

GE Medical Systems
eXplore Locus SP
MicroCT Scanner

Technical Manual - 2407446



Intended Use Statement

This device is designed and intended for use by those operating the device, for research purposes only. It is not intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease in humans or animals.

Compliance

GE Medical Systems eXplore Series uCT scanners are compliant with the United States Radiation Control for Health and Safety Act (Title 21, Code of Federal Regulations, Subchapter J) as they pertain to Cabinet X-Ray Systems (21 CFR 1020.40), FDA Report accession number 0212775, and Canadian RED Regulations C.R.C., c. 1370.

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GE eXplore Locus SP Micro CT System Technical Manual

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Table of Contents

CONTACTING GE MEDICAL SYSTEMS.....	1
TABLE OF CONTENTS.....	2
FIGURES	
FRONT PANEL OF THE CONTROL MODULE.....	3
BACK PANEL OF THE CONTROL MODULE	4
FRONT PANEL OF THE POWER DRIVE MOTOR MODULE	5
BACK PANEL OF THE POWER DRIVE MOTOR MODULE	6
FRONT PANEL OF THE DETECTOR POWER MODULE.....	7
BACK PANEL OF THE DETECTOR POWER MODULE	8
MICRO CT CABINET ELECTRICAL PANEL	9
FILTER WHEEL.....	10
GENERAL DESCRIPTION.....	11
STANDARD CT OPERATION.....	12
SAFETY INTERLOCK.....	13
SPECIFICATIONS	14
CABLE CHECKLIST	14

Notice:

GE Medical Systems declares the following:

1. The Safety Interlock switches are precautionary devices used to protect personnel from accidental radiation. They are not to be used as an easy way to turn OFF the x-ray tube. Such use will greatly decrease the life of the tube.
2. Any warranty expressed or implied will be voided if any Safety Interlock switch is defeated for any reason.
3. GE Medical Systems is not responsible for any medical complication caused by not following the appropriate government regulations regarding the use of Cabinet X-ray Equipment in your local jurisdiction.



FIGURES

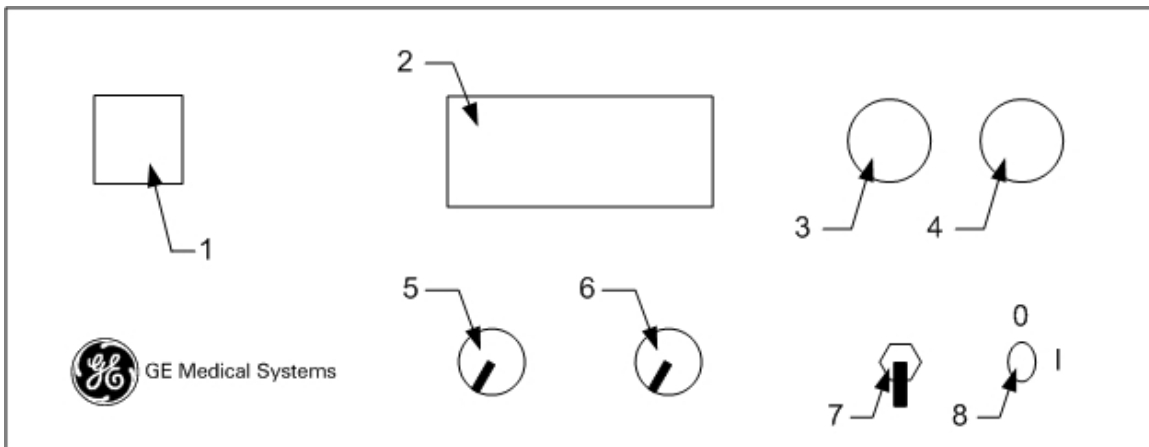


Figure 1. Front panel of the CM (Control Module)

- 1. X-ray Reset Switch Button.** When the system is first powered on or when the enclosure door has been opened (triggering the interlock switch) the RESET button is illuminated. This kills x-ray generation and does not allow the x-ray tube to turn back on, giving the operating personnel extra safety from accidental x rays. Pressing the button will arm the system and allow normal operations.
- 2. LCD Display Window.** Displays x-ray tube voltage [kVp], and current [μ A]
- 3. Green LED Indicator (STANDBY).** Lights up when the system has power
- 4. Red LED Indicator (X RAY).** Lights up when X rays are being generated
- 5. kVp Manual Control Knob.** (manual mode only) Controls high voltage delivered to the x-ray tube. Turning CW to increase the voltage. Turning CCW to decrease the voltage.
- 6. μ A Manual Control Knob.** (manual mode only) Controls the current to the x-ray tube. Turning CW to increase the current. Turning CCW to decrease the current.
- 7. Manual X-Ray Control (ON/OFF) Switch.** (manual mode only) Controls the generation of x rays. Flip lever UP to turn x rays ON. Flip it DOWN to turn x rays OFF.
- 8. Key-Lock Power Switch.** Turns the power to the system ON and OFF. To turn the POWER ON, insert the key and rotate it CW to the 1. To turn the POWER OFF, turn the key CCW to the 0, and if necessary remove the key (the key cannot be removed, when rotated CW).



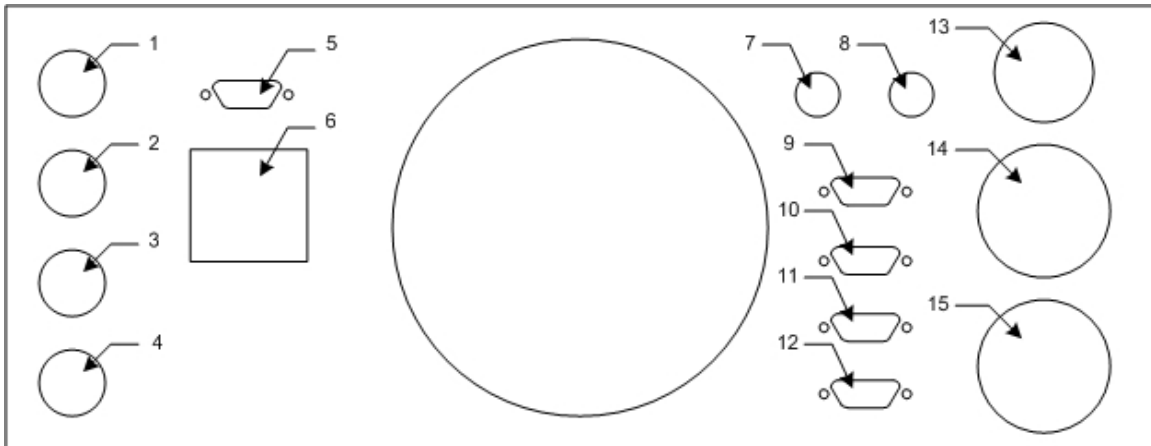


Figure 2. Back panel of the CM (Control Module)

1. **Fuse 1** [5A, 250V fast blow fuse]
2. **Fuse 2** [3A, 250V, fast blow fuse]
3. **Fuse 3** [750mA, 250V fast blow fuse]
4. **Fuse 4** [1A, 250V fast blow fuse]
5. **Computer Interface** [DB-9 Female]
6. **120VAC, 60Hz Power Inlet** [3.75A, 250V fast blow fuse]
7. **Control Module Interface** [BNC 50 Ω]
8. **Control Module Interface** [BNC 50 Ω]
9. **Motor Data 1** [DB-9 Male](Connects to PDMM)
10. **Motor Data 2** [DB-9 Male](Connects to PDMM)
11. **Motor Data 3** [DB-9 Male](Connects to PDMM)
12. **Motor Data 4** [DB-9 Male]
13. **Control Data 1** (Connects to Cabinet)
14. **Control Data 2** (Connects to Cabinet)
15. **Control Data 3** (Connects to Cabinet)



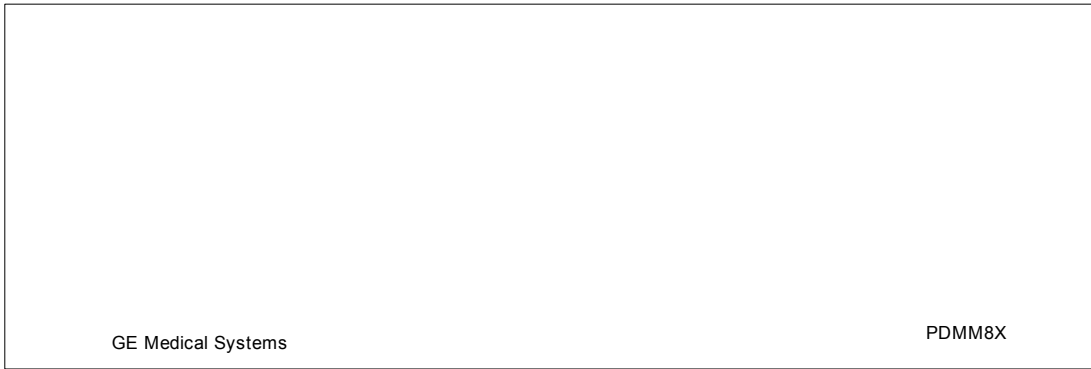


Figure 3. Front panel of the PDMM8X (Power Drive Motor Module)



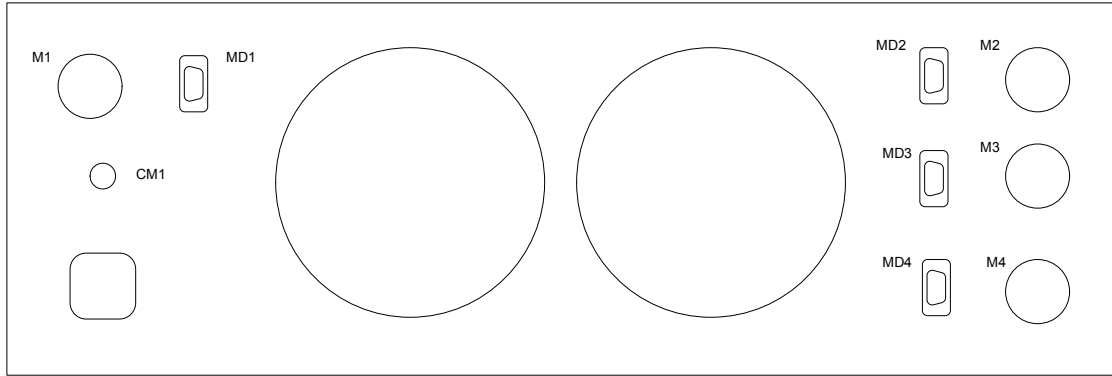


Figure 4. Back panel of the PDMM8X (Power Drive Motor Module)

1. **120Vac, 60Hz Power Inlet** [3.15A, 250V fast blow]
2. **CM1: Control Module Interface** [BNC 50 Ω] (Connects to CM)
3. **M1: Motor Control 1** [Magnification Stage](Connects to Cabinet)
4. **MD1: Motor Data 1** (DB-9 Female)
5. **M2: Motor Control 2** [Rotary Stage] (Connects to Cabinet)
6. **MD2: Motor Data 2** (DB-9 Female)
7. **M3: Motor Control 3** [Elevation Stage] (Connects to Cabinet)
8. **MD3: Motor Data 3** (DB-9 Female)
9. **M4: Motor Control 4** [Not Used]
10. **MD4: Motor Data 4** (DB-9 Female)





Figure 5. Front panel of the CMR8X (Detector Power Module)



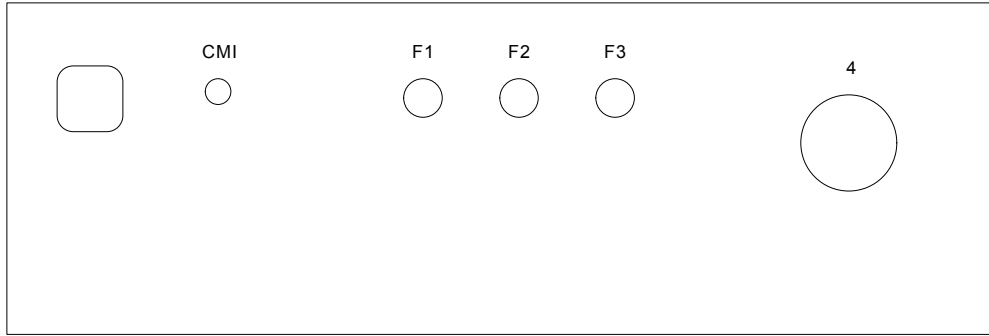


Figure 6. Back panel of the CMR8X (Detector Power Module)

1. **120Vac, 60Hz Power Inlet** [4.25A, 250V fast blow]
2. **CMI: Control Module Interface** [BNC 50Ω]
3. **F3: Fuse 3** [0.5A, 250V fast blow fuse] Hydro for 5V Power Supply
4. **F1: Fuse 1** [0.75A, 250V fast blow fuse] Hydro for 24V Power Supply
5. **F2: Fuse 2** [3.0A, 250V fast blow fuse] Hydro for 24V Power Supply
6. **4 : Control Data 4** (Connects to Cabinet)



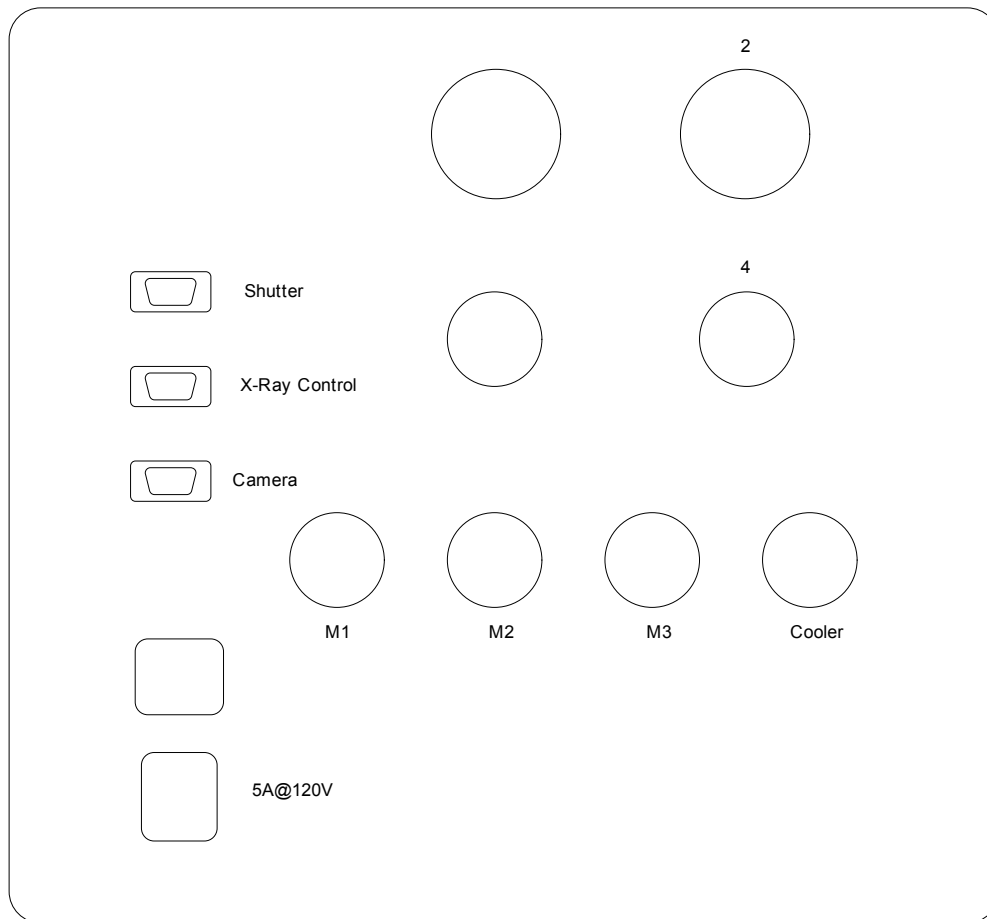


Figure 7. Micro CT Cabinet Electrical Panel

1. **Unlabelled**
2. **2: Control Data 2** (Connects to CM)
3. **Unlabelled**
4. **4: Control Data 4** (Connects to CM)
5. **Shutter: Shutter Control** [DB-9 Male] (Connects to Multi-Serial Expansion Cable)
6. **X-Ray Control: X-ray Control**[DB-9 Male] (Connects to Computer)
7. **Camera: Camera Control** [DB-9 Male] (Connects to Computer)
8. **M1: Motor Control 1** [Magnification Stage] (Connects to PDMM)
9. **M2: Motor Control 2** [Rotation Stage] (Connects to PDMM)
10. **M3: Motor Control 3** [Elevation Stage] (Connects to PDMM)
11. **Cooler: Cooler** (Connects to Cooler)
12. **Power Outlet** (Connects to Cooler)

Power Inlet [**5A, 250V Fast Blow**]



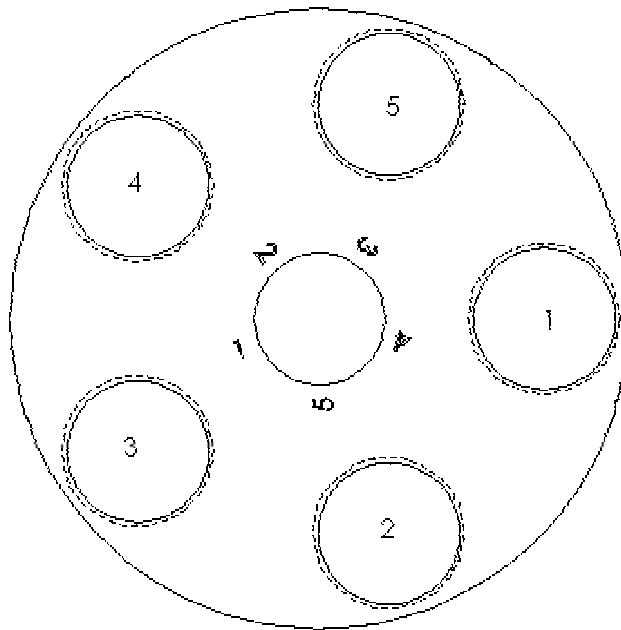


Figure 8. Filter Wheel

- 1. Aluminum 0.010" & Copper 0.010"**
- 2. Open**
- 3. Aluminum [0.010"]**
- 4. Aluminum [0.020"]**
- 5. Aluminum [0.050"]**



GENERAL DESCRIPTION

GE Medical Systems manufactures a wide range of Micro CT Systems. It is possible that the system delivered to the user will differ from the one described herein. Variations, however, are minor and user should have no difficulties when operating the system using the guidance of this manual.

A generic Micro CT system comprises of several components. They are:

1. **CM** [Control Module]
2. **PDMM** [Power Drive Motor Module]
3. **CMR** [Detector Power Module]
4. Cooler
5. Interconnecting Cabling

(The below items are located within the scanner box)

6. X-ray Source [X-ray tube]
7. X-ray Detector [camera]
8. Scanning Hardware [specimen stage/holder, 3D motion system etc.]
9. Safety X-ray Interlock Mechanism [scanner sliding-door switch]



STANDARD CT OPERATION

ACTIVATING THE SYSTEM

After ensuring that the cabling is properly connected to the unit, turning the POWER Key on the Main Controller Unit will power up the system.

[There are only two keys with each system. They should be kept in a secured location.]

Visual verification of each unit upon activation should have the following:

PDMM [Power Drive Motor Module]

1. Exhaust fan turns on

Cabinet [CT Scanner Unit]

1. Exhaust fan turns on

The X-Ray ON command cannot be initiated until the Micro CT Scanner sliding door is closed properly to activate the INTERLOCK switch.

WARNING

At no time should the INTERLOCK be defeated. This is a precaution for personal safety.

X RAY WARNING SYSTEMS

There are three (2) Safety warnings when the x-ray tube is activated.

1. The X-Ray On LED on top of the **Cabinet Unit** will be illuminated RED.
2. The Tube Status window on the computer console will report the kVp and uA of the tube thereby indicating when X-Rays are on.

To prolong the life of the x-ray tube the voltage and current are ramped up and down during activation and deactivation. Turning off the x-ray tube by means of the POWER Key on the Main Controller Unit or by disengaging the Safety INTERLOCK is for emergency situations only.



SAFETY INTERLOCK

1. When the Primary Door Safety Interlock is triggered, the power to the high voltage circuit in the x-ray tube is physically removed and the x-ray tube will be immediately SHUT OFF .
2. To operate the X-ray Controller again, please follow the steps below:
 - A. Close the Cabinet door properly
 - B. Re-initiate the X-Ray ON command from the computer console.



SPECIFICATIONS

1. Input Voltage: 100-120 ~ VAC at 50-60Hz – 784 W
2. Cooling Requirement: Forced Air
3. X-ray Tube Voltage Range: 0 kVp - 90 kVp
4. Electron Beam Current Control: 0 uA- 180 uA [MAX 8W]
5. Key-lock switch: A key-lock switch is used to enable/disable the power supply. The key can be removed in the "OFF" position only
6. Indicators: The "X-ray On" LEDs and Tube Status window on the computer console indicate system status
7. Environmental Operating Range: 15°C - 30°C <80% relative humidity (non-condensing)
8. **CM** weight: 10 lbs (4.5 kg) – 115 ~VAC, 196 W
9. **PDMM** weight: 25 lbs (11.34 kg) – 115 ~VAC, 211 W
10. **CMR** weight: 10 lbs (4.5 kg) – 115 ~VAC, 215W
11. **PDMM** dimensions (Width x Depth x Height):
19" x 14" x 7" (483mm x 356mm x 178mm)
12. **CM and CMR** dimensions (Width x Depth x Height):
19" x 14" x 5" (483mm x 356mm x 127mm)
13. All Cables: 6' (1.84m) in length.
14. Installation / Overvoltage category II

Cable Checklist

<u>Cables</u>	<u>Connector Type</u>	<u>Quantity</u>
MD 1 ... 3	DB 9 pin (M/F) 6 ft	3
Motor 1 ... 3	AMP 9 pin 6ft	3
Control Data 4	AMP 16 pin 6ft	1
Control Data 2	AMP 24 pin 6ft	1
Camera Data	Custom 25ft	1
Camera	DB 9 pin (null modem) 6ft	1
CMP	DB 9 pin (M/F) 6ft	1
CMI	BNC (50Ω) 1ft	2
Shutter	DB 9 pin (null modem) 6ft	1
AC cord	AC cord	4
AC cord (Cooler)	AC Extension Cord	1
Cooler	AMP to various (6ft)	1
CAB04DX	Multi-Serial Expansion cord	1

