit (GigE). Pulsed and contiunuos fluoroscopy. "cine" sequence up to 25 fps. Digital Snapshot.
Images storage	1024 x 1024 x 12 bit
Images storage on H.D	about 110.000 (expandable)
Video output	2 x DVI 1280x1024
Programmed acquirement sequences	Yes, 1, 3, 6, 12, 25 fps
Pulsed fluoroscopy	Yes
Electronic rotation at 1° steps	Yes
Image horizontal and vertical inversion	Yes
Inversione della scala dei grigi	Yes
Grey scale inversion	Yes
Recursive filter	Yes (1, 2, 4, 8, 16)
Smart Filter con "Motion Detection"	Yes
Edge enhancement Smooth, Normal, Sharp in post processing	Yes
Cineloop review	Yes
Virtual shutter	Yes
Electronic collimator (rectangular and circular)	Yes
Max. opacity fluoroscopy acquirement	Yes
Subtraction in real time with manual/automatic mask	Yes
Shifting pixels	Yes
Land Marking	Yes
Electronic zoom factor from 1,2 to 3	Yes
Electronic lens factor from 1,2 to 3	Yes
Land marking	Yes
Overview	Yes 4, 9, 16 images
Text editing	Yes
Dose report	Yes
Patient archive	Yes
Length measures	Yes
Length calibration on reference object measure	Yes
Angles measures	Yes
Stenosis measures	Yes
Interface for network Ethernet TCP/IP	Yes
Adapter of Wireless network 802.11 a/g/n	Optional
Infrared remote control	Yes
Data transmission towards PACS	Yes (DICOM 3.0)
Dicom option	Dicom VERIFY (SCU/SCP), Dicom STORAGE (SCU), Dicom WORK LIST (SCU), Dicom PRINT (SCU), Dicom CDR/DVD, Dicom QUERY/RETRIEVE (SCU), Dicom MPPS (CPU), Dicom STORAGE COMMITMENT (SCU)

7.13.3 HRP Memory

Features	Data
Images acquirement	Digital CCD camera 1024x1024 up to 12 bit (GigE). Continuous and pulsed fluoroscopy. Pulsed at high dose up to 25 fps (HCF). "cine" sequence at high dose up to 25 fps. Digital Snapshot.
Images storage	1024 x 1024 x 12 bit
Images storage on H.D	About 110.000 (expandable)
Video output	2 x DVI 1280x1024
Programmed acquirement sequences	Yes, 1, 3, 6, 12, 25 fps
Pulsed fluoroscopy	Yes
Electronic rotation at 1° steps	Yes
Image horizontal and vertical inversion	Yes
Inversione della scala dei grigi	Yes
Grey scale inversion	Yes
Recursive filter	Yes (1, 2, 4, 8, 16)
Smart Filter con "Motion Detection"	Yes
Edge enhancement Smooth, Normal, Sharp in post processing	Yes
Cineloop review	Yes
Virtual shutter	Yes
Electronic collimator (rectangular and circular)	Yes
Max. opacity fluoroscopy acquirement	Yes
Subtraction in real time with manual/automatic mask	Yes
Shifting pixels	Yes
Land Marking	Yes
Electronic zoom factor from 1,2 to 3	Yes
Electronic lens factor from 1,2 to 3	Yes
Land marking	Yes
Overview	Yes 4, 9, 16 images
Text editing	Yes
Dose report	Yes
Patient archive	Yes
Length measures	Yes
Length calibration on reference object measure	Yes
Angles measures	Yes
Stenosis measures	Yes
Interface for network Ethernet TCP/IP	Yes
Adapter of Wireless network 802.11 a/g/n	Optional
Infrared remote control	Yes
Data transmission towards PACS	Yes (DICOM 3.0)
Dicom option	Dicom VERIFY (SCU/SCP), Dicom STORAGE (SCU), Dicom WORK LIST (SCU), Dicom PRINT (SCU), Dicom CDR/DVD, Dicom QUERY/RETRIEVE (SCU), Dicom MPPS (CPU), Dicom STORAGE COMMITMENT (SCU)

7.13.4 EYES Memory

Features	Data
Acquirement	Digital CCD camera 960x960 up to 12 bit (GigE). Continuous and pulsed Fluoroscopy. Digital Snapshot.
Images acquirement	1024 x 1024 x 12 bit
Images storage on H.D.	about 55.000
Video output	1 x HDMI 1960x1200
Pulsed fluoroscopy	Yes
Electronic rotation at 1° steps	Yes
Horizontal and vertical inversion	Yes
Grey scale inversion	Yes
Brightness and contrast	Yes
Recursive filter	Yes (1,2,4,8,16)
Smart Filter with "Motion Detection"	Yes
Edge enhancement Smooth, Normal, Sharp in post processing	Yes
Virtual collimator	Yes
Electronic collimator (rectangular and circular)	Yes
Electronic zoom factor from 1,2 to 3	Yes
Electronic lens factor from 1,2 to 3	Yes
Overview	Yes 4, 9, 16 images
Text editing	Yes
Dose report	Yes
Patient archive	Yes
Length measures	Yes
Length calibration on reference object m.	Yes
Angles measures	Yes
Stenosis measure	Yes
Interface for network Ethernet TCP/IP	Yes
Adapter of Wireless network 802.11 a/g/n	Optional
Data transmission towards PACS	Yes (DICOM 3.0)
Dicom options	Dicom VERIFY (SCU/SCP), Dicom STORAGE (SCU), Dicom WORK LIST (SCU), Dicom PRINT (SCU), Dicom CDR/DVD, Dicom QUERY/RETRIEVE (SCU), Dicom MPPS (CPU), Dicom STORAGE COMMITMENT (SCU)

7.13.5 DICOM Terminology

Terminology	Description
Dicom VERIFY (SCU/SCP)	It allows the connection check, in both ways, with Dicom units present on the network.
Dicom STORAGE (SCU)	It allows to send the images to a Dicom server for filing.
Dicom WORKLIST (SCU)	It queries and receives from a Dicom server the patients list to be examined on the acquirement system.
Dicom PRINT (SCU)	It sends to Dicom printer the images to be printed in panoramic way and through film composer.
Dicom CDR/DVD (media Interchange)	It burn on Cd or DVD the patients images with the possibility to add a display program.
Dicom MPPS-Modality Performed Procedure Step (SCU)	It informs the server that the examination is in operation and then that it has been completed by sending the reference indication to the images and, if available, the total acquirement dose.
Dicom STORAGE COMMITMENT (SCU)	It asks and wait for the confirmation to the storage server that the images sent are saved in a safe way by allowing the cancellation of the acquirement unit from the file.
Dicom QUERY/RETRIEVE (SCU)	It queries and receives from a server the images of a patient data for consultation.
SCU (SERVICE CLASS UNIT)	unit that asks a Dicom service to a unit SCP (SERVICE CLASS PROVIDER) that is able to supply such service.

7.14 Monitors

7.14.1 Monochrome monitor 19"

"C" arm version: 9", 9" 15kW, 12", 12" 15kW, Litho
Standard monitor with memories RTP and HRP

Description	Data
Model	MM191D
Type	19" IPS, backlight type LED
Display angle	Hor: 170° Vert: 170°
Contrast Ratio	1000:1
Resolution	1280 x 1024
Pixel dimensions	0.294mm x 0.2mm
Display color	Monochrome
Brightness Max. luminance	1300 cd/m2
Aspect Ratio	4:3
Response time	30 ms
Video Standard	DVI, VGA, DisplayPort
Connectors	D-Sub 15p. HD ; DVI-D, BNC
Brightness / Contrast	OSD menu
Power supply	110 - 240Vac
Absorption	< 50W
Weight	5,6 kg
Mounting interface	VESA 100x100

7.14.2 Monochrome monitor 19"

C" arm version: 9", Litho
Optional monitor with memories SBFM

Description	Data
Model	EM19TFTI/MII-V
Type	19" LCD TFT B/N anti-glare panel
Display angle	Hor: 170° Vert: 170°
Contrast Ratio	900:1
Resolution	1280 x 1024
Pixel dimensions	0.294 mm x 0.294 mm
Display color	Monochrome
Brightness Max. luminance	800 nit (1000 nit typ.)
Aspect Ratio	4:3
Response time	-
Video Standard	VGA / DVI
Connectors	D-Sub 15p. HD ; DVI-D, BNC video composite (B/N)
Brightness / Contrast	OSD menu, frontal pushbutton
Power supply	110-240 V~ 50-60 Hz
Absorption	max 85 W
Weight	8,6 kg
Mounting interface	VESA 100x100

7.14.3 Basic color monitor 19"

C" arm version: 9", Litho
Standard monitor with memories SBFM

Description	Data
Model	EM19TFTI/MCII-V
Type	19" LCD TFT anti-glare panel
Display angle	Hor: 170° Vert: 170°
Contrast Ratio	800:1
Resolution	1280 x 1024
Pixel dimensions	0.294 mm x 0.294 mm
Display color	Base color
Brightness Max. luminance	270 cd/m2 @ 6500°K
Aspect Ratio	4:3
Response time	-
Video Standard	VGA / DVI-D
Connectors	D-Sub 15p. HD ; DVI-D, BNC for composite video (B/N)
Brightness / Contrast	OSD menu, frontal pushbutton
Power supply	110-240V~ 50-60Hz
Absorption	75 VAmax
Weight	9.8 kg
Mounting interface	VESA 100 x 100

7.14.4 Basic color monitor 19"

"C" arm version:: 9", 9" 15kW, 12", 12" 15kW, Litho, Litho 15kW
Optional monitor with memories RTP and HRP

Description	Data
Brand	EIZO
Model	RadiForce MX191
Type	19" LCD TFT
Display angle	Hor: 170° Vert: 170°
Contrast Ratio	2000:1
Resolution	1280 x 1024
Pixel dimensions	0.294 mm x 0.294 mm
Display color	16,7 milion colors
Brightness Max. luminance	300 cd/m2
Aspect Ratio	4:3
Response time	-
Input signals	DVI-D, D-Sub (VGA)
Brightness / Contrast	OSD menu, frontal pushbutton
Power supply	110-240V~ 50-60Hz
Absorption	43 W max
Weight	5,3 kg
Mounting interface	VESA 100 x 100 mm

7.14.5 Basic color monitor 24"

"C" arm version: 9", 12"
Standard monitor with memories EYES

Description	Data
Brand	EIZO
Model	EV2456
Type	24" LCD TFT
Display angle	Hor: 170° Vert: 170°
Contrast Ratio	1000 : 1
Resolution	1920 x 1200 pixel
Pixel dimensions	0.294 mm x 0.294 mm
Display color	16 million colors
Brightness Max. luminance	350 cd/m2
Aspect Ratio	16:10
Response time	-
Input signals	Display Port, HDMI, DVI-D, DSub
Brightness / Contrast	OSD menu, frontal pushbutton
Power supply	110-240V~ 50-60Hz
Absorption	44 W max
Weight	5,7 kg
Mounting interface	VESA 100x100

7.14.6 Basic color monitor 24" touchscreen

"C" arm version: 9"
Optional monitor with memories EYES

Description	Data
Brand	Olorin
Model	MSBP2416AMC
Type	24" TFT active matrix type liquid crystal panel
Display angle	Hor: 178° Vert: 178°
Contrast Ratio	1000 : 1
Resolution	1920 x 1200 pixel
Pixel dimensions	0.27 mm x 0.27 mm
Display color	16,7 milion colors
Brightness Max. luminance	900 cd/m2
Aspect Ratio	16:10
Response time	-
Input signals	Display Port, HDMI, DVI-D, DSub
Brightness / Contrast	OSD menu, frontal touch pushbutton
Power supply	DC 24V
Absorption	60 W max
Weight	8,8 kg
Mounting interface	VESA 100 x 100 mm

7.15 Optional: laser targeting device

Device for dose reduction (only on I.I. tube)

Description	Data
Wave Length	645 ±10 nm
Optical power of the laser diode	< 1 mW
Safety class 60825-1:2007	Class 2

7.16 Optional: DAP Meter

Description	Data
Model	DIAMENTOR CM-T
Measurement category	Dose area product
Measuring unit	µGy m ²
Digital resolution	0.01 µGy m²
Measurement category	Dose area product rate
Measuring unit	µGy m²/s
Digital resolution	0.01 µGy m²/s
Dose rate range	0.10 to 400 µGy/sec
Dose area product range rate	0.01 to 4500 µGy m²/s
Tube voltage	40 to 120 kV
Chamber:	Type TA34037
Dimension of chamber field	Ø 7.2 cm
Max energy dependence	± 8 % according to IEC60580, Table 6
Min. inherent filtration	< 0.3 mmAl / 70 kV

7.17 Optional: Thermal printer

7.17.1 Thermal Dose Meter Printer

Description	Data
Type	Movable printer
Model	Custom Print's
Printing method	Thermal printing line
Resolution	203 dpi
Printing speed	50 mm/sec*
Paper width (mm)	58 mm
Roll dimensions (mm)	57.5 ±1
Print area	48 mm
Interface	RS-232
Power Supply	9/50 Vdc / 0,6 A
Operating temperature	0±50 °C
Humidity storage	10 ± 85 %, there must be no condensation
Dimensions (WxDxH)	146 x 88 x 65 mm
Weight	340 gr
Safety	EN60950

* it depends on the printing typology and the environment temperature

7.17.2 Thermal printer

Description	Data
Model	Sony UP971AD / UP991AD
Printing Method	Direct thermal printing
Resolution	325 dpi
Gradiations	8 bits (256 levels) processing
Picture elements	Digital: 7680 x 2560 dots, Video NTSC: 720 x 504 dots, Video PAL: 720 x 604 dots
Paper size	Paper width of 210 mm
Picture area	Digital: 600 x 200 mm (Max)
	Video: STD NTSC: 182 x 144 mm PAL: 188 x 140 mm SIDE NTSC: 244 x 184 mm PAL: 244 x 183 mm
Picture memory	Digital: 2816 x 7680 x 8 bits Video: 6 frames (720 x 608 x 8 bits for one frame)
Printing time	Approx. 8 seconds/image (in standard mode)
Interface	Hi-Speed USB (USB 2.0) (x1) VIDEO INPUT: BNC type (X1) NTSC or PAL composite video signals 1.0Vp-p, 75ohm (NTSC/PAL automatically discriminated) VIDEO OUTPUT: BNC type (x1) Loop-through REMOTE: Stereo mini jack (x1)
Power requirements	AC 100 V to 240 V, 50/60 Hz
Dimensions (W x H X D)	316 x 132.5 x 265 mm
Mass	7 Kg

7.18 Optional: DVD Recorder

7.18.1 DVD Recorder

Description	Data
Model	Sony, DVD Recorder HVO-550MD
Recording Features	
Recording Video Format	MPEG-4 AVC/H.264
Recording Audio Format	AC-3/AAC LC
Recording File Format	AVCHD/MP4
Recording Media	Internal HDD (500GB), DVD-R, External USB Storage, Network (CIFS)
Recording Resolution	1280 × 720/59.94p, 1280 × 720/50p, 720 × 480/59.94i, 720 × 576/50i
Recording Bit Rate (HD)	14Mbps (Best), 8Mbps (High), 4Mbps (Standard)
Recording Bit Rate (SD)	5Mbps (Best), 3Mbps (High), 2Mbps (Standard)
Connectors	
Input Connectors	HDMI (Type A) (1), DVI-D (DVI 19-pin) (1), S VIDEO (Mini DIN 4-pin type) (1), VIDEO (BNC type) (1) AUDIO (Stereo mini jack) (1)DC IN (DIN 3-pin)
Output Connectors	HDMI (Type A) (1), DVI-D (DVI 19-pin) (1), S VIDEO (Mini DIN 4-pin type) (1), VIDEO (BNC type) (1) AUDIO (Stereo mini jack) (1)
Other Interfaces	USB (Type A) (3), USB (Type B) (1), Network (RJ-45, 1000 Base-T/100 Base-TX) (1)), REMOTE RS-232C (D-sub 9-pin) (1), REMOTE contact switch (stereo mini jack) (2) REMOTE MONITOR (RJ-45) (1), Equipotential
General	
Power Requirements	+12 V to +24 V DC (supply from AC-81MD AC adaptor)
Input current	3.5 A to 1.8 A
Operating Temperature	Da 5 °C a 40 °C
Operating Humidity	20% to 80% (Maximum wet-bulb temperature: 30°C (86°F)) (no condensation)
Operating Pressure	Da 700 hPa a 1060 hPa
Storage and transport temperature	Da -20 a +60 °C
Storage and transport humidity	20% to 90% (Maximum wet-bulb temperature: 30°C (86°F)) (no condensation)
Storage and transport pressure	Da 700 hPa a 1060 hPa
Mass	3.2 kg (7 lb. 0.88 oz.)
Dimensions (including longest protrusions)	212.0 × 287.7 × 105.5 mm (8 3/8 × 11 3/8 × 4 1/4 in.)

7.19 Optional: Medical Image Capture Device

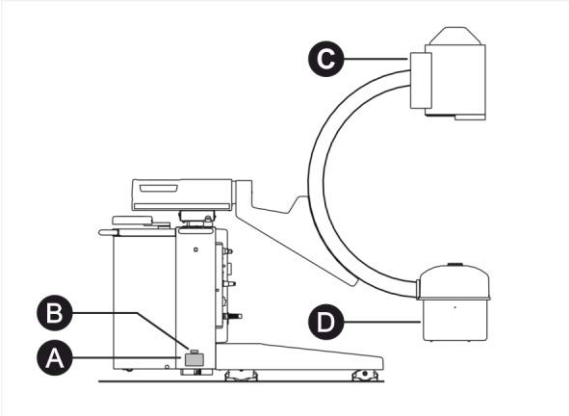
"C" arm version: 9", 12", Litho
Available only with SBFM memory version

7.19.1 Medical Image Capture Device

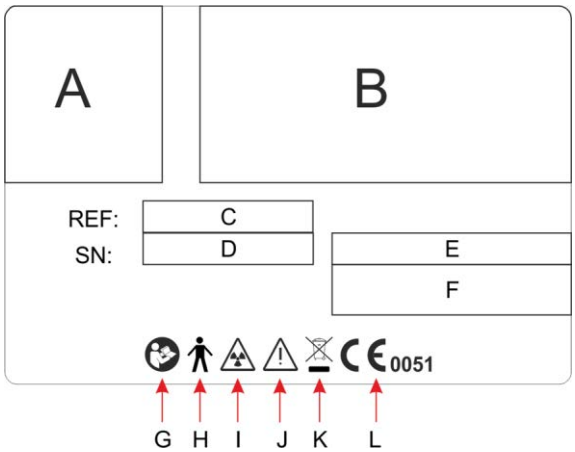
Description	Data
Model	MediCap USB200. Digital medical Image capture device. Saves digital images and video sources to a USB flash drive or USB hard drive. Equipped with USB Data: 2GB, 350 Kb per image, about 5700 image
Case	Rugged metal case with high-impact plastic faceplate
Buttons	Sealed membrane, fluid resistant
Video	PAL / NTSC (switch selectable), S-video or composite BNC connections for both input and output
Foot Switch	Hands-free capture. Standard 3.5 mini jack
Mechanical	Size: 240 x 200 x 63mm / 9.5 x 9.7 x 2.5" Weight: 1.7 Kg / 3lb
Environmental	Storage: -40° to +85° C - Operating: -20°n to +40° C
Power	100/240Vac 50-60Hz 20W 3-prong AC jack
Media	USB flash drives (MediCapture brand recommended) or external USB hard drive
Image Formats	DICOM, JPEG, TIFF, PNG
Video Formats	MPEG2 PS, DVD-quality.
	Quality Levels:
Low (DVD-)	352 x 240 pixels, 1.5 Mbps Variable Bit Rate (VBR)
Normal (DVD)	NTSC: 720 x 480 pixels, 3.5 Mbps VBR, PAL: 720 x 576 pixels, 3.5 Mbps VBR
High (DVD+)	NTSC: 720 x 480 pixels, 8 Mbps VBR, PAL: 720 x 576 pixels, 8 Mbps VBR
Audio format	MPEG1 L2, 2 channels, 16 bits/channel, 48 kHz sampling 256 kbps bitrate
Image Size	1024 x 768 pixels, 800 x 600 pixels, 640 x 480 pixels
Certifications	IEC, UL, CSA, FCC

7.20 Labels

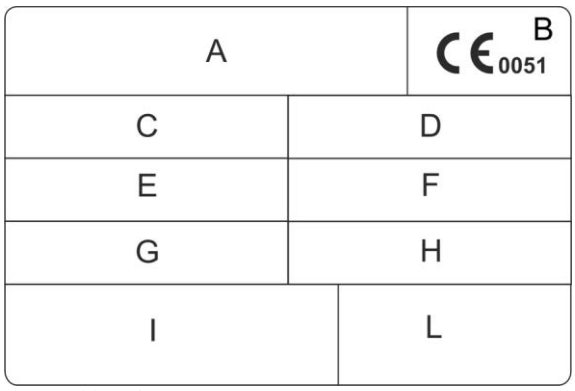
7.20.1 "C" arm labelling



A - Equipment S/N label
B - Equipment weight label
C - Intensifier tube label
D - Monobloc label

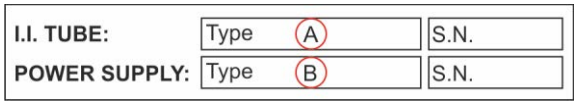


A - Logo of the Distributor
B - Name and address of the Distributor and the Manufacturer
C - Equipment model
D - Equipment serial number
E - Manufacturing date
F - Electrical data
G - Consult the documentation attached
H - Equipment classification
I - Ionizing radiation
J - Warning symbol
K - WEEE
L - EC configuration



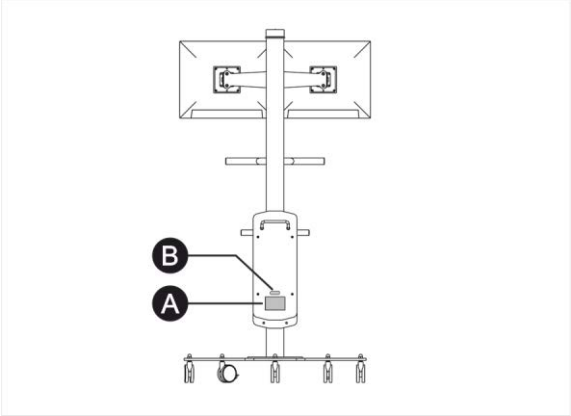
C: Monobloc S/N

A -Manufacturer's logo and address
B - EC Certificate
C - Monobloc code
D - Manufacturing date
E - Monobloc type
F - Monobloc serial number
G - X-ray tube type
H - X-ray tube Serial Number
I - X-ray and filtration data
L - Warning and danger symbols



A - Tube model
B - Power Supply Model

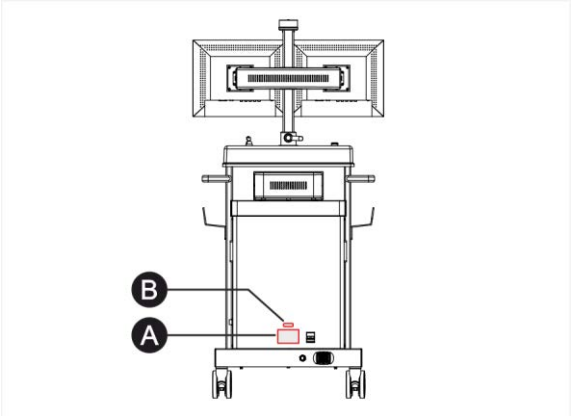
7.20.2 Display Station Basic labelling



A - Equipment S/N label
B - Display station weight label

"Basic" display station labels

7.20.3 Display Station Premium labelling



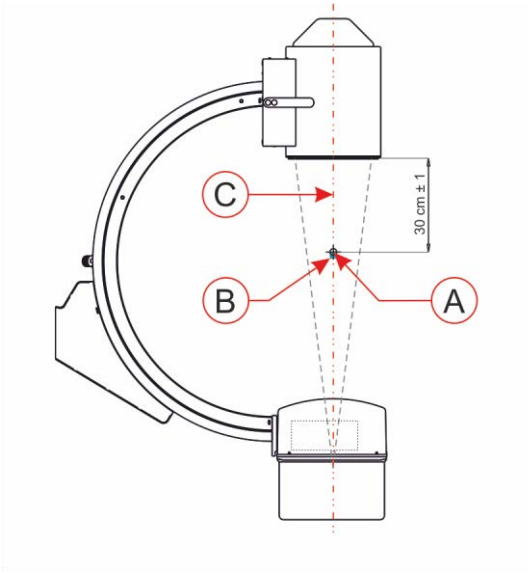
A - Equipment S/N Label
B - Display station weight label

"Premium" display station labels

8 ANNEXES

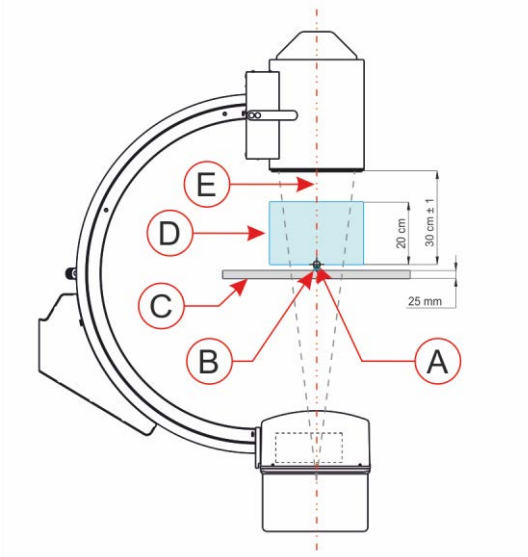
8.1 Dosimetric information

Measurement conditions for manual fluoroscopy and radiography mode.



The measurement for the manual fluoroscopy and radiography mode has been performed as shown in the figure.
The tests have been performed with the bigger x-ray beam according to the dimensions of the equipment.
The dosimeter probe (B) has been placed at a distance of 30cm from the input of the intensifier tube in the interventional point (A)on the reference axis (C).

Measurement conditions for ABC automatic pulsed fluoroscopy.



The measurement for ABC automatic pulsed fluoroscopy has been performed as shown in the figure.
The tests have been performed with the bigger x-ray beam according to the dimensions of the equipment.
A cube phantom made of PMMA (Plexiglas) (D) with thickness 20cm has been placed at a distance of 10cm from the input of the intensifier tube on a 25mm radiotransparent patient table (C).
The dosimeter probe (B) has been placed at a distance of 30cm from the input of the intensifier tube in the reference interventional point (A) on the reference axis (E).

Interventional reference point: in the equipments for radiology assembled on C-arm (without isocenter) it is a point on the x-ray beam axis defined by the manufacturer as representative of the intersection point of the x-ray beam axis with the patient surface.

X-ray beam axis: reference direction line that goes through the center of a radiant source.

8.1.1 Dose in ABC automatic pulsed fluoroscopy

Fixed anode version with 0.5K camera

Standard curve

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	73	8,0	468,6
6"	25	86	8,1	652,1
4"	25	102	8,3	951,1

mA Curve (1/2)

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	82	4,3	347,8
6"	25	99	4,3	501,7
4"	25	110	4,2	575,5

Curve for thin body parts or pediatrics  with 10cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	55	3,6	123,7
6"	25	60	4,7	185,3
4"	25	66	5,5	269,6

Curve for lungs 

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	76	6,7	428,1
6"	25	89	7,0	604,8
4"	25	109	6,5	875,0

Snapshot

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	75	10	1,216
6"	25	89	9,1	1,711
4"	25	106	8	2,563

Rotating anode version with 0,5K camera

Standard curve

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	73	8,0	468,6
6"	25	86	8,1	652,1
4"	25	102	8,3	951,1

mA curve (1/2)

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	82	4,3	347,8
6"	25	99	4,3	501,7
4"	25	120	4,5	783,2

Curve for thin body parts or pediatrics  with 10cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	55	3,6	123,7
6"	25	60	4,7	185,3
4"	25	66	5,5	269,6

Curve for lungs 

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	76	6,7	428,1
6"	25	89	7,0	604,8
4"	25	109	6,5	875,0

Snapshot

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	75	10	1,216
6"	25	89	9,1	1,711
4"	25	106	8	2,563

Fixed anode version with 1K camera

Standard curve

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	73	8,0	468,6
6"	25	86	8,1	652,1
4"	25	102	8,3	951,1

mA curve (1/2)

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	82	4,3	347,8
6"	25	99	4,3	501,7
4"	25	110	4,2	575,5

Curve for thin body parts or pediatrics  with 10cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	55	3,6	123,7
6"	25	60	4,7	185,3
4"	25	66	5,5	269,6

Curve for lungs 

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	76	6,7	428,1
6"	25	89	7,0	604,8
4"	25	109	6,5	875,0

Snapshot

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	75	10	1,216
6"	25	89	9,1	1,711
4"	25	106	8	2,563

Rotating anode version with 1K camera

Standard curve

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	73	8,0	468,6
6"	25	86	8,1	652,1
4"	25	102	8,3	951,1

mA curve (1/2)

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	82	4,3	347,8
6"	25	99	4,3	501,7
4"	25	120	4,5	783,2

Curve for thin body parts or pediatrics  with 10cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	55	3,6	123,7
6"	25	60	4,7	185,3
4"	25	66	5,5	269,6

Curve for lungs 

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	76	6,7	428,1
6"	25	89	7,0	604,8
4"	25	109	6,5	875,0

Curve for sturdy patient with  25cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	67	12,6	626,5
6"	25	76	14,1	892,6
4"	25	93	12,0	1086

Snapshot

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	73	26,4	2,325
6"	25	86	27	3,493
4"	25	103	18,4	4,018

8.1.2 Dose in various modes only for HRP

Version **Rotating Anode camera 1K** - Mode **HCF automatic ABC**
Set: 15 mA - 25 fps - 20 cm PMMA

Field	KV	mA	Dose (µGy/s)
9"	82	15,1	565,7
6"	99	14,7	1509
4"	120	14,6	2031

Set: 30 mA - 25 fps - 20 cm PMMA

Field	KV	mA	Dose (µGy/s)
9"	73	31	840,2
6"	86	30	2132
4"	102	30	2895

Version **Rotating Anode camera 1K** - Mode **ABC automatic fluorography**
Set: 15 mA - 25 fps - 20 cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	82	15,1	565,7
6"	25	99	14,7	1509
4"	25	120	14,6	2031

Set: 30 mA - 25fps - 20 cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	73	31	840,2
6"	25	86	30	2132
4"	25	102	30	2895

Set: 45 mA - 25 fps - 20 cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	69	45,1	2030
6"	25	80	44,7	2680
4"	25	93	45,0	3552

Set: 60 mA - 25 fps - 20 cm PMMA

Field	Cadence (i/s)	kV	mA	Dose (µGy/s)
9"	25	67	59,9	2440
6"	25	77	60	3260
4"	25	88	60	4118

Version **Rotating Anode camera 1K** - Mode **ABC snapshot**
Set: 60 mA - 20 cm PMMA

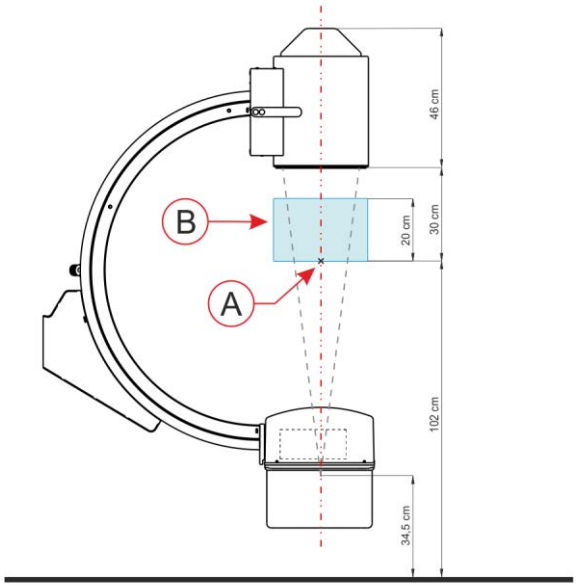
Field	KV	mA	Dose (µGy/s)
9"	73	59	1,883
6"	87	57,6	2,616
4"	103	56,2	3,478

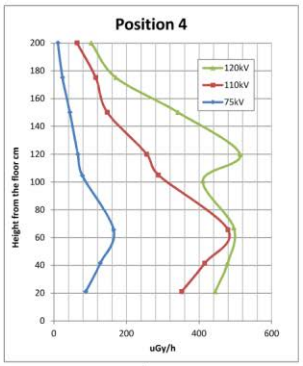
8.2 Significant occupation areas with limited stray radiation

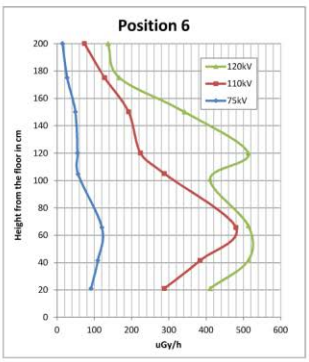
In the x-ray examinations (especially for performing gastrointestinal examinations), during which the operator or the staff must remain close to the patient during the x-ray emission, a significant contribution to the total exposure to the scattered radiation is often given by the scattered radiation from the patient and other objects on the way of the x-ray beam.
Limit values have been measured (in compliance with IEC 60601-2-54 §203.13.4.101) and they are indicated in the figures of the next paragraph by the following test set-up:

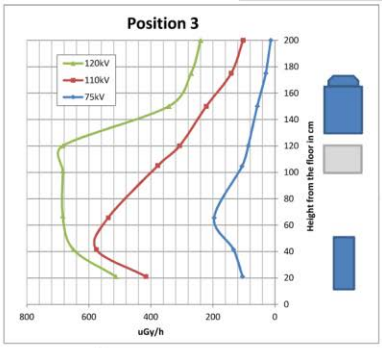
- Point A: interventional reference point : point on the radiation axis that is used as a location reference for air kerma (or air kerma rate) incident on the patient place at 30cm from the surface of the II grid.
- Point B: polymethyl methacrylate phantom (PMMA) with dimensions 30cm x 20cm x 30cm (LxHxW) with properties similar to a water-equivalent phantom with external dimensions 25cm x 25cm x 15 cm, with 10mm thick walls in PMMA.
- Point 1 - Point 8 : as significant occupation area indicated for the use of the C-arm in vertical position (**Misure con arco in posizione verticale a pag. 146**) and in horizontal position (**Misure con arco in posizione orizzontale a pag. 147**) has been considered a maximum distance of 60cm from the radiation axis.
- Exposure performed at 120kV, 1mA (rotating anode version) for 75kW, 110kW, 120kW with normalized results to µGy/h.

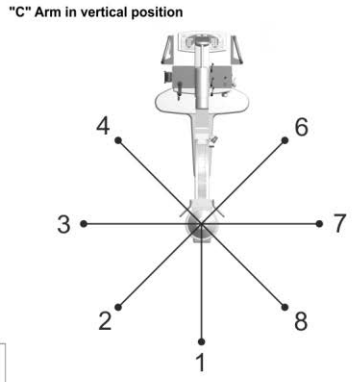
Measures with arm in vertical position

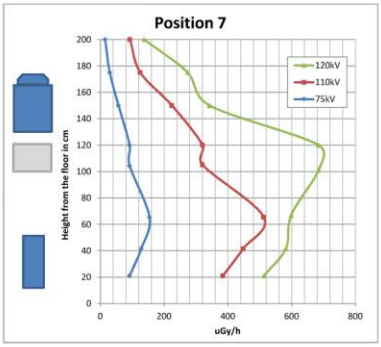


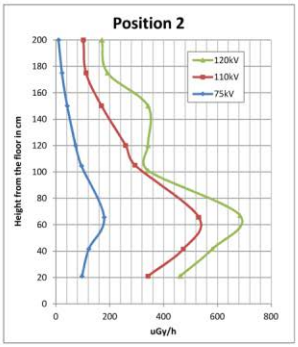


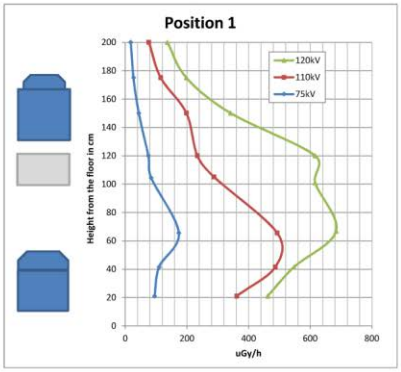


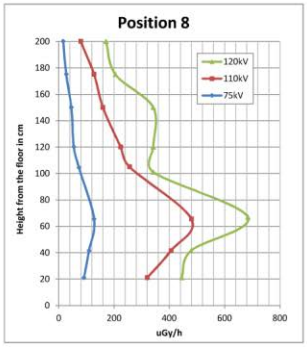




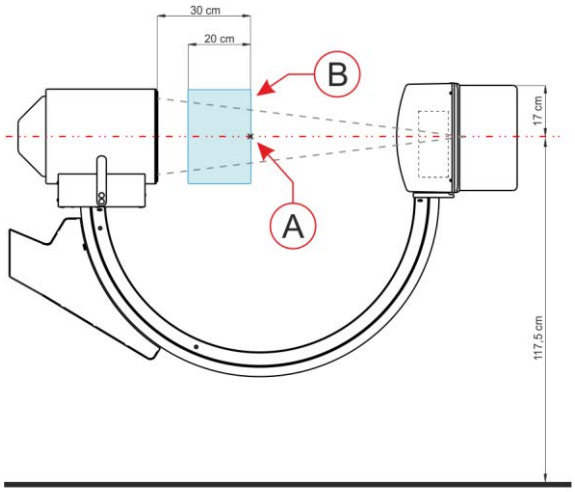


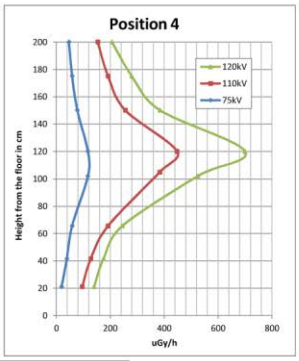


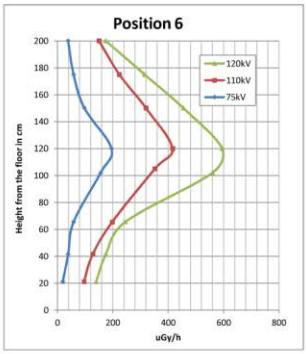


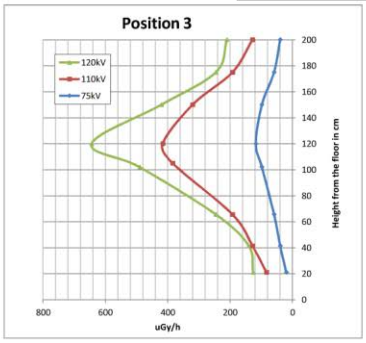


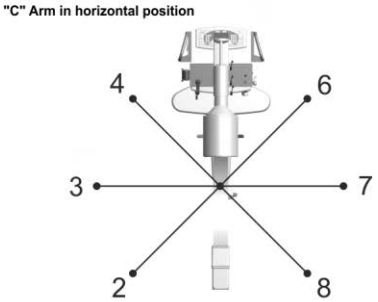
Measures with arm in horizontal position

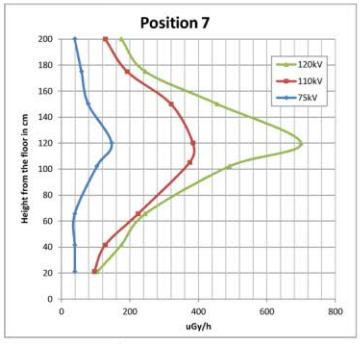


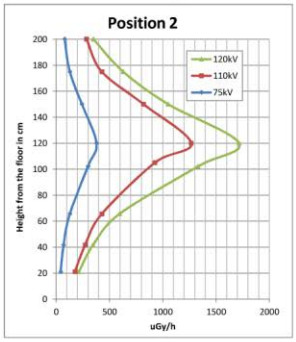


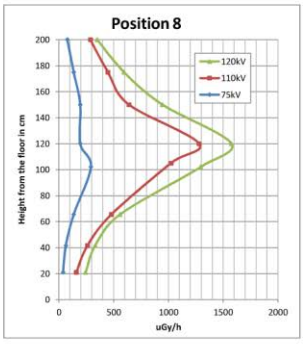












9 CONFIGURATIONS AND ACCESSORIES

Description	Mounting
X-ray handswitch with extensible cable till 4 mt	Standard
Fluoroscopy control by triple footswitch	Standard
Cassette-holder for radiography on cassette 24 x 30 cm (I.I. 9" version)	Optional
Cassette-holder for radiography on cassette 18 x 24cm (I.I. 9" version)	Optional
Cassette-holder for radiography on cassette 10 x 12 inch (I.I. 9" version)	Optional
Cassette-holder for radiography on cassette 35x35 cm (I.I. 12" version)	Optional
Sterilizable drapes set	Optional
Thermal dry film printer	Optional
Printer cables cover	Optional
Medical Image Capture Device	Optional
USB Data: 4 GB, 350 Kb per image, about 11400 images	Optional
DVD Recorder	Optional
Laser Targeting device (only on I.I. tube)	Optional
Dose meter with ionization chamber (DAP)	Optional
Printer for dose meter S Sprint s (on equipment)	Optional
Collimator with iris and parallel shutter	Optional
Extractable alphanumeric keyboard (only for SBFM78)	Optional
External interlocks kit	Standard
Movement handles on "C" arm	Optional
Movement handle on I.I. tube	Optional

10 ABBREVIATIONS LIST

AP	Equipment or part of it, protected by the ignition of a mix of inflammable anaesthetic with air
APG	Equipment or part of it, designed to avoid any flames in a mix of inflammable anaesthetic with oxygen and nitrous oxide.
APR	Programmed anatomic radiography
CR	Computer Radiography - Displaying system of the primary radiological image based on a phosphors detector
DAP	Dose-area product
EMC	Electromagnetic compatibility
ESD	Electrostatic discharge
IP	Protection degree of the electric and electronic devices housings against the penetration of external agent both solid and liquid.
LED	Light-emitting diode
LF	Large focus
PCB	Printed Circuit Board – printed circuit for electronic board.
RF	Radiofrequency
SF	Small focus
SID / DF	Focus-image receptor distance
WEEE	Electric and electronic equipments waste

11 DOCUMENT STATUS

Rev.	Date	Description
-	10/2007	Document approval
A	04/2008	General document revision.
B	11/2008	Added note on the equipment versions. Added note about the use of the overview movement handle. Added "Error of the field bus" alarm. Added note for inserting the C-arm stand-display station connection cable. Added automatic opening of the collimator diaphragms. Modified "User Setup" page. Added warning label.
C	04/2009	Unification of SNAPSHOT function wordings, added data of HiRad exposure time range, modification to the small focus from 0,6 to 0,5 on OX/100-5 insert concerning the fixed anode monobloc and various corrections in the document. Updated description at point 3 of the "Operative Messages"
D	09/2009	Introduced the new model of fixed anode monobloc and inverter. Added DICOM function, new Medicap USB200 model.
E	10/2009	Introduced the new model of rotating anode monobloc and inverter. Upgrading of manufacturer address and relative S/N labels. Upgrading of HRP, HRC, DICOM and laser targeting device data schedules.
F	05/2010	Insertion of the SBFM78 memory functions decription. Introduction of the images export function on USB support. Updating of mAs data in radiography
G	07/2010	Introduction of the remote control and transfer of the Wireless images for HRP2000 memory.
H	09/2011	Introduction of new RTP memory and new 19" monochromatic monitors. General document revision
I	07/2012	General updating for IEC 60601-1 3^ edition, introduction HRP 3000 memory and use of the equipment in the several modes according to the installed memory
L	07/2013	General document updating. Introduction of display dosimetric information
M	08/2019	General updating and introduction of version 12"