

A futuristic medical device with a glowing blue screen displaying patient data. The screen shows a patient's name, 'Veratoni, L. G.', and a table of vital signs. The control panel features icons for a person, a lightbulb, and a person with a heart, along with a circular button and a small black dot. A green 'MMA' logo is visible in the top right corner.

Venus-22-R, Venus-32-R, Venus-50-R

User Manual

English

User Manual

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The Simplified Chinese manual is the original version.

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Revision History

[illegible]

Safety Directions

WARNING, Caution and Note statements are made throughout the manual. The operator must be fully understood before reading the manual. The definitions of the danger statement, warning statement and caution statement are described as follows:



WARNING: This symbol identifies instructions which must be observed in any case to avoid injury to the patient and/or staff.



Caution: This identifies instructions which must be observed in any case to avoid minor injury to the patient and/or to the staff and/or to avoid damaging the device described in this operator's manual.

Note: This is used to identify important advice, e.g. to improve an operating sequence or to point out that certain restrictions should be observed.

CONTENTS

Chapter 1 Read First

1.1 About This Manual	1-1
1.2 Venus R Series Generators	1-1
1.3 Intended Use	1-2
1.4 Contraindication	1-2
1.5 Compliance	1-2
1.6 Training	1-2

Chapter 2 Safety

2.1 Electrical Safety	2-1
2.2 Protection against Ingress of Liquids	2-2
2.3 Explosion Safety	2-3
2.4 Mechanical Safety	2-3
2.5 Radiation Protection	2-3
2.6 Electromagnetic Compatibility (EMC).....	2-4
2.6.1 Definition.....	2-4
2.6.2 Explanation	2-5
2.6.3 EMC Guidelines	2-5
2.6.4 Important Information Regarding EMC	2-5
2.7 Disposal.....	2-9
2.8 Others	2-9

Chapter 3 Console

3.1 XGCS-100S	3-1
3.1.1 Control Panel	3-1
3.1.2 LCD Display	3-2
3.1.3 Button Function	3-2
3.1.4 Handswitch	3-5
3.2 XGCS-200	3-6
3.2.1 Control Panel.....	3-6
3.2.2 Button Function.....	3-6
3.2.3 Handswitch.....	3-7

Chapter 4 Maintenance

4.1 Tests by the User	4-1
4.1.1 Check AEC Function	4-3
4.2 Cleaning	4-4
4.3 Disinfection	4-5

4.4 Repairs	4-6
--------------------------	------------

Chapter 5 Technical Data

5.1 Generator Data	5-1
5.1.1 General Data	5-1
5.1.2 Electric Output Data	5-2
5.1.3 Exposure Techniques	5-3
5.2 EMC Data	5-3
5.3 Environmental Requirements	5-4
5.3.1 Environmental Requirements for Operation	5-4
5.3.2 Environmental Requirements for Transportation and Storage	5-4
5.4 Exposure Parameters.....	5-5
5.5 Error Codes	5-19
5.6 Recommend APR Table	5-26
5.7 Labels	5-31
5.8 Abbreviations and Their Meaning	5-35

Chapter 6 Recycling Passport

6.1 Recycling Passport of the Diagnostic X-ray High Voltage Generator	6-1
6.2 Recycling Passport of the X-ray Generator Console	6-3

NPD-HVG-0015

Chapter 1 Read First

1.1 About This Manual

This manual is intended to assist you in the safe and effective operation of the Venus-22-R,Venus-32-R,Venus-50-R Diagnostic X-ray High Voltage Generator. You may only operate the equipment in compliance with the safety instructions in this manual and you must operate it for purposes in compliance with its intended use.

Before attempting to operate the generator,

- You must read, note, and strictly observe all **DANGER** notices and safety markings on the generator.
- You must read this manual thoroughly, paying particular attention to all **Warnings**, **Cautions** and **Notes** incorporated in it.
- You must pay special attention to all the information given and procedures described in the **SAFETY** section.

This manual is originally drafted in Simplified Chinese language.

Venus-22-R,Venus-32-R,Venus-50-R Diagnostic X-ray High Voltage Generator is called Venus series generators hereafter for short.

1.2 Venus R Series Generators

Venus R series generators comprise three models:

- Venus-22-R
- Venus-32-R
- Venus-50-R

Where:

- Venus = Product name
- 22,32,50= Output power, unit: kW
- R = Radiography only

Venus R series generators contain the following components: Power Supply, Inverter, HV Tank, System Control, Generator Cabinet, Filament Drive, and Console (software included),capacitor box(single-phase generator).

Console is an option.

1.3 Intended Use

Venus R series generators are designed to control and generate electric power to the X-ray tube of medical diagnostic X-ray devices (general radiography only).

1.4 Contraindication

No known contraindications.

1.5 Compliance

Venus series generators comply with relevant international and national standards and laws.

IEC 60601-1 Ed3.0:2005-10-15+Am1:2012-08-20

IEC 60601-1-2 Ed3.0:2007-3-30

IEC 60601-1-6 Ed3.1:2013-10

IEC 60601-2-54 Ed1.1:2015-04-17

IEC 62366 Ed1.1:2014-1-28

IEC 62304 Ed1.1:2015-06-26

EN 60601-1 :2006/A1:2013/AC:2014

EN 60601-1-3:2008/A1:2013/AC:2014

EN 60601-1-2 :2007/AC:2010

EN 60601-1-6 : 2010

EN 60601-2-54 :2009/A1:2015

EN 62366 :2008/A1:2015

EN 62304 :2006/A1:2015

1.6 Training

Operators of the Venus series generators must have received adequate training on its safe and effective use before attempting to operate the equipment described in this manual. Users must ensure that operators receive adequate training in accordance with local laws or regulations which have the force of law.

If you require further information about training in the use of this equipment, please contact your local Neusoft representative. Alternatively, contact:

Neusoft Medical Systems Co., Ltd.

NPD-HYG-0015

**No. 177-1 Chuangxin Road, Hunnan District,
Shenyang, Liaoning, China 110167**

Telephone: +86 24 23358091

The training covers the operation and maintenance of the generators described in this manual and is normally conducted on site when the generator is being installed.

Chapter 2 Safety

Keep this manual with the equipment at all times and periodically review the operating and safety instructions.

You may operate the generator only in compliance with the safety instructions in this manual and not use it for purposes other than for which it is intended.

It is always the user who is responsible for compliance with the regulations applying to installation and operation of the generators.

Note:

- You must never use the generator if it has any electrical, mechanical or radiological defects. This particularly applies to faulty indicators, displays, warnings and alarms.
- Neusoft Medical Systems Co., Ltd. is responsible for the safety features of its products only if maintenance, repairs and modifications have been performed by Neusoft or by persons explicitly authorized to do so by Neusoft .
- As is the case with all technical appliance, this X-ray equipment also requires appropriate operation as well as regular skilful servicing and care, as described in Chapter 4 “Maintenance”.
- If the X-ray equipment is operated inappropriately or if the operator neglects to properly maintain it, Neusoft Medical Systems Co., Ltd. shall not be responsible for any resulting faults. damage or injuries.

2.1 Electrical Safety

This generator meets the following safety standard:

- Classification of protection against electric shock: Class I equipment
- Degree of protection against electric shock: Not applicable
- Degree of protection against harmful ingress of liquids: IPX0
- Protection against flammable gas when used in an environment with flammable anesthetics mixture with air or with Oxygen or Nitrous Oxide: Not applicable
- Operation mode: Continuous operation with intermittent loading

NPD-HVG-0015

- **Rated voltage and frequency:**

HV type	Rated voltage	frequency
Venus-22-R	~220V/230V	50Hz/60Hz
Venus-32-R	~220V/230V(single-phase)	50Hz/60Hz
Venus-32-R	3~380V/400V(three-phase)	50Hz/60Hz
Venus-50-R	~220V/230V(single-phase)	50Hz/60Hz
Venus-50-R	3~380V/400V(three-phase)	50Hz/60Hz

- **Input power:**

HV type	Power capacity (kVA)
Venus-22-R	>2.5
Venus-32-R	≥3.5(single-phase)
Venus-32-R	≥50(three-phase)
Venus-50-R	≥5(single-phase)
Venus-50-R	≥80(three-phase)

- **Application part of protection against defibrillation release effect:** None.
- **Signal input and signal output parts.**
- **Equipment type** Stable mounted.
- **Possible interference with other equipment:** IEC601-1-2:2001 IDT Group 1, Class A.

Venus series generators comply with radiation protection standard IEC 60601-1-3: 1994.

Only trained maintenance staff may open or remove the HV cable of the tube, and the covers of the HV generator and console, while being sure that no residual voltage exists.

NPD-HVG-0015

2.2 Protection against Ingress of Liquids

Venus series generators belong to class IPX0 products according to IEC 529, which means they are non-protected against ingress of liquids.



WARNING:

- Keep the console dry.
- Conductive fluids that seep into the active circuit components of the control desk may cause short circuits that can result in electrical fires. Therefore, do not place any liquid or food on any part of the console or other modules of the system.

2.3 Explosion Safety



WARNING:

- You must not operate this generator in areas where there is a risk of explosion.
- Detergents disinfectants, including those used on patients, may create explosive mixtures of gases. Please observe the relevant regulations.
- This Venus series generators equipment may only be operated in medical rooms, which meet relevant IEC/GB standards.

2.4 Mechanical Safety



WARNING: Contact your Neusoft service engineer immediately if the generator makes unusual noises during operation.

2.5 Radiation Protection

It is always the operator's responsibility to use and operate this equipment correctly and safely. Neusoft is only responsible for offering relevant information and the potential hazards of the product. Neusoft bears no responsibility for any injury caused by over-exposure to the patient or incorrect operation of the product.

Incorrect operation of the product could lead to fatal or serious injury to an operator, patient or any other person.

X-ray exposure is harmful to health, this damage may accumulate in the body and influence the patient who received X-ray examination in a few months and even a few years. X-ray equipment operator must avoid concentrated beam exposing, and take protected measure to protect the radiation of X-ray. Because of scattering effect of the object which is in concentrated beam path, this scattering ray is much less harmful than concentrated beam for human body.

It is impossible to avoid harms caused by X-ray radiation completely without thorough safety awareness of the operator. Only authorized or trained service staff and operators are allowed to operate this product. The operator must be familiar with the potential hazards that could be caused by the generator, console and continuous X-ray exposure.

- **Wear X-ray protection clothing. Radiation protection aprons with a minimum lead thickness being 1/64" (0.35 mm) or product with equivalent protection is recommended.**
- **To protect the patient against radiation always use radiation protection accessories when the patient is examined.**
- **Keep as large a distance as possible away from the exposed object.**
- **This equipment may only be operated in medical rooms, which meet relevant IEC/GB standards.**
- **Do not use this product whenever you are exposed to X-ray radiation.**

2.6 Electromagnetic Compatibility (EMC)

2.6.1 Definition

EMC, which defines the permitted emission levels from electronic equipment and its required immunity against electromagnetic fields.

In accordance with its intended use, this device fulfils the regulations of the EMC legislation on electronic products.

Despite this, it cannot be excluded with absolute certainty that radio signals from high-frequency transmitters, such as mobile phones or similar mobile radio equipment, which also satisfy the EMC regulations will not influence the proper functioning of electro medical equipment when these are operated in direct proximity with relatively high transmitting power. The operation of such radio equipment should, therefore, be avoided in close proximity to electronically regulated or controlled medical products in the face of possible functional interference.

NPD-HYG-0015

2.6.2 Explanation

Electronic equipment which conforms to the EMC regulations is configured in such a way, that under normal circumstances, malfunctions caused by electromagnetic interference can be excluded. However, with regard to radio signals from high-frequency transmitters with a relatively high transmitting power, which are operated in close proximity to electronic devices, the occurrence of possible electromagnetic incompatibility with the electronic device cannot be completely ruled out.

With unusual configurations, this could result in unintentional operating sequences being initiated in the device and, under certain circumstances, undesirable risks for patient or operator.

Therefore, the activation of any transmission from mobile radio equipment - this also applies to equipment in standby mode - is to be avoided. Mobile phones must be switched off in marked problem areas.



Neither console nor any other electronic equipment linked to the generator is allowed to be placed within a distance of 1.8 m with the generator.

2.6.3 EMC Guidelines

Below cables information are provided for EMC reference.

Table 2-1

Cable	Max. cable length, shielded/unshielded		Number	Cable classification
Generator communication cable (generator to console or X-ray system)	14 m	shielded	1 Set	Signal cable
Console grounding cable	15 m	unshielded	1 Set	Grounding cable
High voltage cable conforms to IEC60601-2-7	30 m	shielded	1 Set	High voltage

NPD-HVG-0015

2.6.4 Important Information Regarding EMC

Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator needs special precautions regarding EMC and needs to be installed only by eligible persons and put into service according to the EMC information provided in the user manual; Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic

X-ray High Voltage Generator in use may be susceptible to electromagnetic interference from portable and mobile RF communications such as mobile (cellular) telephones. Electromagnetic interference may result in incorrect operation of the system and create a potentially unsafe situation.

Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator conforms to this EN60601-1-2:2007 standard for both immunity and emissions.

Nevertheless, special precautions need to be observed:

- The use of accessories, transmitters and cables other than those specified by eligible persons, with the exception of accessories and cables sold by eligible persons of Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator.
- Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator should not be used adjacent to or stacked with other equipment. In case adjacent or stacked use is necessary, Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator should be observed to verify normal operation in the configuration in which it will be used.
- Refer to further guidance below regarding the EMC environment in which the system should be used.

Table 2-2

Guidance and manufacturer's declaration – electromagnetic emissions		
The Venus-22-R (Venus-32-R,Venus-50-R) is intended for use in the electromagnetic environment specified below. The customer of the user of the Venus-22-R (Venus-32-R,Venus-50-R) should assure that it is used in such an environment		
Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The Venus-22-R (Venus-32-R,Venus-50-R) uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	
Harmonic emissions IEC 61000-3-2	Not applicable	The Venus-22-R (Venus-32-R,Venus-50-R) 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 purpose.
Voltage fluctuations/flicker Emissions IEC 61000-3-3	Not applicable	


NPD-HVG-0015

Table 2-3

Guidance and manufacturer's declaration – electromagnetic immunity			
The Venus-22-R (Venus-32-R,Venus-50-R) is intended for use in the electromagnetic environment specified below. The customer or the user of the Venus-22-R (Venus-32-R,Venus-50-R) should assure that it is used in such an environment.			
Immunity test	IEC 60601- test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV Line(s) to line(s) ± 2 kV Line(s) to earth	± 1 kV Line(s) to line(s) ± 2 kV Line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	$< 5\% U_T$ ($> 95\%$ dip in U_T) for 5 s	$< 5\% U_T$ ($> 95\%$ dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Venus-22-R (Venus-32-R,Venus-50-R) requires continued operation during power mains interruptions, it is recommended that Venus-22-R (Venus-32-R,Venus-50-R) be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE : U_T is the a.c. mains voltage prior to application of the test level.			

NPD-HVG-0015

Table 2-4

Guidance and manufacturer's declaration – electromagnetic immunity			
The Venus-22-R (Venus-32-R,Venus-50-R) is intended for use in the electromagnetic environment specified below. The customer or the user of the Venus-22-R (Venus-32-R,Venus-50-R) should assure that it is used in such an environment			
Immunity test	IEC 60601-test level	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	3 V rms 150 kHz to 230 MHz	3 V rms	<p>The Venus-22-R (Venus-32-R,Venus-50-R) must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location, a minimum RF filter attenuation of 6 dB from 10 MHz to 100MHz.</p> <p>Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3V/m ^a. Interference may occur in the vicinity of equipment marked with the following symbol:</p> <div></div>
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 V/m FM modulation: 52MHz, 151MHz, 433.92MHz, 446MHz; Pulse modulation: 900MHz	
<p>NOTE 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p> <p>NOTE 2: It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification</p>			
<p>Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength outside the shielded location in which the Venus-22-R (Venus-32-R) is used exceeds 3V/m, the Venus-22-R (Venus-32-R,Venus-50-R) should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as relocating the Venus-22-R (Venus-32-R,Venus-50-R) or using a shielded location with a higher RF shielding effectiveness and filter attenuation.</p>			



WARNING: For Venus-22-R (Venus-32-R,Venus-50-R) Diagnostic X-ray High Voltage Generator system, an exemption has been used and the Venus-22-R (Venus-32-R,Venus-50-R) system has not been tested for radiated RF IMMUNITY over the entire frequency range 80MHz to 2.5GHz, only at selected

NPD-HVG-0015

frequencies 52MHz, 151MHz, 433.92MHz, 446MHz and 915MHz.

2.7 Disposal

Neusoft manufactures state-of-the-art X-ray equipment in terms of safety and environmental protection. Assuming no parts of the system housing are opened and assuming the system is used properly there are no risks to persons or the environment.

To comply with regulations it is necessary to use materials which may be harmful to the environment and therefore have to be disposed of in a proper manner.

For this reason you must not dispose of the X-ray equipment together with industrial or domestic waste.

Dispose of the generator should comply with regulations of your local government.



Neusoft:

- Supports you in disposing of the X-ray equipment described in a proper manner
- Returns reusable parts to the production cycle via certified disposal companies and
- Thus helps to reduce environmental pollution.

Please contact your Neusoft distributor or your municipal waste collection facility for information on proper disposal.

2.8 Others

Contact Neusoft service staff immediately in case:

- The console becomes damp.
- The console malfunctions.
- The console is damaged.

- **Use and link to unauthorized equipment may result in damage to the system or injury to people. Consult your local service before connecting to any peripherals.**
- **Don't exceed the maximum use restriction of tube, which may affect the service life and reliability of the generator.**

NPD-HYG-0015

Chapter 3 Console

3.1 XGCS-100S

3.1.1 Control Panel

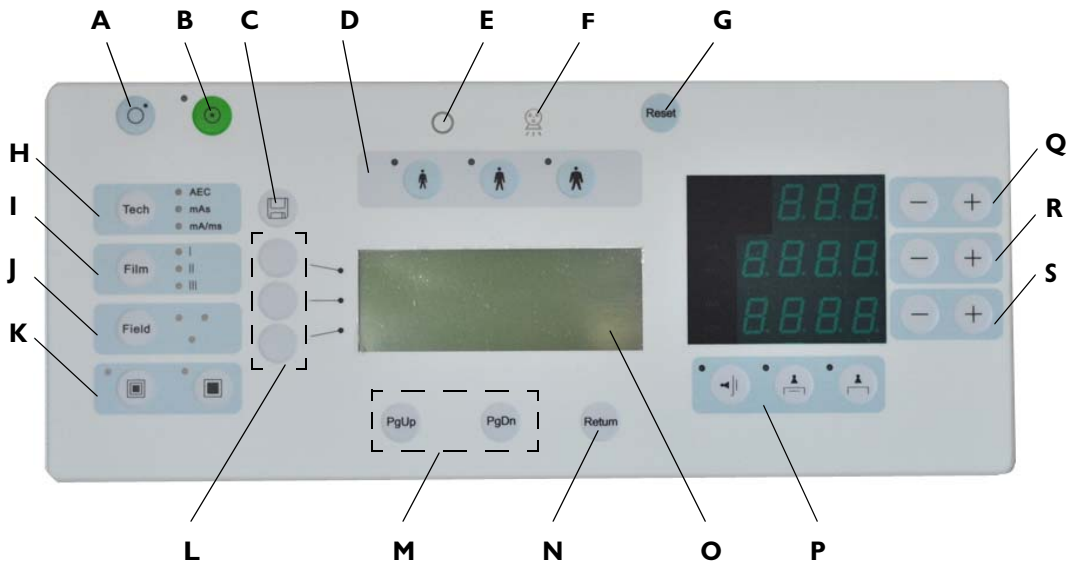
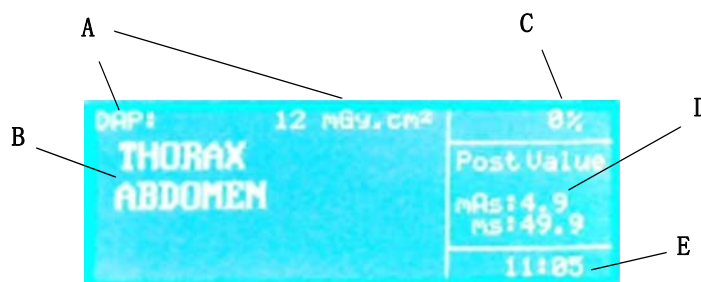


Fig 3-1 Control Panel

A	Switch Off	K	Focal spot select
B	Switch On	L	APR select
C	Save	M	Pg Up/Dn
D	Body size select	N	Return
E	Ready for exposure	O	Display screen
F	Radiation indicator	P	Auxiliary select
G	Reset	Q	kV setting
H	Tech select	R	mA/ mAs setting
I	Film speed select	S	ms/DEN setting
J	Fields select		

NPD-HVG-0015

3.1.2 LCD Display



A	DAP (Last time exposure value)	D	Post Value including mAs/ms Value
B	APR display	E	CPU Time
C	Tube Heat		

3.1.3 Button Function

Please observe operating instructions given in this manual. Any operation combination other than those described in this manual might lead to malfunctions of the system.

3.1.3.1 Radiation Indicator

Ready for exposure lamp: the lamp lights up when the generator is ready for exposure, indicating that the technique selected is properly set, there are no interlock failures or system faults, the anode is rotating and the X-ray tube is ready for exposure.

Radiation indicator: the indicator lights up when the X-ray exposure is in progress. At the same time that radiographic exposures are being made, an audible signal sounds.

3.1.3.2 Switching the Generator On/Off

Pressing and holding **Switch On** button for one second will light up the lamp on the upper left of the button, indicating the generator is switched on to working mode.

Pressing and holding both **Switch On** and **Reset** button at the same time for two seconds starts up the generator to set-up mode. To enter to working mode, switch off the generator and restart.

Press and hold **Switch Off** button for one second to switch off the generator.

NPD-HYG-0015

When the generator is switched on, it performs a self-test:

- All the lamps and display segments light up briefly.
- There is an audible signal.

During this test you should check the following:

- Do all the lamps and display segments light up?
- Is there an audible signal?

If an error message appears, you will find help in the Error Message List.
If you need more help, please contact Neusoft.

3.1.3.3 Radiographic Parameters

1. Tech select: these three lamps indicate the 3 radiography modes AEC, mAs and mA/ms respectively.

Press Tech Select button to select a radiography mode. The lamp indicating the selected mode will light up.

- AEC Mode: Only kV, mA can be adjusted;
- mAs Mode: Only kV, mAs can be adjusted;
- mAs/ms Mode: kV, mAs, ms all can be adjusted.

2. Fields Select (only for AEC tech mode): three lamps indicate the left, middle and right field respectively.

Press Fields Select button to select a field. The lamp indicating the selected field will light up.

3. Film Speed Select (only for AEC tech mode): three lamps indicate the low, medium and high film speed respectively.

Press Film Select button to select a film speed. The lamp indicating the selected speed will light up.

4. Focal Spot Select: there are two buttons for selecting the focal spot, Small Focal Spot and Large Focal Spot.

Press either of the buttons to select the focal spot. The lamp indicating the selected focal spot will light up.

5. Auxiliary Select: there are three buttons to select an auxiliary mode, Table Bucky, Wall Bucky and Free Cassette.

Press any of the buttons to select an auxiliary mode. The lamp indicating the selected auxiliary mode will light up.

NPD-HVG-0015

3.1.3.4 APR Programs Display

APR programs display segment includes one display screen, three APR Select buttons, two Page Up/Dn buttons, one Return button, three Body Size select buttons and one Save button.

- **Display Screen:** Shows the different body regions, the generator status and the current time.
- **Body Size select:** These push-buttons are used to adapt the APR technique chosen according to patient size. Three patient sizes are available, Large, Medium and Small. Default patient size for APR is Medium. When APR is activated, the lamp indicating medium patient size lights up and relevant radiographic parameters are shown in the Exposure Data Display segment. When you adjust the patient size selection, the lamp indicating the selected patient size lights up and the radiographic parameters will change accordingly.

Note: You can only save the kV value if you want to modify and save the radiographic parameters when Large or Small patient size is selected.

- **Page Up/Dn buttons:** The screen displays three body regions or APR programs at one time only. Use these buttons to scroll through the display pages.
- **Return button:** Press this button to return to the main APR menu.
- **APR Select:** Press the corresponding button to select a body region or APR program shown on the display. The selected body region or program will be highlighted on the display. Meanwhile, all the radiographic parameters of the selected APR program will be shown in the Exposure Data Display segment. Use these parameters directly or make any adjustment as you require.
- **Save:** Press and hold the Save button for two seconds to save adjusted radiographic parameters of any APR program.

3.1.3.5 Exposure Data Display Segment

Exposure data displaying segment supports the setting and display of three parameters, kV, mA/mAs and ms/DEN.

- **kV setting:** Press “+” or “-” button to change the kV value in steps of 1 kV. The current kV value is displayed in the LED.
- **mA/mAs setting:** Press “+” or “-” button to change the mA/mAs value, the steps according to R’10 (mA for AEC and mA/ms mode, mAs for mAs mode). The current mA/mAs value is displayed in the LED.

NPD-HYG-0015

- **DEN setting:** Press “+” or “-” button to change the ms/DEN value in steps of 1 ms/DEN (DEN for AEC mode). The current DEN value is displayed in the LED.
- **ms setting:** Press “+” or “-” button to change the ms value , the steps according to R’10 (ms for mA/ms mode,). The current ms value is displayed in the LED.

Note: If you do not select any APR program after selecting a new body region, the data last shown in the Exposure Data Display segment will be used for the new exposure.

3.1.4 Handswitch

Radiographic exposures from the console are made with the handswitch. The status of the exposure is indicated by the Ready for Exposure indicator and Radiation Indicator for the duration of the exposure

Press the handswitch half-way and hold to prepare for exposure. The Ready for Exposure indicator on the console will light when the X-ray tube is prepared and there are no interlock failure or system faults.

Fully press the handswitch and hold to complete an exposure.

During the entire process of an exposure, the status display area displays the following messages step by step:

- **SPINNING ROTOR**, from the start to when the generator is ready for exposure;
- **X-RAY READY**, from when the generator is ready for exposure to when radiation starts and the radiation indicator is lit;
- **X-RAY ON**, from when radiation starts and the radiation indicator is lit to the end.

You can modify the contents displayed in the status display area as necessary.

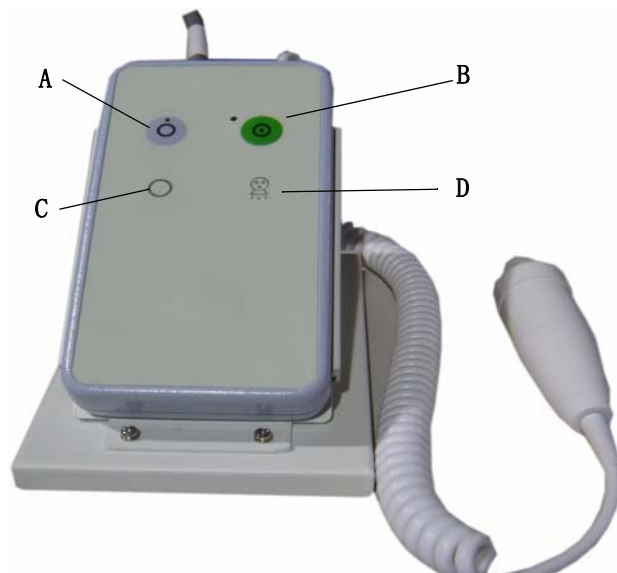
If the button is released before the generator completes the selected time or the AEC time, the exposure will be prematurely terminated and the actual mAs and exposure time will be displayed.

You can also press the button fully directly. After the preparation time the exposure is released. If the button is released before X-ray radiation starts, the exposure will be prematurely terminated.

NPD-HVG-0015

3.2 XGCS-200

3.2.1 Control Panel



A	Switch Off	C	Ready for exposure
B	Switch On	D	Radiation indicator

3.2.2 Button Function

Please observe operating instructions given in this manual. Any operation combination other than those described in this manual might lead to malfunctions of the system.

3.2.2.1 Radiation Indicator

Ready for exposure lamp: the lamp lights up when the generator is ready for exposure, indicating that the technique selected is properly set, there are no interlock failures or system faults, the anode is rotating and the X-ray tube is ready for exposure.

Radiation indicator: the indicator lights up when the X-ray exposure is in progress. At the same time that radiographic exposures are being made, an audible signal sounds.

NPD-HYG-0015

3.2.2.2 Switching the Generator On/Off

Pressing and holding Switch On button for one second will light up the lamp on the upper left of the button, indicating the generator is switched on to working mode.

Press and hold Switch Off button for one second to switch off the generator.

When the generator is switched on, it performs a self-test:

- All the lamps light up briefly.
- There is an audible signal.

During this test you should check the following:

- Do all the lamps light up?
- Is there an audible signal?

If you need more help, please contact Neusoft.

3.2.3 Handswitch

Radiographic exposures from the console are made with the handswitch. The status of the exposure is indicated by the Ready for Exposure indicator and Radiation Indicator for the duration of the exposure

Press the handswitch half-way and hold to prepare for exposure. The Ready for Exposure indicator on the console will light when the X-ray tube is prepared and there are no interlock failure or system faults.

Fully press the handswitch and hold to complete an exposure.

During the entire process of an exposure, the status display area displays the following messages step by step:

- **SPINNING ROTOR**, from the start to when the generator is ready for exposure;
- **X-RAY READY**, from when the generator is ready for exposure to when radiation starts and the radiation indicator is lit;

X-RAY ON, from when radiation starts and the radiation indicator is lit to the end.

Chapter 4 Maintenance

As with any technical appliance this X-ray equipment also requires:

- proper operation,
- regular testing by the user,
- regular service and repair.

By taking these preventive actions you maintain the operability and operational reliability of the system. As the user of an X-ray equipment, you are obliged according to accident prevention regulations, the medical products law and other regulations to take such precautions.

According to medical products law, safety checks should include both operability and operational reliability, and must be performed at least every 2 years, which covers:

- visual checking for completeness and apparent damage or defects as well as soiling, sticking parts and wear and tear which may affect safety,
- testing the necessary monitoring, safety, display and indicating equipment,
- measuring the safety-relevant output parameters,
- checking electrical safety as well as the operability of internal energy supplies,
- for the particular product, other special technical tests according to generally accepted standards of engineering practice,
- other necessary tests as specified by the manufacturer,
- recording results and filing the test reports in the X-ray system manual (medical products logbook),
- checking all speakers, making sure they are set at proper volume,

Maintenance consists of tests the user can perform and maintenance which is performed by qualified X-ray service personnel.

NPD-HVG-0015

4.1 Tests by the User



WARNING: Maintenance can only be performed by persons who have received adequate training on the equipment and are with thorough knowledge of its potential hazards.



Caution: Maintenance period can be adjusted in accordance with local laws and regulations. Reconfirm before making any adjustment.

The user must check the X-ray equipment for apparent defects (see table). If operational defects or other departures from normal operational behaviour occur, he must switch off the X-ray unit and inform Neusoft. He may only resume operation of the X-ray equipment when it has been repaired and when the service engineer approves him to do so. Operation using faulty components may lead to an increased safety risk or unnecessarily high exposure to radiation.

Interval	Scope	Method
Acc. To X-ray Regulations	Stability test	
Daily	Indicator lamps, components, labels and warning signs	Inspection
Weekly	All cables and terminals (damage, breakage)	Inspection
Weekly	Oil leaks and unusual noises	Inspection

Only authorized service personnel can perform the maintenance listed in the table below, while the user is obliged to contact local service department according to the maintenance schedule to perform the maintenance.

Interval	Scope	Method
Every 6 months	Examine the following for any visible damage and replace any damaged components: 1.Open the exterior of HV Generator,checking whether there is a damaged components: ground connection reliability, oil leaks, broken wire, etc. 2.Check X-ray tube assembly and image receptor.	Inspection
Every 6 Months OR whenever a related certifiable X-ray component is replaced:	1.Clean and re-grease all HV connections using vapor proof compound. 2.Clean HV console and main cabinet as needed. Refer to 4.2 CLEANING, before proceeding. 3.Perform any additional tests required by laws governing this installation.	Inspection

NPD-HYG-0015



WARNING: Do not remove covers or internal components from the generator. This could lead to serious personal injury and/or damage to equipment.

The correct setting of the electromechanical and electronic assemblies affects the functioning, image quality, electrical safety and exposure of the patient and medical personnel to radiation.

Neusoft recommends you to:

- perform the tests indicated in the table on a regular basis
- perform maintenance more frequently to heavily used generators.

In this way you avoid endangering the patient and you meet your obligations.

By entering into a service agreement with Neusoft, you retain the value and safety of your Generator equipment. All the necessary maintenance, including the safety tests for the purpose of preventive avoidance of danger and the necessary settings for optimum image quality and minimum exposure to radiation, are performed at regular intervals. Neusoft agrees on these intervals with you, taking the legal requirements into account.

Other examination:

- Check all the display fields (warning, status lamp, indicator lamp and parameter display etc.),
- Check all speakers, making sure they are set at proper volume,
- Check whether the all inter-connected wire and connectors are damaged.

4.1.1 Check AEC Function

The following procedure, which can be performed by user, may be used to verify that the AEC circuits are functioning on HV generators equipped with AEC (Automatic Exposure Control).

This procedure should be performed at least once a month, or on even shorter intervals according to your local regulations.



WARNING: Check on AEC function is performed when X-ray exposure is in progress. Follow the steps below strictly and take radiation precautions.

Follow the procedure below to check AEC function:

1. Switch the generator on.
2. Select an appropriate X-ray image receptor.
3. Align the X-ray tube so that the central beam points directly on the center field of the image receptor.
4. Set SID = 110 cm.
5. Select AEC mode of operation.
6. Select center field.
7. Select large focus.

Minimum exposure time:

8. With no object in the radiation field adjust the collimator or beam limiting device to 24 cm X 24 cm.
9. Select 80 KV, 100 mA, and 50 mAs backup if possible; otherwise use default AEC backup settings .
10. Make an exposure and verify that the POST mAs reading is no bigger than the standard value.

Maximum exposure time:

11. Close the collimator or beam limiting device completely. Place a folded lead apron over the image receptor.
12. Select 60 KV, 100 mA, and 50 mAs backup if possible; otherwise use default AEC backup settings .
13. Make an exposure and verify that the error message code is AEC Feedback error, AEC backup Timer or AEC mAs exceed, indicated in the APR display window after the exposure has terminated. This confirms that the exposure has continued until it was terminated by the AEC backup timer.

4.2 Cleaning



Caution:

- To clean plastic surfaces you must never use anything other than soap and water. If other detergents are used (for example with a high alcohol content), the material will become dull or tend to crack.
- Never use any corrosive, solvent or abrasive detergents or polishes.

When cleaning, please observe the following:

- Before cleaning the X-ray equipment switch off at the mains.

NPD-HYG-0015

- Ensure that no water or other liquids can enter the X-ray equipment. This precaution prevents electrical short-circuits and corrosion forming on components.
- You should wipe plastic parts and aluminium surfaces (for example: tabletop) only with a damp cloth and then rub with a dry woolen cloth.
- Rub down chrome parts with a dry woolen cloth only.



WARNING: You must never try to clean any component when the equipment is switched on. Always switch off at the mains before cleaning.

4.3 Disinfection

The method of disinfection used must conform to the legal regulations and guidelines regarding disinfection and explosion protection.



WARNING:

- Never use any corrosive, solvent or abrasive detergents or polishes.
- If you use disinfectants which form explosive mixtures of gases, these must first have evaporated before you switch the X-ray equipment on again.

Note:

- Before disinfecting the X-ray equipment switch off at the mains.
- You may disinfect all parts of the equipment, including the accessories and connecting cables, by wiping only.
- Disinfect tabletop: Tabletop can be wiped using alcohol when necessary.
- Disinfection by spraying is not recommended because the disinfectant may enter the equipment.
- If you perform room disinfection with a nebulizer, you must switch off the equipment. When the equipment has cooled down, cover it carefully with a plastic sheet. When the disinfectant mist has settled, you can remove the plastic sheets and disinfect the equipment by wiping.

4.4 Repairs



Caution:

- Faulty components which affect the safety of the X-ray equipment must be replaced by genuine spare parts.

Service and repairs must be entered in the medical products logbook, including the following data:

- type and scope of work
- if necessary, details of any changes to ratings or the working zone
- date, person performing the work, signature.

NPD-HYG-0015

Chapter 5 Technical Data

5.1 Generator Data

5.1.1 General Data

Generator Type	Venus-22-R	Venus-32-R	Venus-50-R
Output Power	22kW	32kW	50kW
Nominal Mains Voltage	~ 220V/230V 50Hz/60Hz	~ 220V/230V 50Hz/60Hz 3~ 380V/400V 50Hz/60Hz	~ 220V/230V 50Hz/60Hz 3~ 380V/400V 50Hz/60Hz
kV Range	40kV-150kV, 1kV step		
Accuracy of kV	± 5%		
mA range	10 - 200mA	10mA - 320mA(single-phase) 10mA - 500mA (three-phase)	10mA - 630mA
Accuracy of mA	≤ ± 20%	≤± 20%(single-phase) ≤± 20%(≤ 25mA or ≤20ms);other 5%,(three-phase)	≤± 20%(single-phase) ≤± 20%(≤ 25mA or ≤20ms);other 5%(three-phase)
ms range	1ms -8000ms		
Accuracy of ms	± (5% + 1ms)		
mAs range	0.2mAs - 80mAs	0.2mAs - 100mAs(single-phase) 0.2mAs - 630mAs(three-phase)	0.2mAs - 320mAs(single-phase) 0.2mAs - 800mAs(three-phase)
Accuracy of mAs	± (5% + 0.2mAs)		
Max Power	110kV, 200mA	100kV, 320mA	150kV, 320mA
		80kV, 400mA(three-phase)	79kV, 630mA
		64kV, 500mA(three-phase)	100kV, 500mA

NPD-HVG-0015

Generator Type	Venus-22-R	Venus-32-R	Venus-50-R
AEC Shortest Irradiation Time	5ms		
Rotor Control	Low speed		
Auxiliary	Wall bucky, table bucky, free cassette, DR auxiliary		
Exposure Technique Selection	kV-mA (AEC)		
	kV-mAs		
	kV-mA-ms		
Automatically Programs Radiograph	User programmable maximum APR data is 2000		
	APR Up/Download: Yes		
AEC	Field: 3 fields		
	Film screen: high, middle, low (200~1200)		
	Density: -8~+8		
System Interface	AEC chamber number: 3		
	AEC chamber power supply : +/-12V, 200~500V		
	DR Interface: Yes		
Auxiliary Power Supply	24 VAC 6.3A		
Communication Interface	RS-232		
User Interface	Console, DLL		
Dimension (L*W*H) (mm)	610*420*400		
Weight	60kg	65kg	65kg

5.1.2 Electric Output Data

Output parameter	Mode	Generator series	Loading factor
Nominal X-ray tube voltage and highest X-ray tube current at that voltage	Radiographic (Intermittent)	22kW	150kV, 125mA
		32kW	150kV, 200mA
		50kW	150kV, 320mA

NPD-HYG-0015

Output parameter	Mode	Generator series	Loading factor
Maximum X-ray tube current and highest X-ray tube voltage at that current	Radiographic (Intermittent)	22kW	110kV, 200mA
		32kW	100kV, 320mA(single-phase) 64kV, 500mA(three-phase)
		50kW	79kV, 630mA
Combination of X-ray tube current and X-ray tube voltage resulting in highest output power	Radiographic (Intermittent)	22kW	110kV, 200mA
		32kW	80kV, 400mA
		50kW	100kV, 500mA
Nominal electric output	Radiographic (Intermittent)	22kW	200mA, 110kV, 0.1s
		32kW	320mA, 100kV, 0.1s
		50kW	500mA, 100kV, 0.1s

5.1.3 Exposure Techniques

- kV-mA, constant current operation, AEC (two-factor technique)
- kV-mAs, constant load (two-factor technique)
- kV-mA-ms, constant load (three-factor technique)

5.2 EMC Data

NPD-HVG-0015

No	Emissions test	Measurement Result
1	Radiation emissions CISPR11	Class A Group 1
2	Conduction emission CISPR11	Class A Group 1

No	Immunity test	IEC60601 test level
1	Electrostatic discharge (ESD) IEC61000-4-2	± 6.0kV contact discharge ± 8.0kV air discharge
2	RF immunity IEC61000-4-3	3V/m, 80MHz-2.5GHz

No	Immunity test	IEC60601 test level
3	Electrical fast Transient IEC61000-4-4	$\pm 2\text{kV}$ for power line $\pm 1\text{kV}$ for input/output line
4	Surge IEC61000-4-5	$\pm 2\text{kV}$ (common mode) $\pm 1\text{kV}$ (differential mode)
5	Conducted disturbances immunity IEC61000-4-6	3Vrms 150KHz - 80MHz
6	Power frequency magnetic fields immunity IEC61000-4-8	3A/m

5.3 Environmental Requirements

5.3.1 Environmental Requirements for Operation

Temperature	10°C - 40°C
Rel. humidity	30% - 75%
Atmosphere pressure	70kPa - 106kPa

5.3.2 Environmental Requirements for Transportation and Storage

Temperature	-35°C - +70°C
Rel. humidity	10% - 95% non-condensing
Atmosphere pressure	50kPa - 106kPa

NPD-HYG-0015

NPD-HVG-0015

5.4 Exposure Parameters

Selected according to R'10 (22KW , single-phase)

Time (ms)	mA selected													
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200
1														0.2
1.25													0.2	0.25
1.6												0.2	0.25	0.32
2											0.2	0.25	0.32	0.4
2.5										0.2	0.25	0.32	0.4	0.5
3.2									0.2	0.25	0.32	0.4	0.5	0.63
4								0.2	0.25	0.32	0.4	0.5	0.63	0.8
5							0.2	0.25	0.32	0.4	0.5	0.63	0.8	1
6.3						0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25
8				0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	
10			0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	
12.5		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	
16		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2
20	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4
25	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5

Time (ms)	mA selected														
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	
32	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	
40	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	
50	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	
63	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	
80	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	
100	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	
125	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	
160	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	
200	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	
250	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	
320	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	
400	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63		
500	5	6.3	8	10	12.5	16	20	25	32	40	50	63			
630	6.3	8	10	12.5	16	20	25	32	40	50	63				
800	8	10	12.5	16	20	25	32	40	50	63					
1000	10	12.5	16	20	25	32	40	50	63	80					
1250	12.5	16	20	25	32	40	50	63	80						

NPD-HVG-0015

Time (ms)	mA selected														
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	
1600	16	20	25	32	40	50	63	80							
2000	20	25	32	40	50	63	80								
2500	25	32	40	50	63	80									
3200	32	40	50	63	80										
4000	40	50	63	80											
5000	50	63	80												
6300	63	80													
8000	80														

Selected according to R'10 (32KW ,single-phase)

Time (ms)	mA selected															
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320
1														0.2	0.25	0.32
1.25													0.2	0.25	0.32	0.4
1.6												0.2	0.25	0.32	0.4	0.5
2											0.2	0.25	0.32	0.4	0.5	0.63
2.5										0.2	0.25	0.32	0.4	0.5	0.63	0.8

Time (ms)	mA selected															
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320
3.2									0.2	0.25	0.32	0.4	0.5	0.63	0.8	1
4								0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25
5							0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6
6.3						0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2
8				0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	
10			0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	
12.5		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	
16	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	
20	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3
25	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8
32	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10
40	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5
50	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16
63	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20
80	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25
100	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32
125	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40

NPD-HVG-0015

NPD-HVG-0015

Time (ms)	mA selected															
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320
160	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50
200	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63
250	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80
320	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	
400	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80		
500	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80			
630	6.3	8	10	12.5	16	20	25	32	40	50	63	80				
800	8	10	12.5	16	20	25	32	40	50	63	80	100				
1000	10	12.5	16	20	25	32	40	50	63	80	100					
1250	12.5	16	20	25	32	40	50	63	80	100						
1600	16	20	25	32	40	50	63	80								
2000	20	25	32	40	50	63	80	100								
2500	25	32	40	50	63	80	100									
3200	32	40	50	63	80											
4000	40	50	63	80	100											
5000	50	63	80	100												
6300	63	80														

Time (ms)	mA selected															
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320
8000	80	100														

Selected according to R'10 (32KW ,three-phase)

Time (ms)	mA selected																	
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500
1														0.2	0.25	0.32	0.4	0.5
1.25													0.2	0.25	0.32	0.4	0.5	0.63
1.6												0.2	0.25	0.32	0.4	0.5	0.63	0.8
2											0.2	0.25	0.32	0.4	0.5	0.63	0.8	1
2.5										0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25
3.2									0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6
4								0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2
5							0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5
6.3						0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2
8				0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	
10			0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	
12.5		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	

NPD-HVG-0015

NPD-HVG-0015

Time (ms)	mA selected																	
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500
16		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8
20	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10
25	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5
32	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16
40	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20
50	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25
63	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32
80	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40
100	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50
125	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63
160	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80
200	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100
250	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125
320	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160
400	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200
500	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250
630	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320

Time (ms)	mA selected																	
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500
800	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400
1000	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500
1250	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
1600	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400			
2000	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500			
2500	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630			
3200	32	40	50	63	80	100	125	160	200	250	320	400	500					
4000	40	50	63	80	100	125	160	200	250	320	400	500						
5000	50	63	80	100	125	160	200	250	320	400	500	630						
6300	63	80	100	125	160	200	250	320	400	500	630							
8000	80	100	125	160	200	250	320	400	500									

Selected according to R'10 (50KW,single-phase)

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
1														0.2	0.25	0.32	0.4	0.5	0.63
1.25													0.2	0.25	0.32	0.4	0.5	0.63	0.8

NPD-HVG-0015

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
1.6												0.2	0.25	0.32	0.4	0.5	0.63	0.8	1
2											0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25
2.5										0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6
3.2									0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2
4								0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5
5							0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2
6.3						0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4
8					0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5
10				0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3
12.5			0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8
16		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10
20	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5
25	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16
32	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20
40	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25
50	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32
63	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
80	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50
100	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63
125	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80
160	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100
200	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	
250	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100		
320	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125		
400	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125			
500	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125				
630	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160				
800	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160					
1000	10	12.5	16	20	25	32	40	50	63	80	100	125	160						
1250	12.5	16	20	25	32	40	50	63	80	100	125	160							
1600	16	20	25	32	40	50	63	80	100	125	160	200							
2000	20	25	32	40	50	63	80	100	125	160	200								
2500	25	32	40	50	63	80	100	125	160	200									
3200	32	40	50	63	80	100	125	160	200	250									

NPD-HVG-0015

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
4000	40	50	63	80	100	125	160	200											
5000	50	63	80	100	125	160	200	250											
6300	63	80	100	125	160	200	250	320											
8000	80	100	128	160	200	250	320												

Selected according to R’10 (50KW,three-phase)

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
1														0.2	0.25	0.32	0.4	0.5	0.63
1.25													0.2	0.25	0.32	0.4	0.5	0.63	0.8
1.6												0.2	0.25	0.32	0.4	0.5	0.63	0.8	1
2											0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25
2.5										0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6
3.2									0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2
4								0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5
5							0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2
6.3						0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
8					0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5
10				0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3
12.5			0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8
16		0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10
20	0.2	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5
25	0.25	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16
32	0.32	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20
40	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25
50	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32
63	0.63	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40
80	0.8	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50
100	1	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63
125	1.25	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80
160	1.6	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100
200	2	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125
250	2.5	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160
320	3.2	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200

NPD-HVG-0015

Time (ms)	mA selected																		
	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
400	4	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250
500	5	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320
630	6.3	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400
800	8	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500
1000	10	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630
1250	12.5	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800
1600	16	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800	
2000	20	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800		
2500	25	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800			
3200	32	40	50	63	80	100	125	160	200	250	320	400	500	630	800				
4000	40	50	63	80	100	125	160	200	250	320	400	500	630	800					
5000	50	63	80	100	125	160	200	250	320	400	500	630	800						
6300	63	80	100	125	160	200	250	320	400	500	630	800							
8000	80	100	128	160	200	250	320	400	500	630	800								

Note:

- Venus-22-R generator - max. mA = 200
- Venus-32-R generator - max.mA(single-phase)=320

- Venus-32-R generator - max. mA(three-phase)= 500
- Venus-50-R generator - max. mA(single-phase)= 630
- Venus-50-R generator - max. mA(three-phase)= 630
- mA and ms values are tube rating dependent. For certain tubes, some mA/ms selections are not available at higher kV selections.
- The maximum power output of the generator is 22 kW for Venus-22-R, 32 kW for Venus-32-R and 50 kW for Venus-50-R respectively. The generator software does not allow a kV and mA combination to be selected that exceeds these maximum values.

How to read the table (example)

The table shows

- mAs values resulting from preselected mA and ms values (three-factor technique),
- the range and interrelation of these loading factors.

For example, if in an AEC operation it is known that the preset backup mAs limit is 50 mAs and 100 mA is chosen for that technique, then the maximum exposure time (at which the backup mAs limit is reached) is 500ms.

In the above example read down the 100 mA column to the 50 mAs value. Then read across to the left side of the table to the 500 ms value; this will be the maximum time allowed for the standard conditions.

NPD-HVG-0015

5.5 Error Codes

Error	Message	Possible cause	What can be done
001	Tube Anode Too Hot (E001)	The X-ray tube is too hot for further operation.	1. Power off the generator and cool it for more than 30 minutes. Then power on the generator and check its status; 2. Call service.
002	Thermal Switch of Tube 1 Opened (E002)	Thermal switch of tube 1 housing is open.	Call service.
004	Anode kW Limit (E004)	Requested parameter is not allowed as checked by tube nomogram that the kW limit has been reached.	Call service.
101	Arcing Error (E101)	A fault about overvoltage, overcurrent or overload of inverter boards and resonant circuit during an exposure occurs, which may because of arcing in tube, tank or the HV cables.	Call service.
102	No kV During Exposure (E102)	No kV feedback signal is detected during exposure.	Call service.
103	Unexpected kV During Non-X-ray State (E103)	Unexpected kV (more than 80kV) is detected during non-X-ray state.	Call service.
104	Overvoltage Error (E104)	kV feedback exceeds 120% of kV setting.	Call service.
105	Undervoltage Error (E105)	kV feedback is lower than 80% of kV setting.	Call service.
201	Filament Current out of Range (E201)	A filament current fault is detected.	Call service.
202	High mA Error (E202)	mA feedback exceeds 130% of mA setting.	Call service.
203	Low mA Error (E203)	mA feedback is lower than 70% of mA setting.	Call service.

Error	Message	Possible cause	What can be done
205	Small Filament Exceed Limit During Standby (E205)	Small filament current exceeds upper limitation in standby.	Call service.
206	Large Filament Exceed Limit During Standby (E206)	Large filament current exceeds upper limitation in standby.	Call service.
207	mA Exceeds Upper Limit During Tube Calib. (E207)	mA exceeds upper limitation during calibration.	Call service.
208	Fila. Current Exceed Limit in Tube Calibration. (E208)	Filament current exceeds upper limitation during calibration.	Call service.
209	No mA Feedback During Tube Calib. (E209)	No mA feedback is detected during tube calibration.	Call service.
210	Unexpected Initial mA During Tube Calibration. (E210)	Initial mA feedback is higher than the expected mA at the beginning of calibration.	Call service.
212	Max mA Not Reached During Calib. (E212)	A mA feedback circuit fault is detected. Or max filament current data exception is detected.	Call service.
301	Rotor Fault (E301)	Rotor starter detects fault in rotor driver circuit.	Call service.
401	Exposure Interrupted (E401)	Exposure handswitch has been released before exposure finished.	Press exposure handswitch and hold on until exposure finished.
402	AEC Back-up Time Out of Range (E402)	The automatic exposure control is not able to finish the last exposure properly. There is possibly an object in the radiation field which is considerably attenuating radiation or the exposure values selected are too low. (4s)	1. Ensure proper auxiliary is selected; 2. Increase exposure values; 3. Tube should align with the chamber; 4. Call service.

Error	Message	Possible cause	What can be done
403	AEC Back-up mAs Out of Range (E403)	The automatic exposure control is not able to finish the last exposure properly. There is possibly an object in the radiation field which is considerably decrease radiation or the exposure values selected are too low. (500mAs)	1. Ensure proper auxiliary is selected; 2. Increase exposure values; 3. Tube should align with the chamber; 4. Call service.
404	PREP Kept Overtime (E404)	The preparation button is pressed for a longer time without an actual exposure request. Preparation is aborted. (>60s)	Do not hold on preparation button for more than 60s before X-ray release.
405	Exp. Switch PREP Activied During Power-on (E405)	Prep switch is active during power-on phase.	Call service.
406	Exp. Switch X-ray Activied During Power-on (E406)	X-ray switch is active during power-on phase.	Call service.
409	AEC Reference Voltage Out of Range (E409)	AEC reference voltage is out of range.	Call service.
410	No AEC Field Config (E410)	No AEC field is configured.	1. Enable/Select AEC field(s); 2. Call service.
411	No Tube Configuration in Auxiliary Setting (E411)	All auxiliaries have no X-ray tube programmed.	Call service.
412	Failed to Apply APR (E412)	The FS Speed of the APR is not supported by the corresponding auxiliary.	Call service.
413	Tube Calib. Timeout (E413)	The exposure time is too long for tube calibration.	Call service.
414	AEC Channel Config Error (E414)	Wrong channel number is selected.	Call service.

Error	Message	Possible cause	What can be done
415	AEC Film Config Error (E415)	Film type configuration is incorrect.	Call service.
416	Exposure Interrupted During Tube Calibration (E416)	Operator released exposure switch during tube calibration.	Call service.
417	Tray Interlock Failed (E417)	This error integrates the error from table and wallstand bucky tray error together: 1. The sensor plates in tray or cassette does not detect magnet signal; 2. The moving grid control board in X-ray system could not send out the feedback signal to ER in generator 3. The cable between the ER& moving grid control board is broken.	Call service.
418	Communication Not Allowed (E418)	Operation is forbidden during specific phase.	Call service.
419	Func. Disable Warning (E419)	Chosen function is disabled or not configured.	Call service.
423	Operation Not Allowed (E423)	The parameters or commands received from the console of UI is invalid.	1. Avoid the operation that produces the error; 2. Call service.
426	Gen kW limit (E426)	When adjusting kV, mA or ms, the max power of the generator is reached.	Reset exposure parameter.
427	Gen kV limit (E427)	The max kV of the generator is reached.	Reset exposure parameter.
429	Density Out of Range (E429)	The max density of the generator is reached.	Reset density value.
430	Gen mA Limit (E430)	The max mA limit of the generator is reached.	Reset exposure parameter.
432	Tube mAs Limit (E432)	The max mAs of the generator is reached.	Reset exposure parameter.
433	Gen ms Limit (E433)	The max ms of the generator is reached.	Reset exposure parameter.

NPD-HVG-0015

Error	Message	Possible cause	What can be done
434	Tube mA Limit (E434)	The max mA of the tube is reached.	Reset exposure parameter.
435	Tube kW Limit (E435)	When adjusting kV, mA or ms, the max power of the tube is reached.	Reset exposure parameter.
436	Gen mAs Limit (E436)	The max mAs of the generator is reached.	Reset exposure parameter.
437	Tube kV Limit (E437)	The max kV of the tube is reached.	Reset exposure parameter.
443	No Auxiliary Selected (E443)	No auxiliary is selected.	1. Ensure the proper auxiliary is selected; 2. Call service.
445	Restore Factory Setting (E445)	Restore factory setting to the generator.	Call service.
447	DAP Curve Error (E447)	The values on DAP curve do not increase seriatim.	Call service.
448	Generator Data Not Compatible (E448)	The generator data are not compatible with the software.	Call service.
501	Room Door Open (E501)	Room door is open during or before radiation.	1. Close the door; 2. Call service.
502	Collimator Switch Open (E502)	Collimator switch is open.	Call service.
503	Table Bucky Grid Error (E503)	No feedback signal is detected from table bucky grid.	Call service.
505	Wall Bucky Grid Error(E505)	No feedback signal is detected from wall bucky grid.	Call service.
507	Generator Communication Error (E507)	Generator can't receive the command from the console/UI.	Call service.
514	AEC Feedback Signal Too Low (E514)	Generator has detected less than 10% of reference voltage from AEC device, when 10% of AEC back-up time is reached.	Call service.
601	Mains Contactor Error (E601)	Mains contactor doesn't close. Precharge doesn't finished.	Call service.

Error	Message	Possible cause	What can be done
602	Abnormal Termination of Radiation (E602)	EMC reason. It may be caused by arcing in the X-ray tube , the HV cables, or tank.	Call service.
605	AEC Stop Signal Error (E605)	AEC stop signal is low during prep phase.	Call service.
606	Unexpected Exposure Request in Stand by (E606)	Exposure switch signal in EZ is active during standby phase.	Call service.
607	Inverter Overheating (E607)	Long time working results in that the inverter is too hot.	1. Cool down the tube; 2. Call service.
608	Unexpected Focus (E608)	Current focus is invalid.	Call service.
613	Tube Selection Error (E 613)	The tube selected in Sundisk doesn't accord to the tube detected by PCBs.	Call service.
701	Ready Signal Error (E701)	Ready signal not received by CPU during exposure which is generated from EH CPLD to EZ.	Call service.
702	+15VDC/+12VDC Error (E702)	+15VDC/+12VDC error occurs.	Call service.
703	-15VDC/-12VDC Error (E703)	-15VDC/-12VDC Error error occurs.	Call service.
704	Undervoltage of DC-Bus (E704)	DC-Bus is lower than 382Vdc (three-phase power), or lower than 480Vdc (single-phase power).	Call service.
705	Phase Number of Power Supply Not Match with AC Input (E705)	The phase setting in CPU Board does not match with the type of Power Control Board.	Call service.
706	Wrong connection of AC input (E706)	Only for single-phase AC input, L and N line is reversed.	Call service.
708	Overvoltage of DC-Bus (E708)	DC-Bus is higher than 736Vdc (three-phase power), or higher than 717Vdc (single-phase power).	Call service.

Error	Message	Possible cause	What can be done
802	EEPROM Data Error (E802)	EZ EEPROM data are invalid.	Call service.
805	No Tube Calibration Data (E805)	Requested parameter not calibrated.	Call service.
806	Tube Calibration Data Error (E806)	Tube calibration data are lost or damaged.	Call service.
807	Rotor Data Error (E 807)	Rotor data are lost or damaged.	Call service.
808	Auxiliary Data Error (E808)	Auxiliary data are lost or damaged.	Call service.
809	Tube Data Error (E809)	Tube data are lost or damaged.	Call service.
810	Generator Limitation Data Error (E810)	Generator limit data are lost or damaged.	Call service.
813	AEC Database Error (E813)	AEC data are lost or damaged.	Call service.
814	EZ Clock Error (E814)	EZ clock unit is ineffective.	Call service.
815	Calib. Data Overflow (E815)	Tube calibration issue.	Call service.
817	Buffer Overflow During Calib. (817)	A standby current data exception is detected. Or the standby current is too high.	Call service.
818	Boost Data Corrupted (E818)	The boost data are lost or a boost data exception is detected.	Call service.
819	Blanking Data Corrupted (E819)	The blanking data are lost or a blanking data exception is detected.	Call service.

5.6 Recommend APR Table

Part of Body	Technique	Receptor	Normal kV	Normal mmA	Normal mms	Normal mmAs	Focus	Field	Film Screen
Skull									
Skull ap/pa	AEC	Table Bucky	66	200	100	20	Large	Center	Medium
Skull lat	AEC	Table Bucky	66	200	63	12.5	Large	Center	Medium
Skull Towne	AEC	Table Bucky	73	200	100	20	Large	Center	Medium
Facial bones	AEC	Table Bucky	66	200	80	16	Large	Center	Medium
Orbita	AEC	Table Bucky	66	250	63	16	Large	Center	Medium
Skull axial	AEC	Table Bucky	77	250	80	20	Large	Center	Medium
Sinuses	AEC	Table Bucky	73	200	63	12.5	Large	Center	Medium
Sinuses wall	AEC	Wall Bucky	73	200	63	12.5	Large	Center	Medium
Nasal bone lat	mAs	Free cassette	52	160	16	2.5	Small	Center	Low
Skull zygo arch	mAs	Free cassette	57	160	63	10	Large	Center	Low
Mandible	AEC	Table Bucky	63	250	32	8	Large	Center	Medium
Thorax									
Chest pa wall	AEC	Wall Bucky	117	125	16	2	Large	Left and right	Medium
Chest lat wall	AEC	Wall Bucky	117	160	20	3.2	Large	Center	Medium
Chest supine	AEC	Table Bucky	85	200	20	4	Large	Left and right	Medium

NPD-HVG-0015

NPD-HVG-0015

Part of Body	Technique	Receptor	Normal kV	Normal mA	Normal mms	Normal mmAs	Focus	Field	Film Screen
Chest bed	mAs	Free cassette	73	160	12.5	2	Large	Center	Medium
Ribs ap/pa	AEC	Table Bucky	66	160	80	12.5	Small	Center	Medium
Ribs obl	AEC	Table Bucky	66	160	80	12.5	Small	Center	Medium
Ribs wall	AEC	Wall Bucky	66	160	80	12.5	Small	Center	Medium
Sternum table	AEC	Table Bucky	66	160	80	12.5	Large	Center	Medium
Sternum pa	AEC	Wall Bucky	66	160	80	12.5	Large	Center	Medium
Sternum lat	AEC	Wall Bucky	77	160	80	12.5	Large	Center	Medium
Abdomen									
Abdomen supine	AEC	Table Bucky	73	160	80	12.5	Large	All	Medium
Abdomen erect	AEC	Wall Bucky	77	200	40	8	Large	All	Medium
Abdomen decub	AEC	Wall Bucky	96	200	40	8	Large	All	Medium
Abnomen free	mAs	Free cassette	73	160	80	12.5	Large	All	Medium
Kidneys	AEC	Table Bucky	66	200	40	8	Large	Left and right	Medium
Pelvis									
Pelvis ap	AEC	Table Bucky	73	160	80	12.5	Large	Left and right	Medium
Hip ap	AEC	Table Bucky	70	160	80	12.5	Large	Center	Medium
Hip axial	AEC	Table Bucky	70	160	80	12.5	Large	Center	Medium
Spine									

Part of Body	Technique	Receptor	Normal kV	Normal mmA	Normal mms	Normal mmAs	Focus	Field	Film Screen
C-spine ap	AEC	Table Bucky	66	200	32	6.3	Large	Center	Medium
C-spine lat	AEC	Table Bucky	70	200	40	8	Large	Center	Medium
Dens axis	AEC	Table Bucky	70	32	500	16	Large	Center	Medium
T-spine ap	AEC	Table Bucky	66	200	200	40	Large	Center	Medium
T-spine lat	AEC	Table Bucky	77	200	320	63	Large	Center	Medium
L-spine ap	AEC	Table Bucky	73	200	200	40	Large	Center	Medium
L-spine lat	AEC	Table Bucky	85	160	200	32	Large	Center	Medium
Sacro iliac joint	AEC	Table Bucky	73	160	160	25	Large	Center	Medium
Sacrum ap	AEC	Table Bucky	73	200	100	20	Large	Center	Medium
Sacrum lat	AEC	Table Bucky	85	160	200	32	Large	Center	Medium
Shoulder									
Shoulder ap	AEC	Table Bucky	66	80	160	12.5	Small	Center	Medium
Shoulder axial	mAs	Free cassette	66	160	63	10	Small	Center	Medium
Shoulder transt	AEC	Wall Bucky	85	160	200	32	Large	Center	Medium
Shoulder wall	AEC	Wall Bucky	66	80	160	12.5	Small	Center	Medium
Clavicula ap/pa	AEC	Table Bucky	63	80	160	12.5	Small	Center	Medium
Clavicula obl	mAs	Free cassette	63	160	25	4	Small	Center	Medium
Scapula ap	AEC	Table Bucky	63	80	160	12.5	Small	Center	Medium

NPD-HVG-0015

NPD-HVG-0015

Part of Body	Technique	Receptor	Normal kV	Normal mmA	Normal mms	Normal mmAs	Focus	Field	Film Screen
Scapula lat	AEC	Table Bucky	70	100	100	10	Small	Center	Medium
Scapula wall	AEC	Wall Bucky	70	100	100	10	Small	Center	Medium
Upper extremities									
Elbow ap/lat	mAs	Free cassette	52	160	25	4	Small	Center	Low
Humerus ap/lat	mAs	Free cassette	63	160	40	6.3	Small	Center	Low
Forearm	mAs	Free cassette	50	160	20	3.2	Small	Center	Low
hand ap/obl	mAs	Free cassette	44	160	20	3.2	Small	Center	Low
hand lat	mAs	Free cassette	46	160	25	4	Small	Center	Low
Wrist ap	mAs	Free cassette	46	160	20	3.2	Small	Center	Low
Wrist lat	mAs	Free cassette	46	160	25	4	Small	Center	Low
Finger	mAs	Free cassette	44	160	12.5	2	Small	Center	Low
Lower extremities									
Upper femur ap	AEC	Table Bucky	66	160	80	12.5	Large	Center	Medium
Upper femur lat	AEC	Table Bucky	66	200	50	10	Large	Center	Medium
Lower femur ap	mAs	Free cassette	63	100	50	5	Large	Center	Medium
Lower femur lat	mAs	Free cassette	63	100	50	5	Large	Center	Medium
Knee ap	mAs	Free cassette	60	160	32	5	Small	Center	Low
Knee lat	mAs	Free cassette	60	160	40	6.3	Small	Center	Low

NPD-HVG-0015

Part of Body	Technique	Receptor	Normal kV	Normal mmA	Normal mms	Normal mmAs	Focus	Field	Film Screen
Patella	mAs	Free cassette	57	160	32	5	Small	Center	Low
Lower leg	mAs	Free cassette	57	160	32	5	Small	Center	Low
Foot ap/obl	mAs	Free cassette	48	160	20	3.2	Small	Center	Low
Foot lat	mAs	Free cassette	50	160	20	3.2	Small	Center	Low
Ankle ap	mAs	Free cassette	52	160	25	4	Small	Center	Low
Ankle lat	mAs	Free cassette	55	160	25	4	Small	Center	Low
Forefoot	mAs	Free cassette	44	160	16	2.5	Small	Center	Low

5.7 Labels

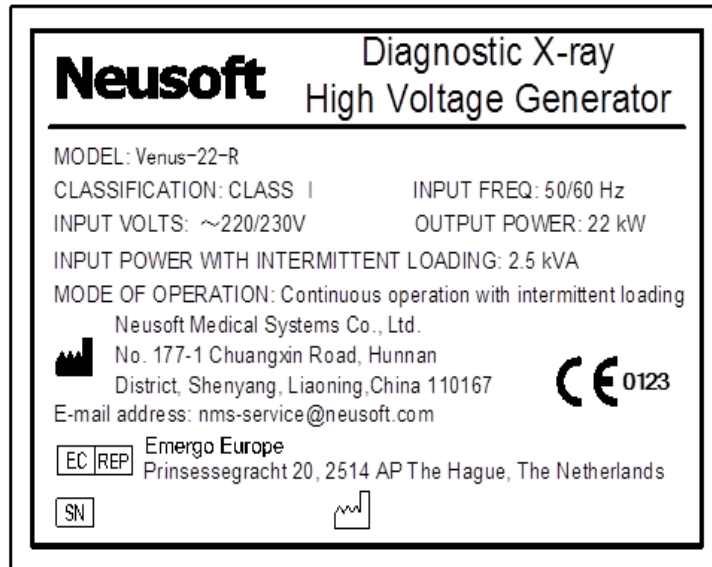


Fig 5-1 System label for Venus-22-R

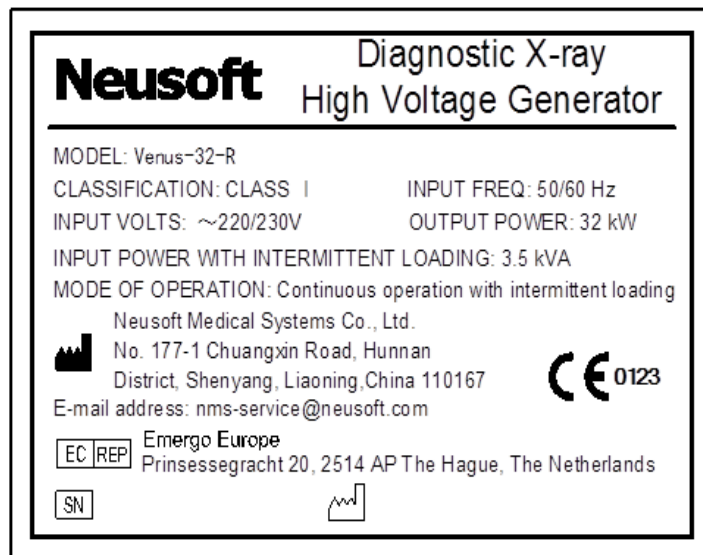


Fig 5-2 System label for Venus-32-R(singl-phase)

NPD-HVG-0015

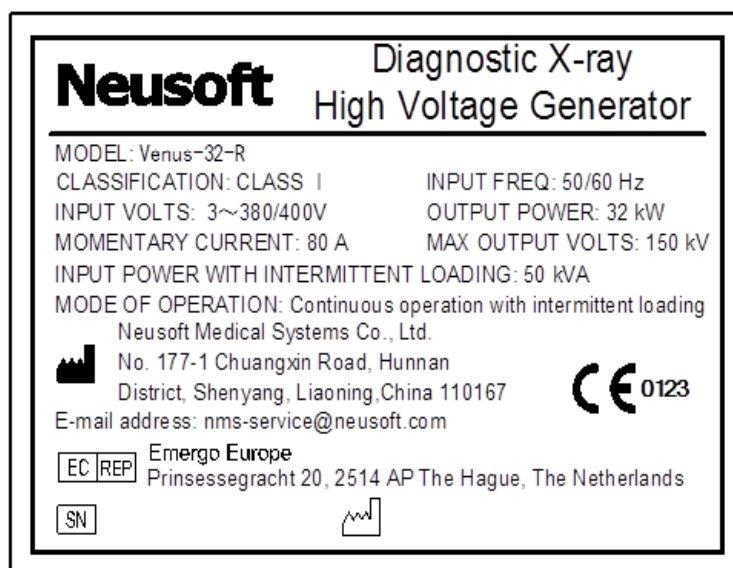


Fig 5-3 System label for Venus-32-R(three-phase)

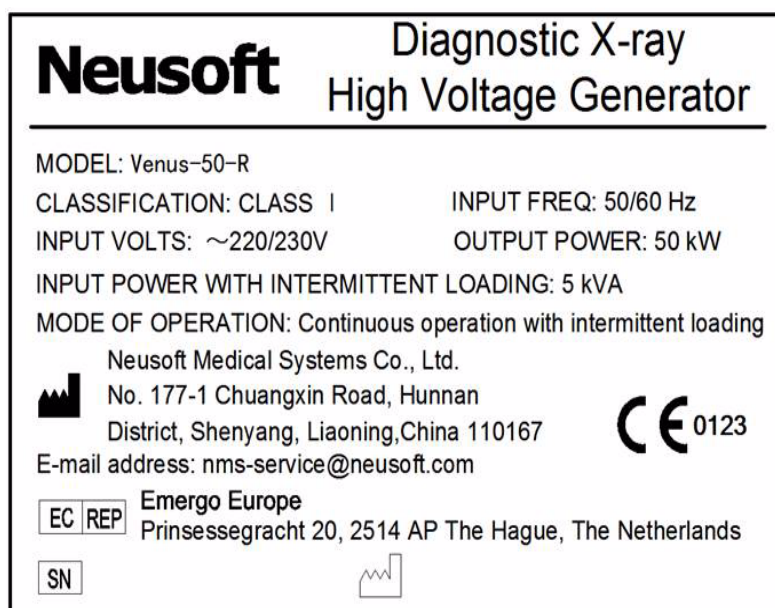


Fig 5-4 System label for Venus-50-R(single-phase)

NPD-HVG-0015

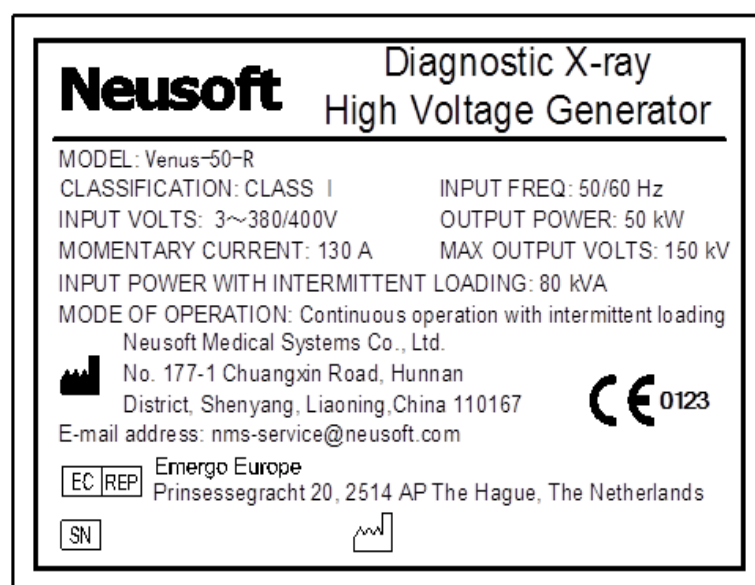


Fig 5-5 System label for Venus-50-R(three-phase)



Fig 5-6 Console label 100S

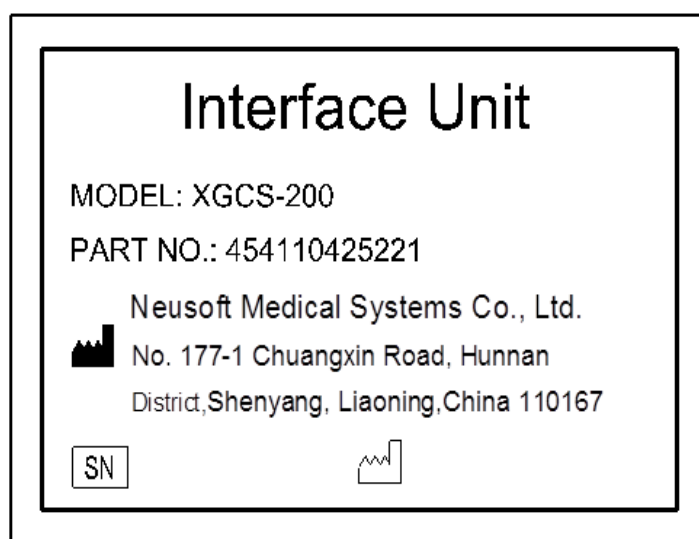


Fig 5-7 Console label 200



Fig 5-8 Dangerous voltage

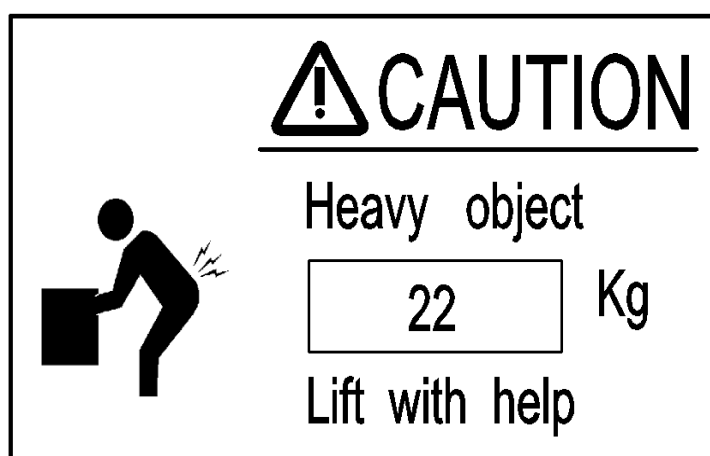


Fig 5-9 Heavy object

NPD-HVG-0015

Note: The values shown are standard values and can vary depending on the configuration of the system and the country where the systems delivered to. These values may have to be adapted according to individual customer needs.

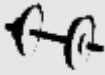

5.8 Abbreviations and Their Meaning

APR: Anatomically Programmed Radiography

AEC: Automatic Exposure Control

Chapter 6 Recycling Passport

6.1 Recycling Passport of the Diagnostic X-ray High Voltage Generator

Recycle info	Substances	Location
	Iron (Fe)	Fig 6-1 Fig 6-3
Fluids/Gases  To be removed	Transformer oil	Fig 6-3

Material content (global)	Weight in Kg
Transformer oil	8
Fe	31
Al	0.2
Cu	7.7
Plastic	0.3
Printed Circuits Boards	7
Rubber	0.5
All other material types	5.3
Total Product	60

Locations as mentioned in the Passport (Pictures information)

NPD-HVG-0031

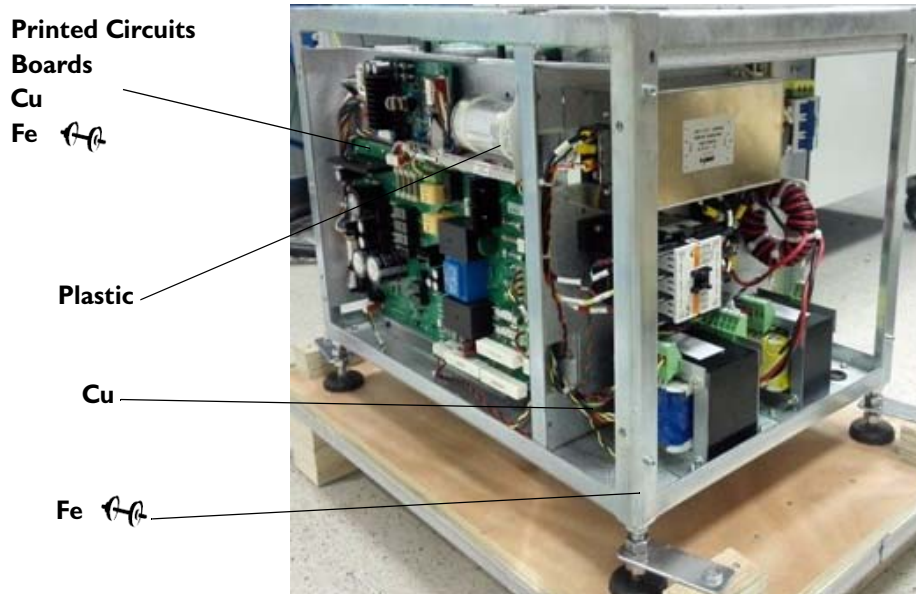


Fig 6-1

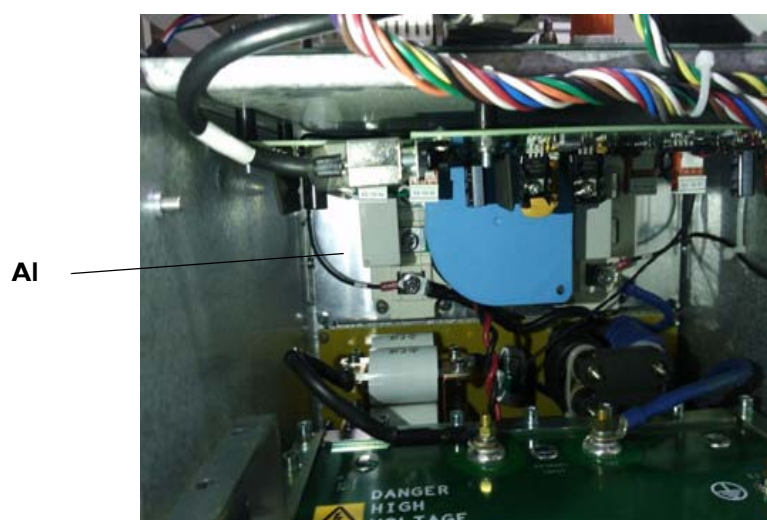


Fig 6-2

NPD-HVG-0031



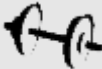
Rubber
Plastic
Oil 
Cu
Fe 
Printed Circuits Boards



Fig 6-3

6.2 Recycling Passport of the X-ray Generator Console

Recycle info	Substances	Location
	Iron (Fe)	Fig 6-4 Fig 6-5

Material content (global)	Weight in Kg
Fe	3.2
Cu	0.01
LCD	0.2
Printed Circuits Boards	0.4
All other material types	0.19
Total Product	4

Locations as mentioned in the Passport (Pictures information)

NPD-HVG-0031

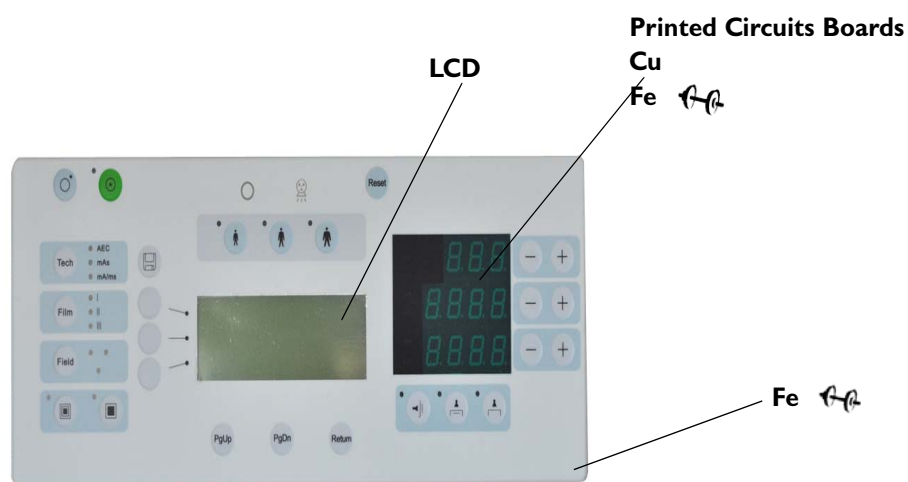
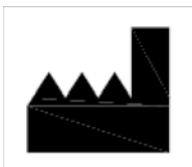


Fig 6-4



Fig 6-5

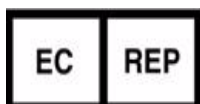
NPD-HYG-0031



Neusoft Medical Systems Co., Ltd.
No. 177-1 Chuangxin Road, Hunnan District, Shenyang, Liaoning, China 110167

Telephone:
Email:

+86 24 23358091
nms-service@neusoft.com



Emergo Europe
Prinsessegracht 20, 2514 AP The Hague,
The Netherlands