

TOPAZ

Mobile DR System

Operation Manual



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D/N: RMD1311-009, Rev.9

CE 2460

1.3 SPECIFICATIONS

Item		Specification	
		TOPAZ-32D	TOPAZ-40D
X-ray Generator	Nominal Output	32KW	40KW
	mA Range	Max. 400mA	Max. 500mA
	KV Range	40 ~ 125 KV (option: 150KV)	40 ~ 125 KV (option: 150KV)
	mAs Range	0,1 ~ 500mAs	0,1 ~ 500mAs
	Operation Duty Cycle	100kV, 320mA, 100ms / Rest time : 1min	100kV, 400mA, 100ms / Rest time : 1min
	Type	High Frequency	
System Design & Transport	Drive Type	Motor Driven(Rear-wheel drive)	
	Speed of Movement	Max. 5Km/h	
	Movement Brake/ Safety	Deadman type Handle, Front Safety Bumper, Spring Caster	
	Maximum Step Height	50mm	
	Maximum ramp gradient	10 degrees	
	Main power supply	100 ~ 240VAC, 9 – 4 A	
	Cable Length(Mains, retractable)	3m	
	Driving distance after fully charged	30km	
	Inch mover	Max. 50mm/s	
X-Ray Tube Support	Colum rotation range	± 325 degrees	
	Tube axis rotation range	-30 ~ +90 degrees	
	Tube support axis rotation range	± 180 degrees	
	Collimator rotation range	± 120 degrees	
	Max./Min. X-ray focal spot height	1,390mm(Option : 1200mm)	
	Max. horizontal extension	560mm	
Option & Accessories	Remote Controller	Ready-Exposure, Lamp On/Off	
	DAP(Dose Area Product) Recording	Thermal Printer	

● X-ray Tube

Tube Model	E7239X	DXT-8M	E7242X	DXT-11M
Manufacturer	CANON	DRGEM	CANON	DRGEM
Focal Spot Size	1.0/2.0mm	1.0/2.0mm	0.6/1.5mm	0.6/1.5mm
Rating(0.1s)	22.5/47kW@60Hz	22.5/47kW@60Hz	18/50kW@60Hz	18/50kW@60Hz
Max. Anode HU	140kHU(100kJ)	140kHU(100kJ)	200kHU(142kJ)	200kHU(142kJ)
Target Angle	16°	16°	14°	14°
Max. kV	125kV	125kV	125kV	125kV
Weight	16kg(35.3lbs)	16kg(35.3lbs)	16kg(35.3lbs)	16kg(35.3lbs)
Inherent Filtration	0.9mmAl/75kV, IEC60522			
Additional Filtration	1.0mmAl			
Half Value Layer	More than 2.9mmAl eq. at 80kVp			
Leakage Radiation	Less than 100mR/hr			

Tube Model	E7299X	E7876X	E7884X
Manufacturer	CANON	CANON	CANON
Focal Spot Size	0.3/1.0mm	0.6/1.2mm	0.6/1.2mm
Rating(0.1s)	3.7/39kW@60Hz	22/54kW@60Hz	22/54kW@60Hz
Max. Anode HU	150kHU(111kJ)	230kHU(163kJ)	300kHU(210kJ)
Target Angle	12°	12°	12°
Max. kV	150kV	150kV	150kV
Weight	16kg(35.3lbs)	16kg(55.1lbs)	16kg(35.3lbs)
Inherent Filtration	1.3mmAl/75kV	1.3mmAl/75kV	0.9mmAl/75kV
Additional Filtration	1.0mmAl		
Half Value Layer	More than 2.9mmAl eq. at 80kVp		
Leakage Radiation	Less than 100mR/hr		

Tube Model	DXT-10M	DXT-12M
Manufacturer	DRGEM	DRGEM
Focal Spot Size	0.6/1.2mm	0.6/1.2mm
Rating(0.1s)	17/48kW@60Hz	22/54kW@60Hz
Max. Anode HU	150kHU(111kJ)	300kHU(210kJ)
Target Angle	12°	12°
Max. kV	125kV	150kV
Weight	16kg(35.3lbs)	16kg(35.3lbs)
Inherent Filtration	1.0mmAl/75kV	1.0mmAl/75kV
Additional Filtration	1.0mmAl	
Half Value Layer	More than 2.9mmAl eq. at 80kVp	
Leakage Radiation	Less than 100mR/hr	

* Total filtration including X-ray tube assembly and collimator will be matched by appropriate additional filters to within the range from 2.9 to 3.3mmAl. eq.

● **DAP meter (Option)**

DAP Resolution	0.01 μGym^2
Interface	RS485
Active area	115 x 115mm

● **Digital Flat Panel Detector(VAREX)**

Model	4336W V4	
Active Pixel Area / Matrix	14 x 17 inch	
Pixel Pitch	139 μm	
Limiting Resolution	3.6 lp/mm	
Scintillator	CsI,	DRZ+
Energy Range	40 – 150kVp	
A/D Conversion	16-bits	
Interface	Gigabit Ethernet	
Weight(including Battery)	2.9 kg (6.4 lbs.)	3.0 kg (6.6 lbs.)

- Digital Flat Panel Detector(I-RAY) – (I-RAY detectors are NOT used in USA installations)

Model	Mano4336W	Mano4343W
Active Pixel Area / Matrix	14 x 17 inch	17 x 17 inch
Pixel Pitch	150um	139um
Limiting Resolution	3.3 lp/mm	3.6 lp/mm
Scintillator	CsI,	
Energy Range	40 – 150kVp	
A/D Conversion	16-bits	
Interface	Ethernet / WIFI(802.11ac)	

- Collimator**

Model / Maker	R108/R108F	DXC-RML/DXC-RMH
Manufacturer	RALCO	DRGEM
Control	Manual with 30sec. lamp timer	
Field Shape	Rectangular	
Max. Field Size	More than 43x43cm(17x17inch) at 100cm SID	
Leakage Radiation	Less than 100mR/hr	Less than 40 mR/h
Max. kVp shield	150kV	
Inherent Filtration	Min. 2.0mmAl eq.	
Luminosity	Over 160LUX at 100cm SID (Typ. 250LUX)	Over 160LUX at 1cm SID
Light source	Single LED	LED and Halogen
Standard	Tape measure, Rotating flange	Rotating flange with fixing knob
Option	Laser line, Near port moving shutters(Only R108F), Manual rotating filters(Only R108F)	Line laser+shutter, Measure tape Near port moving shutters, Additional filter Mounting flange mechanical detent Accessory guides spring DAP rail

Electrical Rating	20–30VAC, 30VA, 50/60Hz	Halogen type - 24 V DC/AC - 50~60Hz 160VA LED type - 12~45V DC 35VA / 20~30VAC 35VA - 50~60Hz
Dimension / Weight	223(W) x 246(D) x 140(H) mm / 6.6kg(14.6lb)	196(W) x 250(D) x 171(H) mm / 7.1kg(15.6lb)

- Image Workstation

Item	Specification
CPU	Intel(R) Core i3-6100(3.70GHz,3MB Cache) or higher
Memory	DDR4 4GB (1x4GB) SO-DIMM
Display	Intel® HD Graphics 530 (Integrated HD graphics)
Storage	120 GB x 1 SSD (Samsung) + 500GB x 1 SATA HDD or higher
Touch Monitor	17 inch Color LCD, IR Infrared Ray, Display resolution: 1280 x 1024 pixels

OPERATING ENVIRONMENT

Ambient temperature range	10 to 35 °C (50 to 95 °F)
Relative humidity	30% to 75%, non-condensing
Atmospheric pressure range	700 hPa to 1060 hPa
Altitude Limit	This product is rated to operate at an altitude ≤3000m

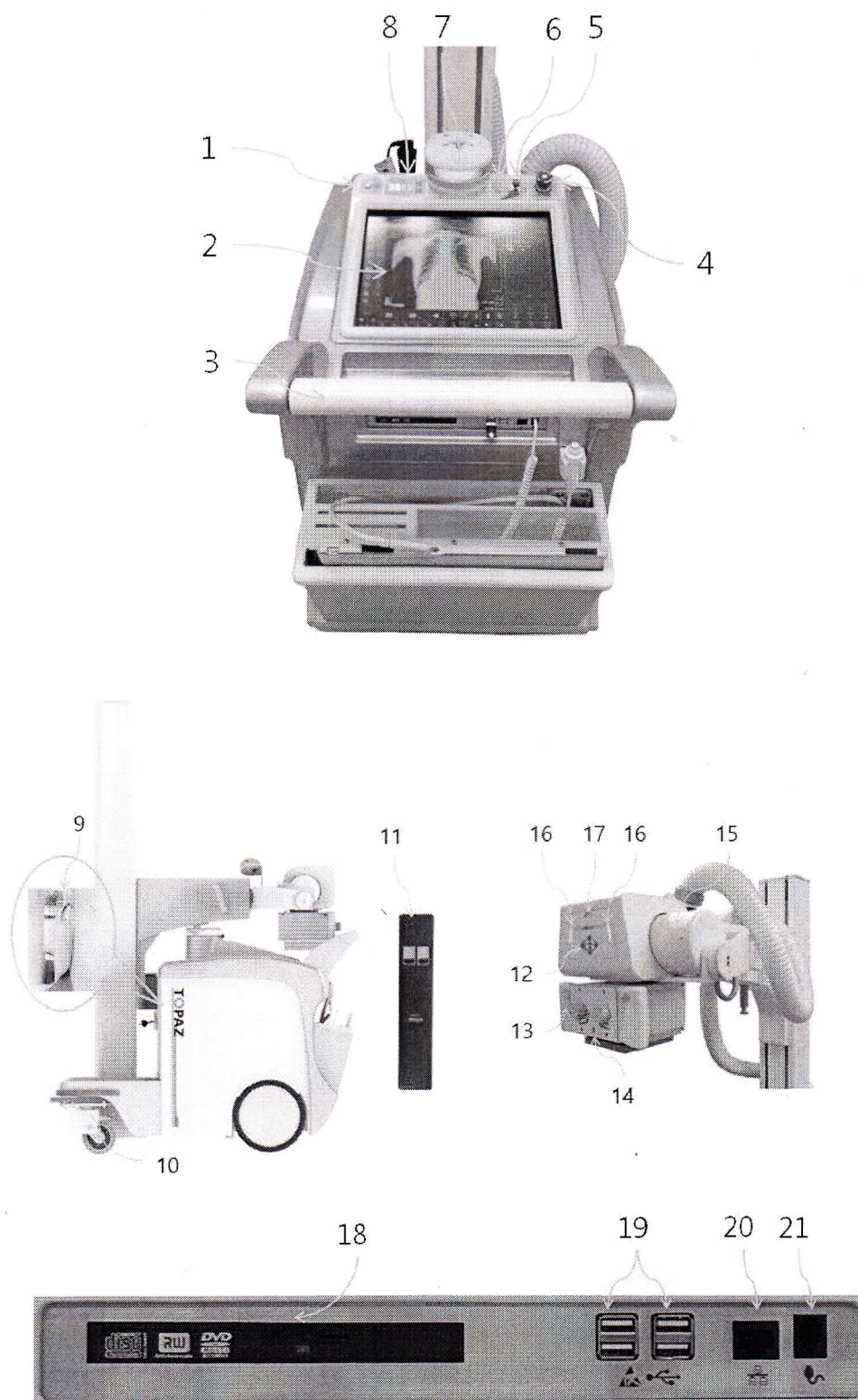
TRANSPORT AND STORAGE ENVIRONMENT

Ambient temperature range	-10 to 70 °C (14 to 158 °F)
Relative humidity	10 to 90%, non-condensing.
Atmospheric pressure range	500 hPa to 1060 hPa

WARNING

Do not operate this system except in accordance with information included in this section, and any additional information provided by the manufacturer and / or competent safety authorities.

1.4 PART DESCRIPTION



- 1 Collimator Lamp On/Off Switch
- 2 Touch screen console
- 3 Mobile Control Handle bar
- 4 Emergency switch
- 5 Key switch
- 6 Exposure / Mobile indicator
- 7 System Indicator
- 8 Charge / Battery Indicator
- 9 AP
- 10 Bumper
- 11 Remote controller
- 12 Inch Movement button
- 13 All Lock Button
- 14 Collimator
- 15 X-Ray Tube
- 16 System Indicator
- 17 Tube axis angles
- 18 DVD player
- 19 USB port
- 20 LAN port
- 21 X-ray Exposure switch connector

<u>SYMBOL</u>	<u>Definition</u>
	Electrostatic sensitive devices symbol used to indicate on packages containing electrostatic-sensitive devices and on the devices themselves.

1.5 APPLICABLE STANDARDS

The main components of Mobile X-ray system comply with the regulatory requirements and design standards in this section as follows:

1) SAFETY

IEC/EN 60601-1 3.1rd Edition

■ EN 60601-1:2006/A1:2013

Medical electrical equipment -- Part 1: General requirements for basic safety and essential performance
IEC 60601-1:2006/A1:2012

■ EN 60601-1-3:2008/A1:2013

Medical electrical equipment -- Part 1-3: General requirements for basic safety and essential performance
- Collateral Standard: Radiation protection in diagnostic X-ray equipment
IEC 60601-1-3:2008/A1:2013

■ EN 60601-1-6:2010

Medical electrical equipment -- Part 1-6: General requirements for basic safety and essential performance
- Collateral standard: Usability
IEC 60601-1-6:2009/A1:2013

■ EN 60601-2-54:2009/A1:2015

Medical electrical equipment -- Part 2-54: Particular requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy
IEC 60601-2-54:2009/A1:2015

■ EN 60601-2-28:2010

Medical electrical equipment -- Part 2-28: Particular requirements for the basic safety and essential performance of X-ray tube assemblies for medical diagnosis
IEC 60601-2-28:2010

GENERATOR TECHNIQUE SELECTION

Time (ms)	mA Selected																				
	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250	320	400	500	640	800	1000
1.0											0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0
1.2										0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25
1.6									0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6
2								0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0
2.5							0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5
3.2						0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2
4					0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0
5				0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0
6.4		0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8
8		0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8
10	0.1	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10
12.5	0.125	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5
16	0.16	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16
20	0.2	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20
25	0.25	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25
32	0.32	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32
40	0.4	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40
50	0.5	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50
64	0.64	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64
80	0.8	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80
100	1.0	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100
125	1.25	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125
160	1.6	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160
200	2.0	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200
250	2.5	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250
320	3.2	4.0	5.0	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250	320

Table 1 continued on next page

Table 1: mAs values vs. mA & time selected

Time (ms)	mA Selected															
	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250	320
400	4	5	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125
500	5	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160
640	6.4	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200
800	8	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250
1000	10	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250	320
1250	12.5	16	20	25	32	40	50	64	80	100	125	160	200	250	320	400
1600	16	20	25	32	40	50	64	80	100	125	160	200	250	320	400	500
2000	20	25	32	40	50	64	80	100	125	160	200	250	320	400	500	
2500	25	32	40	50	64	80	100	125	160	200	250	320	400	500		
3200	32	40	50	64	80	100	125	160	200	250	320	400	500			
4000	40	50	64	80	100	125	160	200	250	320	400	500				
5000	50	64	80	100	125	160	200	250	320	400	500					
6400	64	80	100	125	160	200	250	320	400	500						
8000	80	100	125	160	200	250	320	400	500							
10000	100	125	160	200	250	320	400	500								

Table 1 (Cont): mAs values vs. mA & time selected

kV/mA values are generator's output rating dependent.

mA/ms values are tube rating dependent.

For certain tubes, some mA/ms selections are not available at higher kV selections.