



HUM-20BT / For Human

Battery Powered Portable X-ray System

Product Manual (Operation & Service)



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TABLE OF CONTENTS

PART I. OPERATION MANUAL

1	General description	1
2	Operational safety	6
3	Operating environment	12
4	Radiation safety	13
5	System configuration	14
6	Specification	15
7	Parts description	19
8	Operation	22
9	How to operate	24
10	Remote control function & operation	26
11	Cleaning and disinfection	30
12	Storage, Transport and Package	31
13	Exclusion of liability	33
14	Disposal of the product	33

PART II. SERVICE MANUAL

1	Notice	34
2	Regular maintenance	35
3	Block diagram	36
4	Calibration	37
5	Calibration code and data	43
6	Error code	44
7	How to replace the battery	46
8	Service request form	48

PART 1: OPERATION MANUAL

1. General description

1.1. Overview

Introduction

Thank you for purchasing the HUM-20BT, BATTERY POWERED portable x-ray system. The HUM-20BT is the lightest weight, most compact sized high frequency x-ray machine on the market today. All POSKOM Portable series x-ray units are equipped with ripple free, high frequency generators that produce up to 40~50% stronger power output efficiency when compared to conventional x-ray systems. The ideal balance of power and portability makes this the perfect solution for all your indoor and outdoor radiographic needs.



WARNING

Keep the HUM-20BT electrically grounded when plugged into an outlet.
Put power cable into grounded outlets appropriately.

Features are;

- High frequency type X-ray generator
- Maximum output: 90kV/20mA
- 15 APR memory settings
- Built-in LED collimator with Laser pointer
- Remote control software
- Power requirements: 16.8VDC/1.5A
- Built-in Ultra Capacitor
- Accessories: Aluminum carrying case, hand switch, power cord and charging adapter
- R/F module for wireless communication (DR interface)

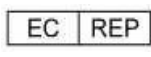
Environmental statement on the lifecycle of this equipment



This equipment contains environmentally dangerous materials (such as lead, dielectric oil, batteries, etc.) which, once the lifecycle of the equipment comes to an end, becomes dangerous and need to be considered as harmful waste according to the international, domestic and local regulations. POSKOM recommends you to contact an authorized representative of manufacturer or an authorized waste management company once the equipment comes to an end to remove this equipment.

SAFETY SYMBOLS

The following safety symbols will be used in the equipment. Their meaning is described below.

	Alternating current		Protective earth (ground)
	Caution		ON (power)
	Non-ionizing radiation		OFF (power)
	General prohibition sign		Ionizing radiation
	Type B Applied Part		General warning sign
	Warning, electricity		Refer to instruction manual
	Date of manufacture		Manufacturer
	Serial number		Authorized representative
	RoHS Compliant		Not for general waste
	Laser beam		Stand-by
	Lithium ion		Battery status

IPX0 No protection of equipment against ingress of water with harmful side effects (non-protected)

CE 0123 "CE" - European Conformity & "0123" - Notified Body no. of TÜV SÜD

1.2. Product manual

This consolidated manual consists of operating and service instructions. The product manual provides HUM-20BT operating instructions for x-ray and medical personnel trained in the use of x-ray equipment. The service manual provides installation, calibration and routine maintenance instructions for field service personnel.

This manual is not designed to replace or substitute certified training in the radiological or medical fields. Operators should be pre-qualified in the use of this type of equipment before reading this manual. This X-ray system is only to be used by licensed operators in diagnostic, operative and post-operative procedures. HUM-20BT can be integrated with several types of radiographic accessories such as mobile stands and x-ray tube mounting tables.

1.3. Intended use

The main concerns about the use of portable x-ray equipment is the potential for exposure to staff and other members of the public from use of portable equipment in areas not evaluated for shielding.

To ensure that the risk of radiation exposure is associated with the benefit of a high quality radiographic image, the use of portable x-ray machines for human diagnostic procedures is restricted to patients who cannot be transferred to a stationary machine. Human diagnostic radiographs should be obtained from the use of stationary x-ray units, as much as possible.

Indication:

The POSKOM Battery Type Portable X-ray Unit is intended for use by a qualified/trained doctor or technician on both adult and pediatric subjects for taking diagnostic radiographic exposures of the skull, spinal column, chest, abdomen, extremities, and other body parts.

Applications can be performed with the patient sitting, standing, or lying in the prone or supine position.

Contraindication:

There are no contraindications for the use of X-radiation for diagnostic purposes provided the practitioner is able to exercise judgment and justify the use of radiation.

1.4. Safety requirement

This manual provides guidelines for the safe use and operation of this medical radiographic system. The operator should be trained in the use of this equipment and refer to this manual in conjunction with that training.

It is owner's responsibility to ensure that the system is operated by properly trained and qualified personnel who have obtained credentials from local, state, and federal authorities (where required). Potential hazards exist in the use of medical electronic devices and X-ray systems. All users and operators must understand all safety and emergency procedures and operating instructions found in

this manual.

This product is in compliance with the following standards:

1.EN 60601-1:2006/A1:2013 Medical electrical equipment - Part 1: General requirements for basic safety and essential performance

2.EN60601-1-2:2015 Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests.

3.EN60601-2-54:2009 Medical electrical equipment - Part 2-54: Particular requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy

4.EN60601-1-3:2008/A11:2016 Medical electrical equipment - Part 1-3: General requirements for basic safety and essential performance - Collateral Standard: Radiation protection in diagnostic X-ray equipment

5. EN 60825-1: 2007 Safety of laser products -Part 1: Equipment classification and requirements

POSKOM and its distributors assume no responsibility or liability for post-sales operating and safety practices, nor can it be responsible for personal injury or damage resulting from misuse of its X-ray systems. Please direct any questions and comments regarding safety issues to POSKOM's service organizations or a local distributor.

1.5. Cautions & Warnings

Possible hazards are associated with the improper operation of x-ray equipment. These hazards are described on the following warning or caution signs with the appropriate safety precautions.



WARNING

This manual is intended for use by radiologists, x-ray technicians and other certified medical professionals trained in the use of this type of x-ray equipment.



CAUTION

Excessive X-ray radiation may be dangerous to patients and operators unless the following safety regulations are strictly observed.

1.6. Product life

The HUM-20BT X-ray unit is designed for a service life of 7 years.

1.7. Disposal

1) Notice for disposal

All the components and electronic and electrical units should be returned to the original manufacturer for scrapping.



This equipment and its accessories are to be disposed of safely. Please abide by all local, regional and federal regulations when disposing this unit.

This equipment and its accessories are to be disposed of accordingly by the regulations outlined in your area or consult a specialized waste service company to dispose of it properly.

1.8. CLASSIFICATION

The X-Ray Unit covered by this Operation Manual is classified as:

- ☐ Protection against Electric Shock: Class I -- Type B device under IEC 60601-1 standard.
- ☐ Protection against Harmful Ingress of Water: Ordinary.
- ☐ Degree of Safety in the presence of Flammable Anesthetics Mixture with air or with oxygen or with nitrous oxide: Not suitable for use in the presence of Flammable Anesthetics Mixture with air or with oxygen or with nitrous oxide.
- ☐ Mode of Operation: Continuous with intermittent loading.

1.9. Essential Performance

- 1) The error in the indicated value of the X-ray tube voltage, in any combination of loading factors, shall not be greater than 10%.
- 2) The error in the indicated value of the X-ray tube current, in any combination of loading factors, shall not be greater than 20%.
- 3) The error in the indicated value of the X-ray tube loading time, in any combination of loading factors, shall not be greater than $\pm(10\%+1\text{ms})$.
- 4) The error in the indicated value of the X-ray tube current time product, in any combination of loading factors, shall not be greater than $\pm(10\%+0.2\text{mAs})$.
- 5) The coefficient of variation of measured values of air kerma shall not be greater than 0.05 for any combination of loading factors.

Note: The device fundamental performance shall be tested once a year contacting POSKOM service or a qualified agent.

2. Operational safety

2.1. Safe Use

Expected service-life of POSKOM X-ray units is 7 years. Please see the manufacture date on the device label.

2.2. General Rules for Safe Use

The user's safety, ease of operation and product reliability were our major concerns when designing this X-ray system. We highly recommend observing the following instructions and guidelines for your additional safety when operating this equipment:

- (1) This product should be operated only by or under the supervision of a properly trained and qualified professional.
- (2) The HUM-20BT is designed for radiographic uses only and not intended for fluoroscopic use or other associated applications.
- (3) The HUM-20BT should be used for the diagnosis purposes and is not intended for therapy of any kind.
- (4) The HUM-20BT is specified as Class1, type B and IPX0 equipment under EN 60601-1 standards.



CAUTION

This equipment is not protected against ingress of water or liquid.

- (5) Do not make any modifications to this equipment. **Any modification made to this unit without the express authorization of POSKOM or an authorized dealer will void your warranty.** If any modifications are required, please contact POSKOM or an authorized dealer immediately for service.
- (6) This system has been calibrated for optimal operation.
- (7) If you experience any problems with this equipment, turn off the power immediately and notify POSKOM or an authorized dealer of assistance and/or service.
- (8) Before connecting this device to any secondary device made by other manufacturers, please contact POSKOM or an authorized dealer for compatibility instructions.
- (9) This equipment has been tested and found to comply with the limits for medical devices to the EN 60601-1:2006/A1:2013, EN 60601-1-2:2015, EN 60601-3:2008/A11:2016, and EN 60601-2-54:2009
- (10) Do not use in the presence of a flammable anesthetic mixture with air or with Oxygen or Nitrous Oxide
- (11) Not to be immersed in water.
- (12) Do not touch signal input, signal output or other connectors, and the patient simultaneously.

- (13) Do not expose the device to strong shocks or vibrations.
- (14) X-radiation may be interrupted by strong electromagnetic interference. Do not use X-ray equipment at not suitable environment e.g. near active HF surgical equipment and the RF shield room of an ME System for magnetic resonance imaging, where the intensity of EM disturbances is high

Checking before operating

-  Make sure this unit is connected to a well-grounded power supply.

NOTE

- Due to the essential performance and intended use of the device, testing for immunity to electromagnetic disturbances was performed. The device may be susceptible at levels below IEC60601-1-2 immunity test levels. Refer to '1.9 Essential Performance' of the X-ray units. One of Error Codes among #10 to #19 shown in '4. ERROR CODES & COUNTERMEASURES' will appear, if the Essential Performance is lost or degraded due to EM disturbances.

2.3. Electromagnetic compatibility (EMC) information

(1) General

HUM-20BT X-ray Units fulfill the requirements on electromagnetic compatibility according to EN 60601-1-2:2015 (Ed. 4). The equipment is built so that the generation and emission of electromagnetic interference is limited to the extent that other devices are not disturbed in their use in accordance with the regulations and so that the equipment itself is suitably immune to electromagnetic interference in hospitals, transports and home healthcare use environment.

- (1) If any interference is produced from the device (confirmed by switching the device power switch state), the user (or a qualified service person) should use one or more of the following means to fix the problem:
 - (a) Redefine the orientation to place or relocate the affected device.
 - (b) Increase the distance between the device and the affected device.
 - (c) The power supply for the device shall be changed to another one different from the power supply for the affected device.
 - (d) For more advices, please contact the sales agent or the service representative.
- (2) To reduce potential interference, do not try to alter the device without our authorization.
- (3) Do not use any devices for transmitting RF signals (mobile phones, transmitters, or wireless control products) near the device, otherwise it may result in device performance beyond the published specifications.



WARNING

Portable and mobile RF communication equipment can affect the X-ray Unit. Electrical medical devices and systems are subject to special EMC measures. Third-party devices may only be connected in compliance with the EN 60601-1 standard.



WARNING

The EMISSIONS characteristics of this equipment make it suitable for use in professional healthcare facilities and in a residential environment (for which CISPR 11 class B is normally required). Nevertheless, this equipment may not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.



CAUTION

This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation.

(2) Essential performance

Essential performance (purpose of immunity testing)

Unless the exposure switch is pressed, X-ray is not exposed.

(3) Electromagnetic emissions

These X-ray Units are intended for use in the electromagnetic environment specified below. The customer or the user of HUM-20BT should assure that it is used in such an environment.

Table 1 – based on IEC 60601-1-2:2014		
Guidance and manufacturer's declaration – electromagnetic emissions – HUM-20BT K, HUM-20BT, PXM-20BT PLUS, PXM-40BT PLUS		
These X-ray Units are intended for use in the electromagnetic environment specified below. The customer or the user of HUM-20BT K, HUM-20BT, PXM-20BT PLUS, PXM-40BT PLUS should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment – guidelines
RF emissions CISPR 11.	Group 1.	The POSKOM Portable X-ray Unit uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause interference in nearby electronic equipment. The RF emissions characteristic of POSKOM Portable X-ray Unit make it suitable for use in hospitals, transport and home healthcare use environments.
RF emissions CISPR 11.	Class B	
Harmonic emissions IEC 61000-3-2.	Not applicable	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Not applicable	

(4) Electromagnetic immunity

These X-ray Units are intended for use in the electromagnetic environment specified below. The customer or the user of HUM-20BT should assure that it is used in such an environment.

Table 4 – based on IEC 60601-1-2:2014			
Guidance and manufacturer's declaration – electromagnetic emissions – HUM-20BT K, HUM-20BT, PXM-20BT PLUS, PXM-40BT PLUS			
These X-ray Units are intended for use in the electromagnetic environment specified below. The customer or the user of HUM-20BT K, HUM-20BT, PXM-20BT PLUS, PXM-40BT PLUS should assure that it is used in such an environment.			
Immunity test	EC 60601 test level	Compliance level	Electromagnetic environment-guidelines
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 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%.
Radiated RF EM fields IEC 61000-4-3	10 V/m 80 MHz – 2.7 GHz 80% AM at 1 kHz	10 V/m 80 MHz – 2.7 GHz 80% AM at 1 kHz	Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ (80MHz to 800MHz) $d = 2.3\sqrt{P}$ (800MHz to 2.7GHz) where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meter (m).

Rated power frequency magnetic fields IEC 61000-4-8	30 A/m – 50 or 60 Hz	30 A/m – 50 Hz or 60 Hz	Power frequency magnetic fields should be at least characteristic of a typical location in a typical commercial or hospital environment.
Enclosure port immunity IEC 61000-4-3	IEC 60601-1-2;2014 Table 9	IEC 60601-1-2;2014 Table 9	Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol:

Recommended separation distances between portable and mobile RF communications equipment and X-ray Unit. The healthcare professional or the user of X-ray Unit can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and X-ray Unit as recommended below, according to the maximum output power of the communications equipment.

Separation distance according to frequency of transmitter (m)

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150kHz to 80MHz $d = 1.2\sqrt{P}$	80MHz to 800MHz $d = 0.35$	800MHz to 2.7GHz $d = 0.7\sqrt{P}$
0.01	N/A	0.04	0.07
0.1	N/A	0.11	0.22
1	N/A	0.35	0.7
10	N/A	1.11	2.21
100	N/A	3.5	7

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meter (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by adsorption and reflection from structures, objects and people.

(5) Battery



CAUTION

Failure to properly abide by the following instructions may lead to personal injury or permanent damage of your battery and x-ray unit.

- (1) Consumed batteries should be disposed of properly. Please check local laws and ordinances regarding the proper and safe disposal of batteries.
- (2) Only use batteries pre-approved and designated by POSKOM in this device.
- (3) Avoid contact with foreign metal objects during storage or transport of the battery. Excessive current from direct contact with metal objects can permanently damage the battery.

- (4) Batteries are not alterable or replaceable by the end user. Approved replacement batteries are only available through POSKOM and its authorized dealers and may only be serviced by POSKOM or an approved POSKOM service agency. Unapproved batteries have the potential danger of damaging the device and should not be attempted.
- (5) Do not subject batteries to excessive heat.

(6) IMPORTANT Battery Maintenance and User's Safety Instructions

- (1) Charge your Lithium-Ion batteries to full capacity before beginning use of your unit in battery mode.
- (2) Try to use the Lithium-Ion battery every 2-3 weeks.
- (3) Keep Lithium-Ion batteries at a minimum 30% charge when not in use.
- (4) Charge Lithium-Ion batteries regularly and at the end of every day of use.
- (5) Avoid regularly running Lithium-Ion batteries too low (below a 30% charge).
- (6) Unplug your unit from the charger after the battery is fully charged.
- (7) Never leave Lithium-Ion batteries discharged for any lengthy period of time as the batteries will self-discharge when not in use and over time, the charge could drop low enough to damage the battery permanently.
- (8) Keep lithium-Ion batteries away from high heat. High heat may cause premature battery failure and the battery to explode or catch fire. DO NOT leave this battery powered unit in a closed vehicle in direct sunlight or any other potential high heat areas.

(7) Laser pointer

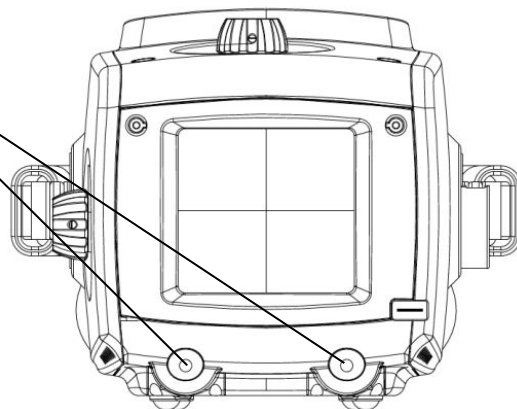


CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- (1) The laser beam is emitted from the front of HUM-20BT
- (2) Do not place the laser pointer for direct eye exposure.
- (3) Do not stare into the beam.
- (4) Do not view directly with optical instruments.

*laser pointer



3. Operating environment

3.1. For proper operation and the longevity of your system, please avoid exposing this equipment to the following conditions:

- (1) Exposure to water vapor.
- (2) Direct exposure to sunlight for prolonged periods of time.
- (3) Exposure to heavy air contaminants and/or dust.
- (4) Exposure to high humidity conditions.
- (5) Areas with poor air circulation and/or ventilation.
- (6) Exposure to a salty atmosphere.
- (7) Exposure to corrosive gases or harsh chemicals.

3.2. Keep a safe distance away from strong vibrations. Operate and store in a cool, dry environment.

Operational Environment

Temperature range	10°C ~ 40°C (50°F ~ 104°F)
Humidity range	30% ~ 75%RH
Atmosphere Range	700 ~ 1060hPa

Optimal Working Environment

Temperature range	17°C ~ 23°C (63°F ~ 73°F)
Humidity range	40% ~ 60%RH
Atmosphere Range	700 ~ 1060hPa

4. Radiation safety

**CAUTION**

Ionized radiation produced by the unit may be hazardous to patients and operators unless the following safety regulations are strictly observed.

- 1) Users and operators are required to wear appropriate protective clothing and gear.
- 2) Users and operators are required to leave a minimum safe distance from any radiant source and secondary radiation zones.
- 3) Users and operators are required to eliminate all unnecessary objects near the exposure areas.
- 4) Users and operators are required to leave a minimum safe distance of 2m from the target.
- 5) Users and operators are requested to use minimum kV and mAs values for experimental use.
- 6) Users and operators are requested to use caution and not to exceed the appropriate radiograms in the exposure area.

**CAUTION**

in case of less than 30% lithium ion battery remains, as the guidelines of this manual about the previously mentioned battery remains might be different , you are cordially required to use the battery by charging more than 60%.

5. System configuration

This device consists of the following components: Portable X-ray Unit (include Hand-switch)

These components are only provided by the manufacturer (POSKOM). The unit is for generating accurate X-ray source for diagnosis only, and X-ray cassette or FPD for receiving X-ray images can be provided on the request of purchase. The user can purchase X-ray cassette and/or FPD as a patient applied part.

HUM-20BT consists of following parts and devices. The following items should be firmly fixed and connected for proper functionality:

- 1) HUM-20BT components
 - A. Operation Panel
 - B. DRV BOARD (INVERTER)
 - C. HV Tank including X-ray Tube
 - D. LED Collimator
 - E. Hand Switch
 - F. Battery
- 2) Supplement
 - A. Carrying Case
 - B. Operation & Service Manual
 - C. AC Cord & Adapter

6. Specification

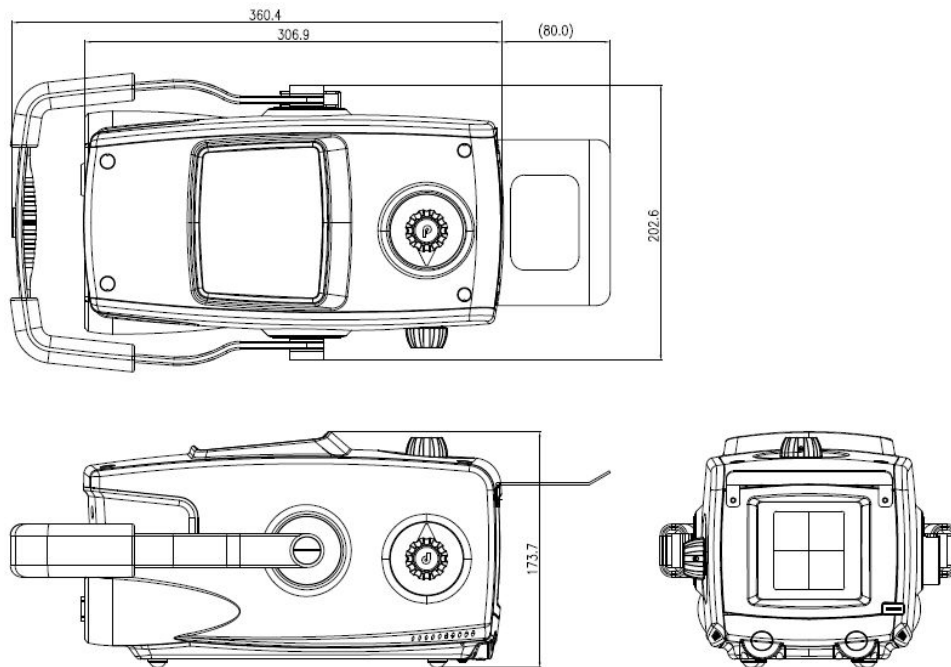
6.1. ELECTRONIC SPECIFICATION

Contents		Specification
Input Power	Equipment power supply	DC 16.8V $\pm$ 0.1 V / 1.5 A
	Charger power supply	100~240 VAC, 50/60 Hz
	MODEL	PK-LCH-AD22
Output Power	Max. Output	1.6 kW
	Max. kV / mA	90 kV / 20 mA
Tube Voltage Range [kV]		50 ~ 90 kV in 1kV steps
mAs Range [mAs]		0.4 ~ 20 mAs in 25 steps 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.9, 3.2, 3.6, 4.0, 4.5, 5.0, 6.4, 8.0, 9.0, 10, 12, 15, 18, 20
Tube current [mA]		20mA (50 ~ 80kV / 0.4 ~ 3.2mAs) 10mA (50 ~ 80kV / 3.6 ~ 20mAs) 15mA (81 ~ 90kV / 0.4 ~ 3.2mAs) 8mA (81 ~ 90kV / 3.6 ~ 20mAs)
APR(Anatomical Programmed Radiography)		15 Memories
Max. Deviation	kV	$\pm 7\%$
	mAs	$\pm 7\%$
Indication		kV / mAs : 7-Segment LED
X-ray Tube	Model name	OX/70 (C.E.I.)
	Focal Spot Size	1.2 mm
	Target Angle	19 degree
	Inherent Filtration	0.5 mmAl
	Anode Heat Content	10 kJ
Collimator with Laser Pointer	Type	Double slit type, Manually operation
	Min. X-ray Field Size	$\leq 5 \times 5$ cm @ 100 cm SID
	Max. X-ray Field Size	$\leq 47 \times 47$ cm @ 100 cm SID
	Laser pointer	Class 2, Maximum output < 1.0 mW, Wavelength 655 ± 10 nm
	Timer	30 sec
	Lamp	3.3 V LED Lamp
Total Filtration		Min. 3.0 mm Al
Dimension		307 X 173.7 X 202.6
Weight		6.8 kg
BATTERY		Lithium Polymer 14.8 V 5000 mAh

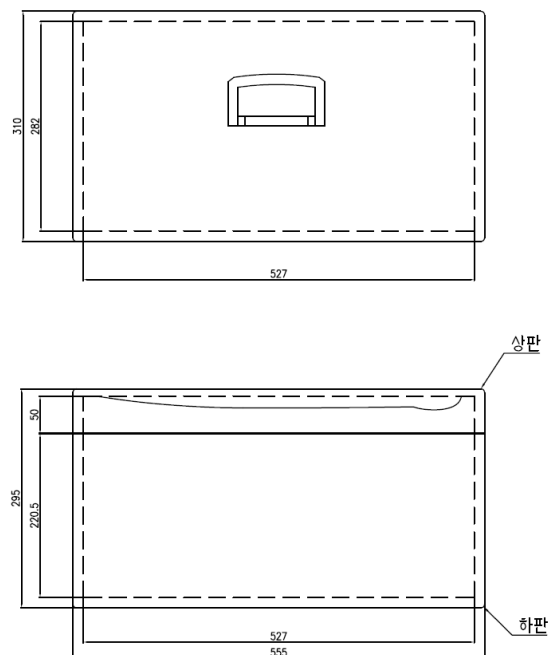
[Table 1. Specifications of Unit]

6.2. Main Body and Carrying Case

(1) Main Body



(2) Carrying Case

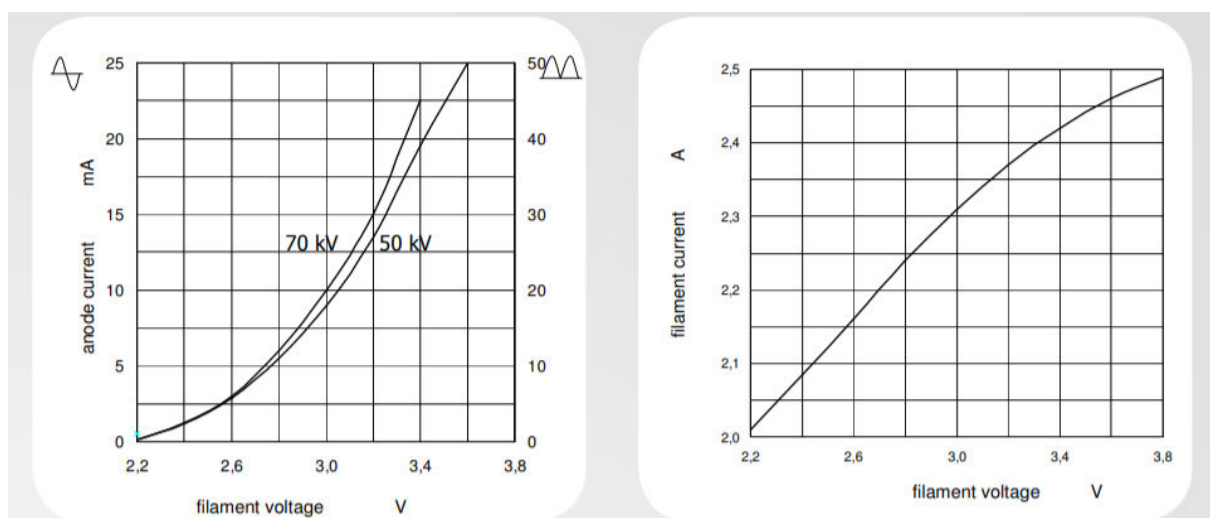


3) X-ray Tube Specifications

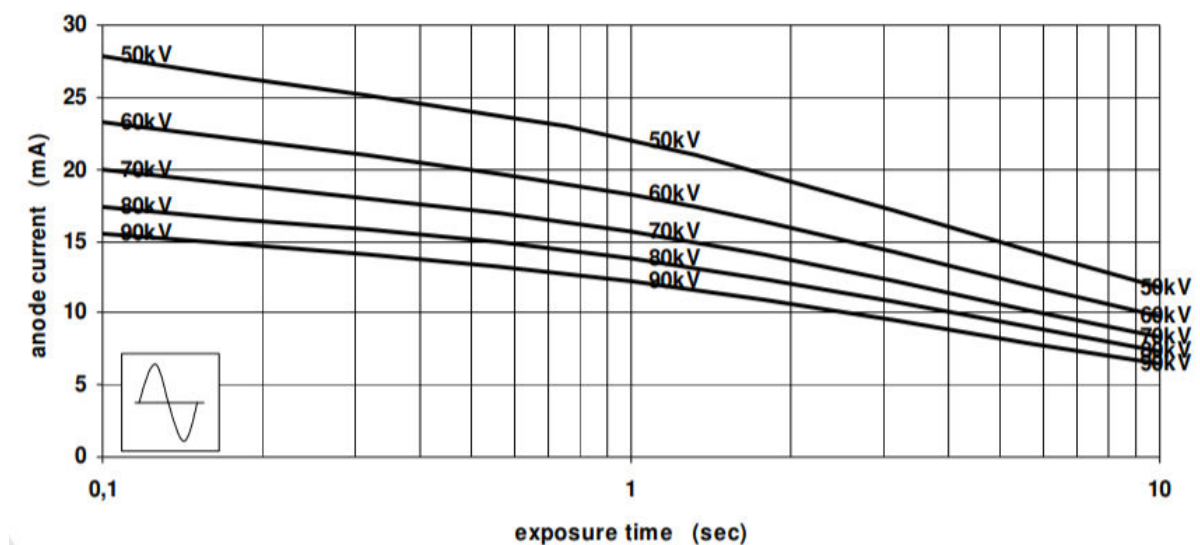
(1) General details

- A. kV scope(Max. kV): 50 – 100 kV
- B. Focal spot size: 1.2 mm
- C. Heat Storage: 10 kJ
- D. Cooling rate: 110 W
- E. Inherent Filtration: 0.5 mmAl
- F. Target angle: 19°

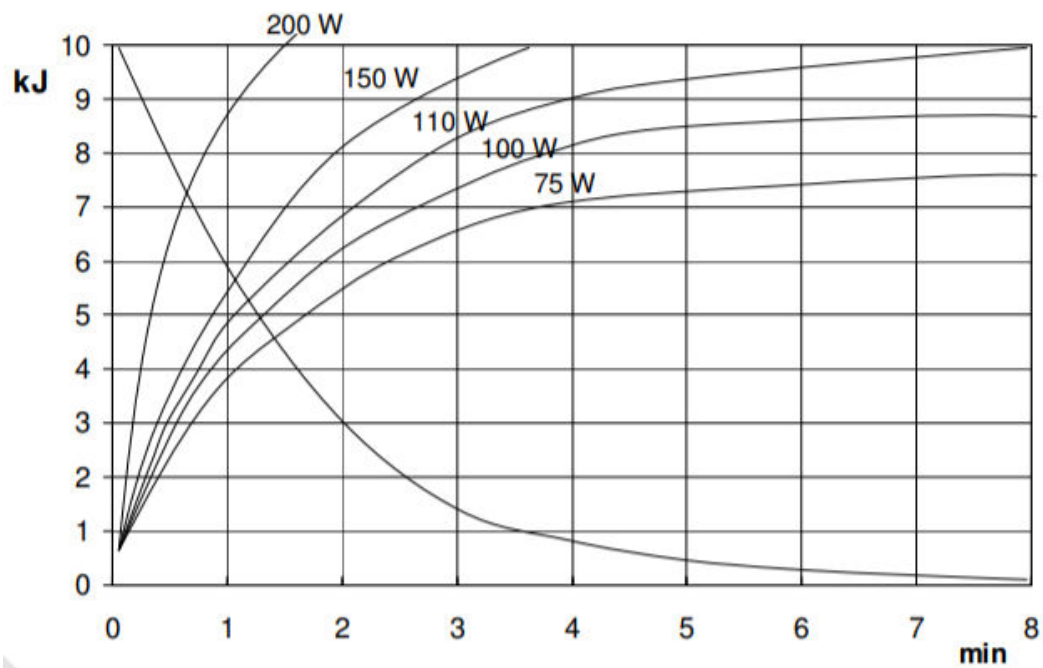
(2) Filament And Emission characteristics



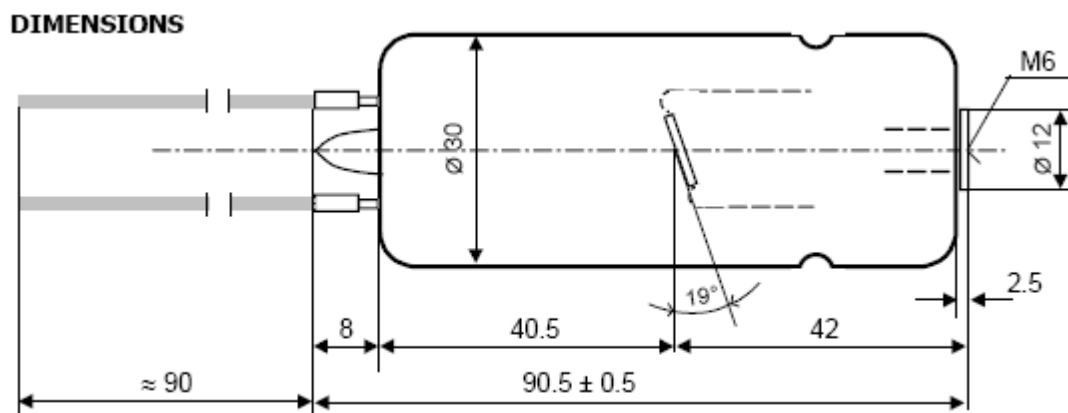
(3) Rating Charts



(4) Anode Heat characteristic curve

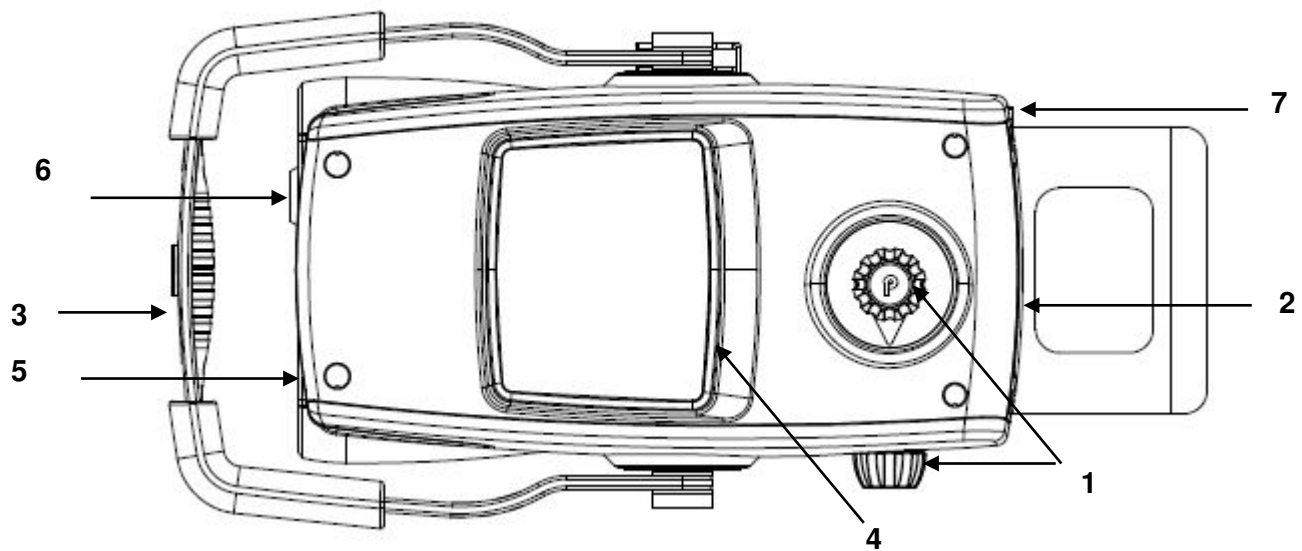


(5) Dimension



7. Parts description

7.1. Part Names



(1)	Collimator knob
(2)	Collimator
(3)	Handle
(4)	Operation panel
(5)	Battery charge connector
(6)	Hand switch connector
(7)	Measuring Tape

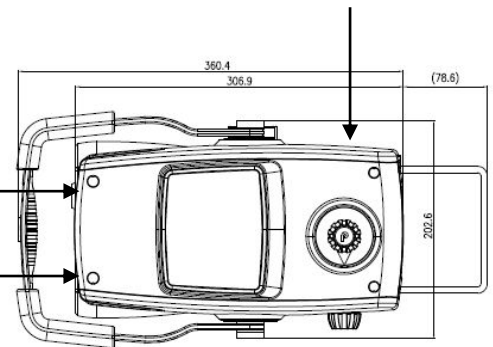
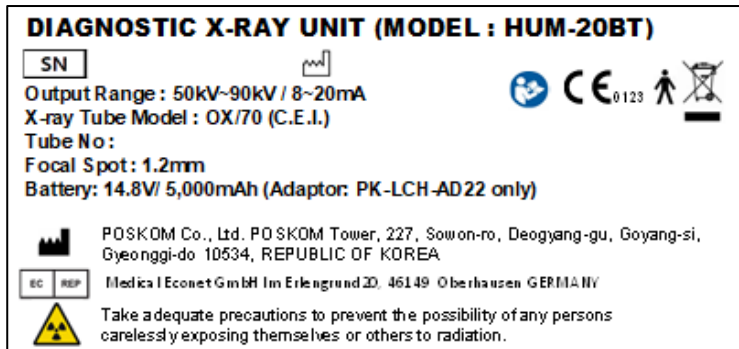
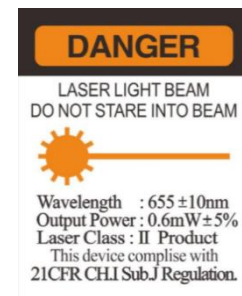
7.2. OP Console and panel display



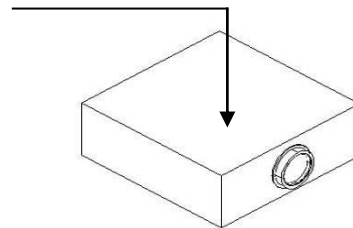
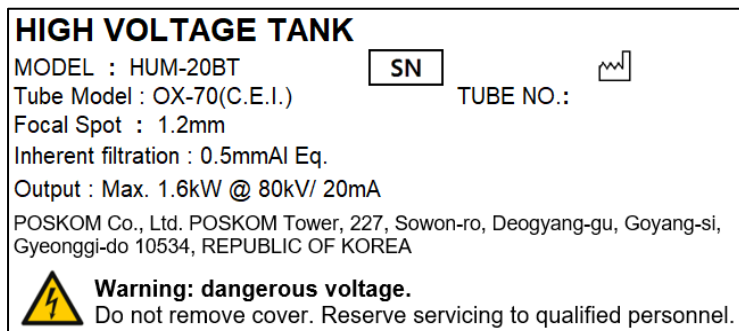
No.	Name	Description
1	kV Control Switch	Select kV value by up or down buttons
2	mAs Control Switch	Select mAs value by up or down buttons
3	APR Store Switch	Save the selected APR Data
4	Lamp/Laser Switch	Switch for operation of the lamp / laser inside the collimator
5	Ready Lamp	Lighted when you push the hand switch one time for preparation
6	Exposure Lamp	Alert lamp during X-ray exposure
7	Wait Lamp	Lighted until the second exposure started
8	On / Off Switch	Switch for Turn device On / Off
9	Battery Leftover Display	Displays battery charge level
10	APR Selection Switch	Memory setting is available for APR data
11	Reverse Display	Help to read LED value of kV, mAs reversed
12	Fast Exposure Switch (optional)	Switch for activate fast exposure mode.

7.3. Label Attachment Location

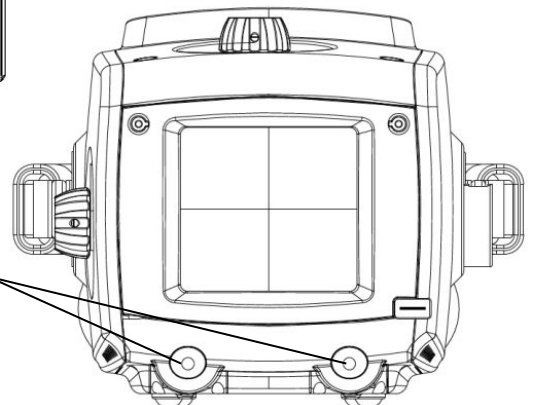
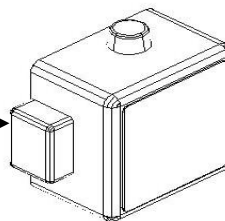
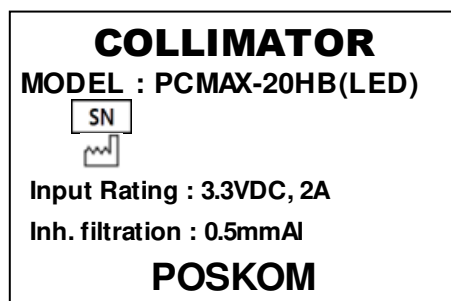
Warning: This X-ray unit maybe dangerous to patients and operators unless safe exposure procedures and operational instructions are observed.



(2) High-Voltage Generator Label



(3) LED Collimator Label



8. Operation

8.1. Operational preparations

- (1) Always wear a lead apron during x-ray exposures.
- (2) Please leave at least 2 meters ($\approx$ 6.5 feet) between the operator and the unit. Use the supplied extended hand switch cable in order to keep minimum safe distance from the unit.
- (3) Use the proper beam size and technical values to produce the best radiographic results while minimizing exposure dose.
- (4) Please make special note of the decimal point on the mAs display in order to acquire the appropriate intended mAs values.
- (5) During indoor radiographic use, remember to keep all bystanders at a minimum safe distance and use the appropriate safety gear while producing exposures.
- (6) Please pay attention to the proper management and regular maintenance of this equipment.
- (7) Cumulative doses of radiation are a serious hazard to patients and users of this device. Please observe the guidelines set forth by your local authorities regarding additional requirement for protective devices when dealing with machines producing high kV and mAs radiation values.



WARNING

Check to see that the voltage and current of the power supply match the figures written on the device's labels on the body of the machine. The voltage levels must be within $\pm 0.1V$ of the stated values.



CAUTION

Please check the connection between the power cable and the other cables before operating the equipment and producing exposures.



WARNING

In case of any trouble, power down the unit immediately and contact POSKOM or an authorized distributor.

8.2. Positioning of patient

- A. Place the loaded cassette on the patient's backside.
- B. Arrange the SID (Focal Spot to Image Receptor Distance) with measuring tape.
- C. Turn on the collimator laser pointer with the "Laser Pointer Switch."
- D. Arrange the beam size according to the scale of the X-ray film with the collimator knob.
- E. Collimator and laser pointers will turn off automatically.



CAUTION

During initial installation or operation after a long period of non-use, pre-heating procedures are highly recommended to insure the safety and longevity of the X-ray tube. Follow these pre-heating instructions:

Operate the machine with low kV values (50kV 5mAs) three times in row.

Follow this up with higher value [70kV 5mAs] exposures again, three times in row.

9. How to operate

9.1. General Mode

- A. Open the carrying case and make sure all the parts are accounted for and there is no damage to your device.
- B. Connect the hand switch to HUM-20BT's main body via the provided hand switch cord.



CAUTION

Third party parts (i.e. adaptors, hand switches, etc.) are not compatible and cannot be used with this equipment (except those provided by POSKOM and its affiliates).

- C. Startup display:



- D. The "Wait LED" will be lit while the Ultra Capacitor is charging.
- E. Select your kV value via the kV up/down switch. You can quickly scroll up/down these values by holding the key down.
- F. Select your mAs value via the mAs up/down switch.
- G. After inputting your values, push the hand switch to the "first step" position of the 2 step controls and your unit is ready for the exposure.
- H. When the "Ready Lamp" is lit, push the hand switch to the "second step" position of hand switch and produce your exposure. During the exposure, the "Exposure Lamp" will be lit.
- I. After the exposure, the Ultra-Capacitor will recharge and the "Wait Lamp" will again be lit.

9.2. APR Mode

A. After turning your unit on, the below display will appear:



B. Select 1-5 APR switch. (15EA APR available)

Switch Combination : 1, 1+2, 1+3, 1+4, 1+5, 2, 2+3, 2+4, 2+5, 3, 3+4, 3+5, 4, 4+5, 5

C. Select the kV value by pressing the kV up/down switch.

D. Select the mAs value by pressing the mAs up/down switch.

E. Store selected kV/mAs value by pushing the “STORE” button.

F. After properly positioning your device in relation to the patient, use the hand switch in “Prep Mode” by pushing Hand switch to the 1st (Ready) step.

G. When the “Ready Lamp” is ON, push the hand switch to the 2nd step to expose.

During the exposure, the “Exposure Lamp” will be lit.

H. After the exposure, the capacitor will need a moment to recharge and the “Wait Lamp” will be lit.

I. After selecting another APR the unit will return to “Normal Mode.”



REFERENCE

When selecting an APR Mode, the latest memory setting will be recalled and displayed automatically.

9.3. DAP Display



A. After X-ray emitted, display exposure dose for 1 sec. (unit: $\mu\text{Gy}\cdot\text{m}^2$)

B. Press display reversal switch for 3 Sec. to display previous kV, mA, sec, DAP value.

10. Remote control function & operation

10.1. Introduction

The exposure hand switch consists of two steps hand switch. The 1st step of the hand switch is called the Preparation (PREP or Ready) step. The 2nd step of the hand switch is called the Exposure (Exp. or X-ray out) step.

All of remote control functions are operated by depressing the first stage of the hand switch (Ready Step). Further explanation on each function and the setting of technical values are as follows:



10.2. Remote control mode

The kV and mAs setting, memory selection and collimator lamp is controlled remotely by the hand switch by pressing the PREP mode as seen below:





ATTENTION

Click the “Prep.” hand switch three (3) times consecutively. This will allow you to enter in the “remote hand control” menu mode for operation.

<TRIPLE CLICK>

10.3. Memory selection

When you click the PREP stage hand switch rapidly three (3) times, the Pre-set Memory station LED (PXPM-40BT PLUS: 1-6) and the kV and mAs LED readouts will blink sequentially. Make a single (1) click with the hand switch when the desired pre-set memory station lamp begins to blink. This will cause the pre-set memory data to be selected and displayed in the control LCD window.

NOTE

All pre-set memory data should be entered and stored at each memory station (HUM-20BT PLUS: 1-4), prior to performing the above mode of operation.

10.4. kV selection

One (1) click of the “Prep” switch will cause the kV LED readout to blink. You will now be in the kV selection menu mode. The kV values increase by one (1) kV unit per click of the “Prep.” switch. If you depress and hold the prep switch for a few second, the kV readout will increases rapidly up to the maximum value (100kV). The kV readout will circulate from lowest to highest values as long as you hold and press the button. When the desired kV readout appears on the control display panel, release the prep hand switch and wait for a few seconds. The kV value will set up automatically.

10.5. mAs selection

mAs selection is similar to the kV selection mode. Click the “Prep.” hand switch once to make the mAs LED readout blink. You will be in the mAs selection menu mode. The mAs value will increase with each click of the “Prep.” switch (0.4 mAs to the maximum mAs of each portable X-ray unit). If you wish to increase the mAs value quickly, simply hold the “Prep” switch down one stage. The mAs readout will circulate as long as you hold the “Prep.” switch. When the desired mAs readout appears on the control display panel, release the prep hand switch and wait for a few seconds. Then mAs value will set automatically.



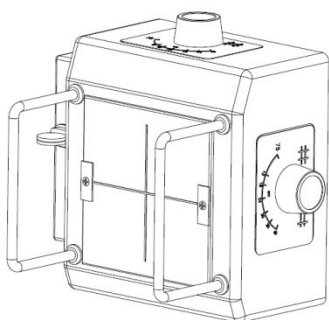
ATTENTION

Double click the Prep. stage of the hand switch. The collimator lamp and laser pointer beam will illuminate for X-ray exposure positioning.

<DOUBLE CLICK>

With the exposure technique (mAs & kV) set with your remote hand switch, you are ready to make a radiographic exposure for examination. It is very important to position the right region of interest on a patient's anatomy. Therefore, the collimator beam must be turned on to confirm the size of region and size of film covered. When the PREP step switch is rapidly clicked twice, the collimator lamp will turn on simultaneously until the lamp timer (30 seconds) runs off.

However, it will turn off automatically when X-ray exposure sequence is completed.



Collimator is supplied with a SID guard.

Collimator Lamp: Collimator lamp is provided with a thermal protection that may reduce the lighting time of the lamp and even turn the light Off in case it is On for an excessive period of time. In case this happens, stop using the Unit for 1 minute before turning On Collimator lamp again.



WARNING

Prolonged lighting of the lamp will produce overheating in the collimator internal area unless the lamp is allowed to cool.

Collimator Lamp with Laser Positioner: After pressing the Collimator Lamp push-button, laser light points at the patient and after one second later, the Collimator Lamp lights. They remain lighting for 30 seconds before they switch off automatically.

Collimator Control Knobs: These knobs are used to open or close the Collimator blades in order to limit the X-ray beam. The final image film may be checked switching on the Collimator Lamp.

The table on the Collimator shows the number to be set with the knobs to open the blades according to the SID (Source-Image Distance) and film size to be used.



CAUTION

In order to apply the lowest Dose to patient, it is recommended to use the larger SID that film size allows.

Image/Reception Area: The collimator projects a lighted area with reference axis on the image reception area that coincides with X-ray projection area.

10.6. X-ray exposure

WARNING

Minor radiation scattering may occur while X-rays are being exposed. Operators and patients should always wear a lead apron and any other protective gear as required by law.

After the X-ray exposure technique is selected and collimator light beam size is adjusted with the collimator blade knob, an X-ray exposure may be produced. All X-ray exposures should only be produced by a qualified medical professional.



< 1st step >



< 2nd step >

X-RAY EXPOSURE SEQUENCE:

- A. Press the Prep. hand switch (1st stage) and hold
- B. Press down the 2nd stage hand switch. Exposure will be made automatically by the exposure timer.

10.7. Remote control override

NOTE TO THE USER

All of the before mentioned remote control hand switch functions and operations can also be accomplished via the one-touch control panel. All exposure functions and parameters can be overridden through the main control panel prior to final exposure.

(See user's manual for directions on how to use the main control panel)

11. Cleaning and disinfection

The following cleaning solutions will not harm the models HUM-20BT K, HUM-20BT, PXM-20BT PLUS, PXM-40BT PLUS X-ray Units.

- Gentle dish soap and water
- Dry microfiber cleaning cloth or a chamois (static-free cloth without oil)
- Static-free cloth wipes

A. Never use anything other than soap and water to clean plastic surfaces. Other cleaners may damage the plastic.

B. Never use any corrosive, solvent or abrasive detergents or polishes.

C. Ensure that no water or other liquid can enter any equipment. This precaution prevents short circuits and corrosion forming on components.

D. Methods of disinfection used must conform to legal regulations and guidelines regarding disinfection and explosion protection.

E. If disinfectants are used which form explosive mixtures of gases, these gases must have evaporated before switching on the equipment again.

F. Disinfection by spraying is not recommended because the disinfectant may enter the X-ray equipment.

G. If room disinfection is done with an atomizer, it is recommended that the equipment be switched OFF, allowed to cool down and covered with a plastic sheet. When the disinfectant mist has subsided, the plastic sheet may be removed and the equipment be disinfected by wiping.

Physical Inspection:

Any negative findings should be brought to the attention of the Asset Manager so appropriate action may be taken and, if necessary, informed to the responsible service engineer or POSKOM.

12. Storage, transport and package

12.1. Storage and transport:

- (1) Ambient temperature: -20 °C ~ 55 °C
- (2) Relative humidity: ≤ 93%
- (3) Atmospheric pressure: 500hPa ~ 1060hPa
- (4) No corrosive gases, good ventilation Indoors
- (5) Transport requirements are as required by the contract, and package symbols are compliant to requirements.
 - Intact devices can be transported by land freight or air freight in the original packaging. The applicable requirements must be met (see table below).
 - Defective devices can also be transported by air freight or land freight in the original packaging. If the battery is defective, the device must not be transported by air freight under any circumstances.
 - Indicators of defective battery are:
 - Liquid is leaking,
 - Swelling caused by a variety of non-ideal chemical reactions including: overcharge, elevated temperature aging, and moisture intrusion, and
 - air cargo incidents are caused by mechanical damage or external short circuiting of cells

Standards and regulations that apply to the transport of POSKOM Battery Type X-ray Unit

	Air Freight	Land Freight
Intact device or defective device with intact battery	- UN 3481 Lithium batteries in equipment - IATA Packing instruction 967 Part 11 - Special regulations issued by airlines and national regulations must be complied with	- UN 3481 Lithium batteries in equipment - ADR Special provisions 188 f) and g)
Device with defective battery	Not possible	- International, multilateral agreements M 228 and M 259 - ADR SV 661 (international, road) - Regulations issued by GRS (German Joint Battery Take back System Foundation) for the transport of waste lithium batteries (FRG, road)

12.2. Package symbols

				
Recycled Package	UP	Fragile Handle with care	Use No Hand Hooks	Keep dry

12.3. Unpacking and check

- 1) The whole loading and unloading process shall be steady and slow. Handle carefully in transport and placement. No tilt, collision, flipping or vibration.
- 2) The unit should be placed in the direction according to the box symbol. Do not reverse the direction
- 3) Storage environment requirements: Temperature $-20^{\circ}\text{C} \sim 55^{\circ}\text{C}$, relative humidity $\leq 93\%$, no source of corrosion, or strong power supply.
- 4) Clean indoor environment with heat source.
- 5) The package cartons should be placed separately, no stacking.
- 6) After unpacking, check if the configuration is complete based on the packing list.

WARNING



In rain and foggy weather, the package cartons of the unit should be covered before handling, and placed in the indoor environment that meets the requirements above after unloading. Keep away from rain, fog invasion and the sun

13. Exclusion of liability

In the following cases the manufacturer declines all liability:

If you have any questions, contact your dealer or POSKOM.

- Use of POSKOM Portable X-ray Unit for purposes and applications that differ from the specific requirements made in this User Manual.
- Cleaning and disinfection methods contrary to the directions in this User Manual.
- Work or repairs performed by unauthorized persons.
- Rights under the warranty or statutory guarantee are rendered void if the device is opened without permission.
- have been caused by damage in transit to POSKOM/to a service partner authorized by POSKOM for the purpose of repair;
- have been caused by atmospheric events such as lightning strike, fire and moisture.

14. Disposal of the product

Comply with your national regulations, guidelines and requirements for the disposal of end-of-life electrical equipment and batteries. Specialist Medical Device dealers will be pleased to provide you with country-specific information concerning disposal.

Make sure the product and the battery are not mixed with other types of waste when it is being disposed of. Prior to disassembly and disposal your device must not be contaminated and must have been completely reprocessed (Cleaning/Disinfection).

PART II. SERVICE MANUAL

1. Notice

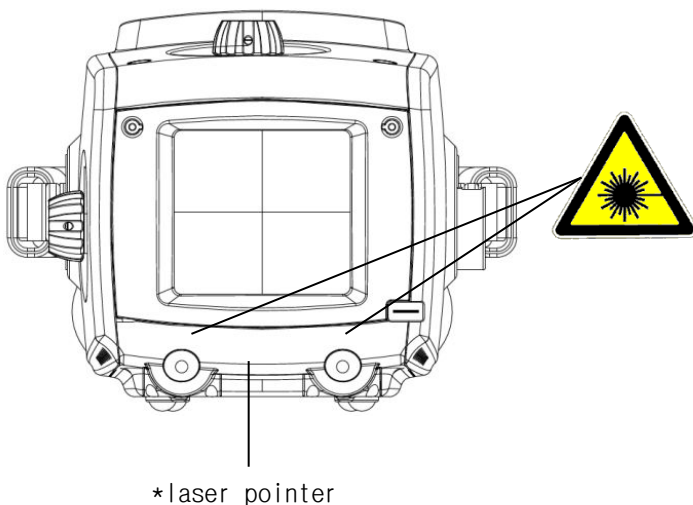
- 1.1. Please observe following protocols when calibrating your device between periodical inspections or repairs.



CAUTION

Ionized radiation may be dangerous to patients and operators unless the following safety regulations are strictly observed.

- 1.2. This manual is designed to ensure correct use and operation of the HUM-20BT. Please read this manual entirely before using this equipment.
- 1.3. Incorrect use and operation exceeding described conditions in this manual may cause permanent damage to this machine. Please pay special attention to all the warnings, cautions and notes incorporated herein.
- 1.4. This equipment should be used only by certified persons and practitioners.
- 1.5. Only use the AC cable and software developed and supplied by POSKOM.
- 1.6. POSKOM is not responsible for any infringement of patients or other rights for third parties alterations which many results from the misuse of this manual.
- 1.7. Always keep the manual for your reference.
- 1.8. Laser pointer
- 1) By pressing the lamp/laser switch [4], laser pointers are lighted.
 - 2) Do not place the laser pointer for direct eye exposure.
 - 3) Do not stare into the beam.



2. Regular maintenance

2.1. Overview

This device should be inspected regularly in accordance with the instructions described in this manual.

2.2. Periodical Inspections

- 1) Every 6 Month:
 - A. Check all visual displays: display readout windows (FNDs), LEDs and other indicators.
 - B. Check all functions: operation switches, collimator, laser pointer and program pad.
 - C. Check all calibrations in accordance with section 4 of this service manual.
 - D. Execute additional tests as required by local laws and regulations.
- 2) Every 12 Month:
 - A. Check for damages to the outer case and operation console, including all buttons.
 - B. Check cable connections to main body, hand switch cable, collimator cable and other connections.
 - C. Open the top cover and check for any visible damage including missing or loosened ground connections, oil leakage, damaged cables, etc.
 - D. Execute additional tests as required by local laws and regulations.



CAUTION

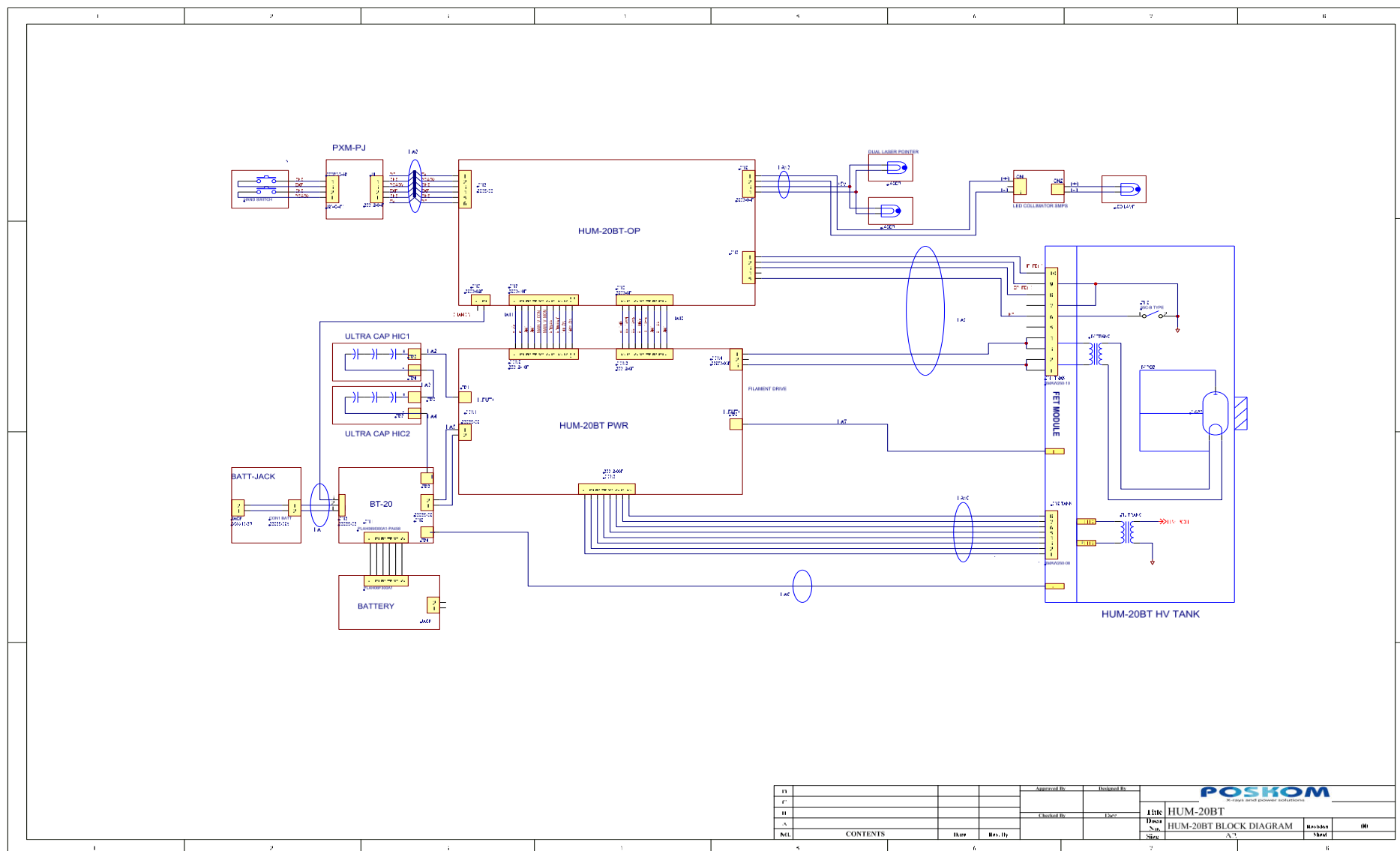
When cleaning, use a soft (microfiber) cloth. A slightly damp cloth may be used for excessive dirt. Harsh chemicals such as benzene should not be used in cleaning and may cause permanent damage to your device and its surfaces.



WARNING

This equipment should be handled and operated by certified persons and practitioners only.

3. Block diagram



4. Calibration

* Preparation

Following tools and instruments are required for technical calibration.

- 1) Tools: Screwdrivers (No.1 & 2), Straight slot screwdriver
- 2) Instruments: DVM, oscilloscope (Tektronix TDS 3032 or equivalent device)

4.1. Power Supply

- 1) The device should be turned off before beginning.
- 2) Turn on the device.

4.2. Calibration 3 step process:

- Tube kV confirmation and calibration
- Tube mA confirmation and calibration
- Filament Preheat Calibration

A. Tube kV confirmation and calibration

- Turn the power OFF.
- Make sure all DIP switches on OP B/D are in the OFF position.

(Note: DIP switches are normally in this position.)

- **Channel 1:** Connect your oscilloscope probe to TP12 (mA F/B) and GND (TP2)
- **Channel 2:** Connect your oscilloscope probe to TP8 (kV F/B) and GND (TP2).

Channel 1 : mA, 1V = 5mA

Channel 2 : kV, 1V = 20kV

- Initial display of the OP console:



- Set kV to 50kV and mAs to 0.4mAs (20mA), then check the mA waveform of Oscilloscope **Channel 1**.
- If Oscilloscope **Channel 1** is not at 4V (20mA), adjust the mA output via the Calibration Mode.
- Next, observe the kV waveform 50kV (2.5V) of Oscilloscope **Channel 2**.
- Set kV to 90kV and mAs to 0.4mAs (15mA), then observe the mA and kV waveforms of Oscilloscope **Channel 1 and 2**.
- If **Channel 1** is not at 3V (15mA), control the mA via the Calibration Mode.
- Next, observe the kV waveform 90kV (4.5V) of Oscilloscope **Channel 2**.



CAUTION

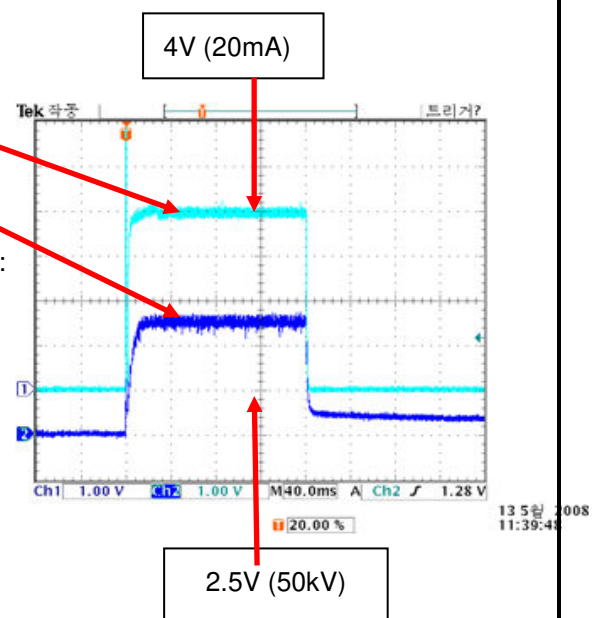
The kV value of **Channel 2** is auto-calibrated. There is no need for additional calibration.

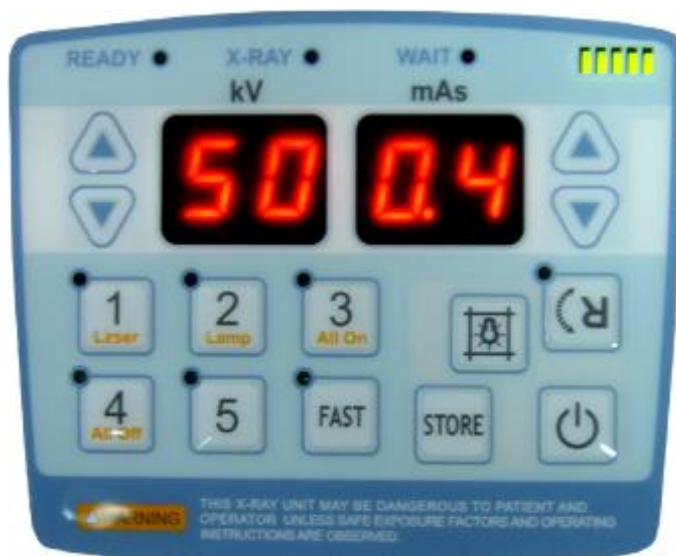
B. Tube kV confirmation and calibration

- Turn power OFF.
- Uncover the upper section where the OP board is attached.
- Check to see that OP Board SW1 DIP switch is OFF. (Note: This is the standard DIP switch position.)
- **Channel 1**: Connect oscilloscope probe to TP12 (mA F/B) and GND (TP2).
- **Channel 2**: Connect oscilloscope probe to TP8 (kV F/B) and GND (TP2).

Channel 1 : mA, 4V = 20mA
Channel 2 : kV, 2.5V = 50kV

As you turn the power on, the following display will be seen:





- Set kV to 50kV and mAs to 1.2mAs (20mA), then observe the mA waveform on oscilloscope Channel 1.
- If Channel 1 is not at 4V (20mA), the mA output may be adjusted on the OP B/D controls.
- Turn SW1 dip s/w pin 1 to the ON position (found on the soldered side of the OP board).

- kV indicator FND is displayed as "CX~CX".



Calibration Code Calibration Data

- Push the kV up switch. (Refer to the "OP sheet").
- You will see the following display:



Calibration Code Calibration Data

C1 is the calibration code of the tube current. (15mA at 81kV~90kV).

50 is the calibration value of the tube current. (15mA at 81kV~90kV).

- You can adjust the value by pressing the "mAs up/down" arrows. (Refer to the "OP sheet").
- Press and hold the "Store Key" to set the new value. (Refer to the "OP sheet").
- After storing the reset value, make an exposure.
- If the measured value is not 4V (20mA), you will need to re-set the calibration value.

C. Self-Measurement of kV, mAs & Sec.

- The HUM-20BT generator has a built-in, Self-Measurement Tool (SMT). Technique factors, kV, mAs & time (seconds) can be measured without an external meter and the actual technique factors will be displayed on HUM-20BT's display window immediately after exposure. Please follow the next steps:
 - A. Turn the power on.
 - B. Select the kV & mAs values as such: 50 kV /2 mAs
 - C. Click the "Reverse Display" (R) button twice (2x).
 - D. Press the "Exposure" control on the hand-switch and produce an exposure.
 - E. The actual kV, mA and time will be display sequentially in the kV & mAs windows.

D. Filament Preheat Calibration

- If the preheat calibration value or the VR1 calibration are off, there might be an over or under current to the tube.
- There are 2 ways to set Preheat calibration. Calibration data can be changed according to tube's condition.
- VR1 calibration is applied to all scope of Tube kV on PCB.
Filament Preheat calibration data is applied to each Tube mA.
- Power ON.
- Turn "SW1 Dip S/W pin 1" on OP.
- As you press "APR Key No.1" once. The following display will be seen:



Preheat Calibration Code Preheat Calibration Data

- P0 is the Filament Preheat Calibration Code. (Preheat Calibration Code of 20mA).
55 is the Filament Preheat Calibration Value. (Preheat Calibration Data of 20mA).
- You can adjust the value with mAs up/down Switch. (Refer to the "OP sheet").
 - After adjustment, push the "Store" key for more than 1 sec. (Refer to the "OP sheet").
 - If the waveform is over or under the intended value, you will need to re-set the calibration value. Push the kV up switch. (Refer to "OP sheet").

The following display will be seen:



Preheat Calibration Code Preheat Calibration Data

P1 is the Filament Preheat Calibration Code. (Preheat Calibration Code of 15mA).

47 is the Filament Preheat Calibration Value. (Preheat Calibration Data of 15mA).

- You can adjust the value with mAs up/down Switch. (Refer to "OP sheet").
- After adjusting, push the "Store" key for more than 1 sec. (Refer to "OP sheet").
- After storing, make an exposure.
- If the waveform is over or under the intended value, you will need to re-set the calibration value.-

Table 1 shows the calibration code and value of each tube's kV.

- Turn "DIP S/W No.1" OFF and then exit the calibration mode.



NOTICE

Calibration values are subject to change depending on the tube's condition.



NOTICE

To repeat the P-> C (P: Preheat, C: mA) mode, push the APR Key No.1 once while in calibration mode.

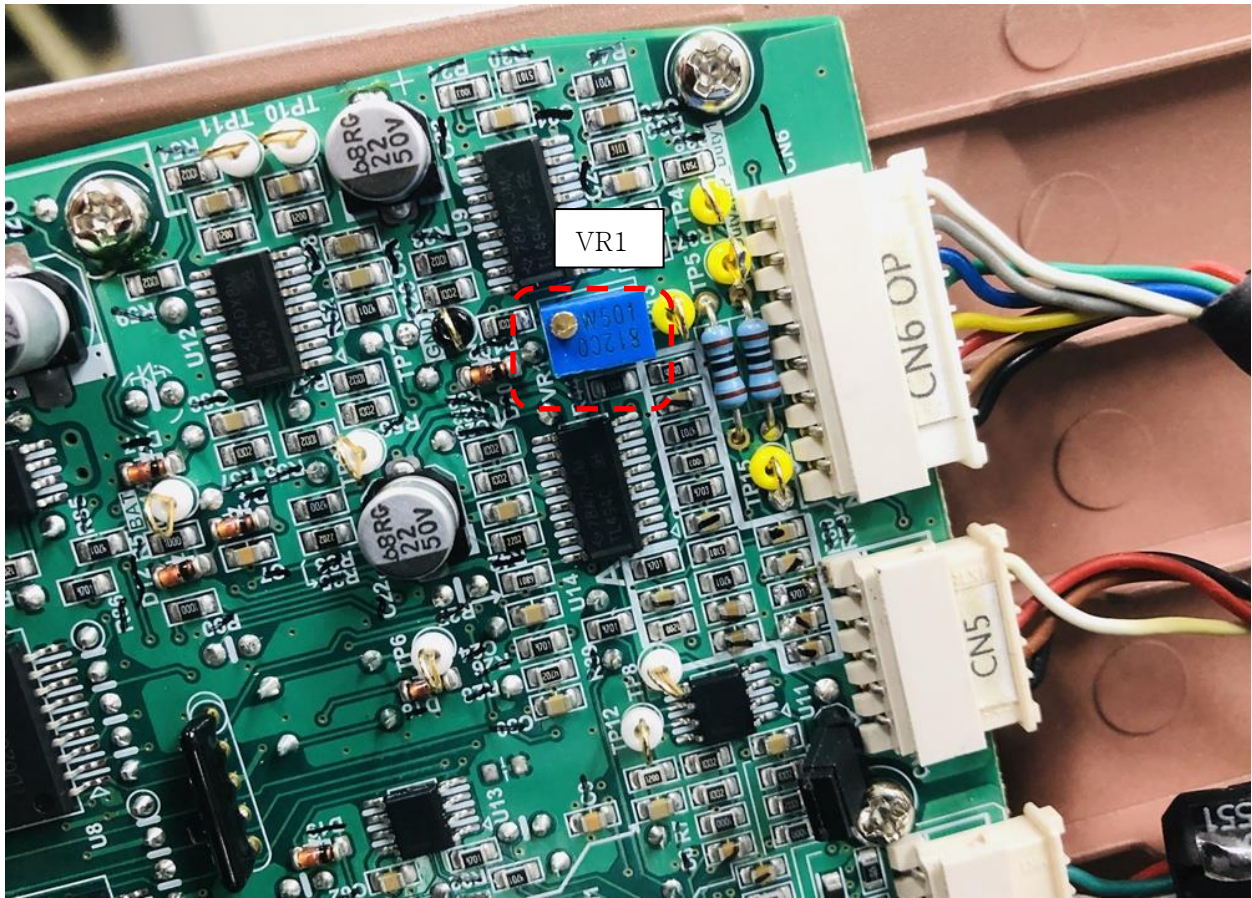


NOTICE

In regards to the "preheat calibration and mA calibration values," please pay special attention to the decimal points in the preheat calibration codes.

EXAMPLE: P.1.00 = 200 and P1.00 = 100

E. VR Info



VR Number	Adjusted Values	Direction		REMARK
		LEFT (CCW)	RIGHT (CW)	
VR1	Preheat	Increase	Decrease	

5. Calibration code and data

[TABLE 1. mA Calibration Data]

Code	Tube kV	Initial Data	Data Range	Tube mA	mAs
C0	50kV ~ 80kV	200	0 ~ 249	20mA	0.4 ~ 3.2
C1	81kV ~ 90kV	150	0 ~ 249	15mA	0.4 ~ 3.2
C2	50kV ~ 80kV	100	0 ~ 249	10mA	3.6 ~ 20
C3	81KV ~ 90kV	80	0 ~ 249	8mA	3.6 ~ 20

[TABLE 2. Filament Preheat Calibration Code and Data]

Code	Tube mA	Initial Data	Data Range
P0	20mA	152	0 ~ 199
P1	15mA	145	0 ~ 199
P2	10mA	142	0 ~ 199
P3	8mA	137	0 ~ 199



NOTICE

When encountering continuous "Err" messages, discontinue use of your device immediately and contact POSKOM or one of its authorized distributors for assistance.

6. Error code

6.1. When the hand switch is non-operational, check to see if the hardware values are more than kV=10kV, mA=5mA, FIL=0.1V F/B,

Code No.	Description	Resolution
Err. 10	Filament feedback over	Calibration or change OP B/D
Err. 11	kV feedback over	Calibration or change OP B/D
Err. 12	mA feedback over	Calibration or change OP B/D.

6.2. When the "Ready Exposure" mode is malfunctioning, check the filament conditions and if the hardware value is less than FIL=0.35V F/B, this will be the cause of the error code.

Code No.	Description	Resolution
Err. 14	Filament feedback low	Calibration or change OP B/D

6.3. Error at Exposure

kV, mA Low Error: lower than Min. (30kV) value ->Error

kV, mA over Error: higher than Max. (100kV) value -> Error

kV, mA State Low Error: lower than output kV (-10kV) -> Error

kV, mA State over Error: higher than output kV (+10kV) -> Error

Code No.	Description	Resolution
Err. 15	kV feedback low detect err at exposure	Calibration or change OP B/D
Err. 16	mA feedback low detect err at exposure	Calibration or change OP B/D
Err. 17	kV feedback over detect err at exposure	Calibration or change OP B/D
Err. 18	mA feedback over detect err at exposure	Calibration or change OP B/D
Err. 19	-10kV kV feedback low detect err at exposure	Calibration or change OP B/D
Err. 20	+10kV kV feedback low detect err at exposure	Calibration or change OP B/D
Err. 22	-10kV mA feedback low detect err at exposure	Calibration or change OP B/D
Err. 23	+10kV mA feedback low detect err at exposure	Calibration or change OP B/D

6.4. Inter_Lock Error

Err Code	Description	Resolution
Err. 21	Tank Thermal S/W check	- Check the Tank & OP F/B cable connection - Check the Tank temperature - Change OP B/D

6.7. Deadman check code

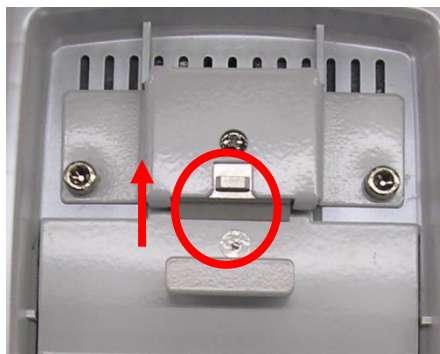
When the hand switch is turned off during X-ray exposure, Then it displays the mAs of the exposed X-ray and informs the user of Deadman check by beep sound.

7. How to replace battery

7.1. Loosen the bolt located on the bottom of the unit as seen below.



7.2. Move the grip towards the rear of the unit as shown by the arrow in the picture below.



The battery cover will slide off easily.

7.3. Grab a hold of the handle and gently pull upwards until the battery is separated from main body of the unit.



7.4. Replace the new battery into the body of the unit and follow the above steps in reverse order to reassemble your unit.

8. Service request form

This form must be completed fully and submitted with any POSKOM x-ray products returned for warranty considerations or repair services.

A. General Information

A. Product name : _____

B. Serial number : _____

C. Date received : _____

D. Date installed : _____

E. Date defective found : _____

F. At what stage did your device fail:

☐ At the initial inspection upon receipt? or ☐ After storage?

☐ During the course of an installation? or ☐ During actual service in the field?

B. Detailed Information

1) Symptoms in detail: _____

Highest condition used at: _____ kV _____ mAs

Most frequently used at: _____ kV _____ mAs

2) Describe any problems experienced:

Setting at time of failure: _____ kV _____ mA/mAs _____ sec

Describe any unusual occurrences: _____

Abnormal symptoms prior to failure: _____

Abnormal symptoms at time of failure: _____

3) Please include any additional details or documentation (e.g., photos, purchase orders, receipts) that may assist in troubleshooting the problem.

Full Name _____ Phone _____

Signature _____ Fax _____

Company/Hospital _____ Email _____

Website _____ Date _____



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