



# Mobile DR System Technical Specifications



## DRGEM Corporation

7FI, E-B/D Gwangmyeong Techno-Park, 60 Haan-ro,  
Gwangmyeong-si, Gyeonggi-do, 14322, Korea  
TEL: +82-2-869-8566, FAX: +82-2-869-8567



D/N: RSP1210-001, Rev. 17

## **1. INTRODUCTION**

TOPAZ System is a system providing state-of-the-art image quality, user interface; making the system easy to use and reliable while providing high quality radiographic images with reduced dose.

TOPAZ System may be moved quietly and smoothly with motor drive mechanism

TOPAZ system has a basic type column option, which is a reasonable price and high-quality product, and a collapsible type column option with a trendy design that allows driving without disturbing the front view.

The core part of x-ray source adopts high quality tube assembly, x-ray collimator, HV cable assembly and high frequency x-ray generator with excellent performance, lifetime and stability.

Direct radiography via flat panel detector improves workflow, exam speed and comfort with efficiency. Digital flat panel detector with CsI screen provides excellent spatial resolution, MTF, DQE and stability based on fine pixel pitch.

The core part of x-ray source adopts high quality tube assembly, motorized x-ray collimator, HV cable assembly and high frequency x-ray generator which have worldwide reputation on excellent performance, lifetime and stability. Touch screen LCD based x-ray control console provides user-friendly interface and easy technique selection. Collimator supports high accuracy for selected x-ray field size over any SID.

Selection of an anatomical study on the imaging software automatically sets up the x-ray generator's pre-programmed exposure technique.

The types of "TOPAZ" system are divided into TOPAZ-32D, and TOPAZ-40D according to maximum power and mA. The higher the maximum output, the wider the mA range to choose from, giving the user more technical options to choose from.

**1.1 STANDARD**

- High-Frequency X-ray Generator
- Motor Driven (Max. Driving Speed: 5km/h)
- 2 types column stand (Basic type, Collapsible type - Optional)
- X-Ray Tube
- High Voltage Cables and stator cable
- Flat-Panel Detector
- Collimator with 30 seconds LED lamp timer
- Outstanding Image Quality by Optimized Digital image Processing
- Workstation / 21.5 inch High Resolution Touch Screen
- User Programmable APR
- Exposure Hand Switch
- Infrared remote controller (Ready-Exposure / Collimator Lamp)
- Wireless LAN connectivity, CD/DVD image Burning, USB interface

## 2. SPECIFICATION

### 2.1 TOPAZ CONFIGURATION PART

| Part                              |                                      | Specification   |                           |
|-----------------------------------|--------------------------------------|---|---------------------------|
|                                   |                                      | TOPAZ-32D<br>(Basic type)   | TOPAZ-40D<br>(Basic type) |
| TOPAZ Main<br>Body                | Drive Type                           | Motor Driven (Rear-wheel drive)   |                           |
|                                   | Speed of Movement                    | Max. 5Km/h  |                           |
|                                   | Movement Brake / Safety              | Deadman type Handle,<br>Front Safety Bumper,<br>Spring Caster(Front Wheel)<br>Driving Beep Alarm                      |                           |
|                                   | Maximum Step Height                  | 50mm  |                           |
|                                   | Maximum ramp gradient                | 10 degrees  |                           |
|                                   | Main power supply                    | 100 ~ 240VAC, 9 – 4 A   |                           |
|                                   | Battery                              | 12V 12AH Lead-acid type, 26ea   |                           |
|                                   | Cable Length(Mains, retractable)     | 3m  |                           |
|                                   | Driving distance after fully charged | 30km  |                           |
|                                   | Small Movement                       | Max. 120mm/s  |                           |
|                                   | Dimension / Weight                   | 583(W) x 1,970(H) x 1,390(D) mm<br>/ 430 kg(948 lbs)<br>Option : 583(W) x 1,800(H) x 1,390(D) mm<br>/ 428 kg(944 lbs) |                           |
|                                   | Software/Firmware                    | Mobile Control Board<br>Motor Driver Board  |                           |
|                                   | X-Ray Tube<br>Support                | Rotation Range(Column)  | ± 325 degrees             |
| Rotation Range(Tube Axis)         |                                      | -30~+90 degrees   |                           |
| Rotation Range(Tube Support Axis) |                                      | ± 180 degrees   |                           |
| Rotation Range(Collimator)        |                                      | ± 120 degrees   |                           |
| Vertical Range                    |                                      | 640 ~ 2,030 mm (stroke : 1,390mm)<br>Option : 640 ~ 1,860 mm (stroke :<br>1,220mm)                                    |                           |
| X-ray Focal Spot Height           |                                      | 630 ~ 2,030 mm<br>Option : 630 ~ 1,860 mm   |                           |
| Max. horizontal extension         |                                      | 530mm   |                           |
| Software/Firmware                 |                                      | Angle Board   |                           |

|                       |  |  |                  |
|-----------------------|--|--|------------------|
| X-ray Generator       | Type                                   | High Frequency   |                  |
|                       | Nominal Output                         | 32kW   | 40KW             |
|                       | kV Range                               | 40 ~ 125 KV (option: 150KV)  |                  |
|                       | mA Range                               | 32kW : max 400mA   | 40kW: max. 500mA |
|                       | Time Range                             | 0.001~10 sec   |                  |
|                       | mAs Range                              | 0.1~500mAs   |                  |
|                       | Software/Firmware                      | HT Control Board   |                  |
| X-ray Tube Assembly   | Tube                                   | E7239X, E7242X, E7876X, E7884X<br>DXT-8M, DXT-10M, DXT-11M, DXT-12M  |                  |
|                       |  | E7299X   | -                |
|                       | Type of Collimator                     | R108, R108F, DXC-RML   |                  |
| SW                    | Operating software                     | RADMAX   |                  |
| Detector              | Detector                               | PaxScan4336W v4, 4343W(Basic),<br>XRpad2 3025 HWC-M, XRpad2 4336<br>HWC-M, XRpad2 4343 HWC-M, 2530W-<br>G5, 4336W-G5, 4343W(Lumen)<br>Mano4336A, Mano4343A, Mars1417X,<br>Mars1717X, Luna1012X |                  |
| Options & Accessories | DAP (Dose Area Product) meter          | 120-131HS (RS485)  |                  |
|                       | Detachable High Resolution Grid        | Grid 1000  |                  |
|                       | Detachable High Resolution Grid Holder | -  |                  |
|                       | Live stream camera                     | HU205  |                  |
|                       | Remote Control                         | Ready-Exposure   |                  |
|                       | DAP(Dose Area Product) Recording       | Workstation  |                  |
|                       | Ion chamber                            | Mobil-AID  |                  |
|                       | Protective Screen                      | Fixed or Folding type  |                  |


**2.2 TOPAZ MECHANIC PART**

| Item                      |                                      | Specification   |  |
|---------------------------|--------------------------------------|---|--|
|                           |                                      | TOPAZ-32D<br>(Basic type)   | TOPAZ-40D<br>(Basic type)                    |
| X-ray Generator           | Nominal Output                       | 32KW  | 40KW   |
|                           | mA Range                             | Max. 400mA  | Max. 500mA                                   |
|                           | KV Range                             | 40 ~ 125 KV<br>(option: 150KV)  | 40 ~ 125 KV<br>(option: 150KV)               |
|                           | mAs Range                            | 0,1 ~ 500mAs  | 0,1 ~ 500mAs                                 |
|                           | Operation Duty Cycle                 | 100kV, 320mA, 100ms<br>/ Rest time : 1min   | 100kV, 400mA,<br>100ms<br>/ Rest time : 1min |
|                           | Type                                 | High Frequency  |  |
| 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   |  |
|                           | Vertical range                       | 640 ~ 2,030 mm (stroke : 1,390mm)<br>Option : 640 ~ 1,860 mm (stroke : 1,220mm)                                       |  |
|                           | X-ray focal spot height              | 630 ~ 2,030 mm<br>Option : 630 ~ 1,860 mm   |  |
|                           | Max. horizontal extension            | 530mm   |  |
| 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,<br>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. 120mm/s  |  |
|                           | Dimension / Weight                   | 583(W) x 1,970(H) x 1,390(D) mm<br>/ 430 kg(948 lbs)<br>Option : 583(W) x 1,800(H) x 1,390(D) mm<br>/ 428 kg(944 lbs) |  |

● **Workstation**

|               |   |
|---------------|---|
| CPU           | Intel(R) Core i3-6100(3.70GHz,3MB Cache) or higher                            |
| Memory        | DDR4 8GB (1x8GB) SO-DIMM or higher  |
| Display       | Intel® HD Graphics 530 (Integrated HD graphics) or higher                     |
| Storage       | 120 GB x 1 SSD (Samsung) or higher + 500GB x 1 SATA HDD or higher             |
| Touch Monitor | 21.5 inch Color LCD, Capacitive Touch, Display resolution: 1920 x 1080 pixels |

● **AP (Access Point)**

|                       |  |
|-----------------------|--|
| Model                 | DAP 2660 (AC 1200)   |
| Product Picture       |  |
| Manufacturer          | D-Link   |
| Standards             | IEEE 802.11n, IEEE 802.11ac  |
| Frequency             | 5GHz / 2.4GHz  |
| Wireless LAN (max.)   | 867Mbps(5GHz)/300Mbps (2.4GHz)   |
| Weight Antennas Type  | 4 internal antennas  |
| AC Power Adapter      | 12V / 1.5A   |
| Regulatory Compliance | CE, FCC, RoHS, KCC   |

|                            |                                   |                                 |                                 |
|----------------------------|-----------------------------------|---------------------------------|---------------------------------|
| Model                      | Mano1417A                         | Mano1717A                       | Luna1012X #                     |
| Active Pixel Area / Matrix | 14 x 17 inch<br>(3,500 x 4,300)   | 17 x 17 inch<br>(4,267 x 4,267) | 10 x 12 inch<br>(2,505 x 3,152) |
| Pixel Pitch                | 100um                             |                                 |                                 |
| Limiting Resolution        | 4.3 lp/mm                         |                                 |                                 |
| Screen                     | Csl                               |                                 |                                 |
| Energy Range               | 40 – 150kVp                       |                                 |                                 |
| A/D Conversion             | 16-bits                           |                                 |                                 |
| MTF                        | @ 1 lp/mm                         | 65%                             | 60%                             |
|                            | @ 2 lp/mm                         | 35%                             | 30%                             |
|                            | @ 3 lp/mm                         | 19%                             | 14%                             |
| DQE                        | @ 0 lp/mm                         | 68%                             | 60%                             |
|                            | @ 1 lp/mm                         | 54%                             | 43%                             |
|                            | @ 2 lp/mm                         | 38%                             | 27%                             |
| Interface                  | Gigabit Ethernet / WiFi(802.11ac) |                                 |                                 |
| Weight                     | 3.0kg (6.6 lbs.)                  | 3.4kg (7.5 lbs.)                | 2.2kg (4.9 lbs.)                |

#: These component are not applied NRTL(CSA mark) Certificate.

\* Luna1012X is not applied CE Certificate.

\* Mars1417X, Mars1717X, Luna1012X detector are NOT used in Brazil installations.

## 2.4 IMAGING SOFTWARE

### 1) General Features

- Windows OS based graphic user interface
- Multi-image display ( 1x1 ~ 4x4 )
- Multi-image selection
- Auto display layout changing function
- X-ray generator control panel
- Unlimited procedure step
- Quick step add feature and image maintenance feature by popup menu
- ROI feature ( support the creation of ROI for each APR by user )
- Maker feature ( support the creation of maker for each APR by user)
- Multi-language support
- EXCEL sheet for language support ( only possible on Microsoft Office automation environment )
- DAP meter ( optional )
- Unlimited PACS code ( CPT code )
- Unlimited Anatomically programmed radiography (APR) support
- Support DICOM Worklist SCU, DICOM Storage SCU and transfer function
- Support DICOM Multi-transfer function
- High-performance post-processing feature
- Copy & Move Images
- Dose monitoring function
- Grid line suppression function
- Reject analysis function
- 9 preset function
- Cobb's angle function
- Tube & line enhancement function
- Detector built-in charger function
- APR positioning guide function
- Auto ROI function
- Screen Locker function
- ROI Masking function
- Authority setting function
- Patient information tag deletion function
- Auto Stitching function to manual type
- MANO Detector power off function
- Live Streaming function
- Blue and Dark Skin GUI
- Support Audit Trail

- Support Period Setting
- Support DICOM Send Monitoring
- Support DICOM Tag Matching
- Support Scatter Reduction image processing parameter
- Support C-Store SCP function

2) Post processing parameters

- MODULE 1
  - ◆ Edge Enhancement: 0 ~ 50
  - ◆ Contrast Factor : 1 ~ 200
  - ◆ Image Frequency : 0 ~ 20
  - ◆ Image Latitude : -10 ~ 10
  - ◆ Sharpness : 0 ~ 100
  
- MODULE 2
  - ◆ Histogram Optimization : -100 ~ 100
  - ◆ Skin line Weight : -100 ~ 100
  - ◆ Latitude Compression : -100 ~ 100
  - ◆ Contrast Enhancement : -100 ~ 100
  - ◆ Edge Enhancement : -100 ~ 100
  - ◆ Noise Suppression : -100 ~ 100
  - ◆ Gamma : -20 ~ 20
  
- MODULE 3
  - ◆ Global Brightness : -100 ~ 100
  - ◆ Global Contrast : -100 ~ 100
  - ◆ Latitude Compression : -100 ~ 100
  - ◆ S-Structure Enhancement : -100 ~ 100
  - ◆ Noise Suppression : -100 ~ 100
  - ◆ Gamma : -20 ~ 20
  
- MODULE 4
  - ◆ Global Brightness : -20 ~ 20
  - ◆ Global Contrast : -20 ~ 20
  - ◆ Local Contrast : 0 ~ 20
  - ◆ Small Enhancement : 0 ~ 20
  - ◆ Latitude Reduction : -20 ~ 20
  - ◆ Noise Suppression : 0 ~ 20
  - ◆ Gamma : -20 ~ 20

### 3) Image Maintenance ( All functions are supported by the pop-up menu )

- ROI : Support the creation of up to 30 of ROI by user
- ROI Shape : Support the shape of rectangle, circle and polygon
- MARK : Support the creation of up to 30 of MARKER by user ( User preset support )
- Arrow Marker
- Overlay Display On/Off
- Horizontal Flip
- Vertical Flip
- Rotate CW
- Rotate CCW
- Fine Rotation : Rotate the image with fine angle (1,2,3,45 degree)
- Line Rotation: Rotate the image by the line angle.
- Inverse (Black or White)
- Text Annotation
- Ruler : Distance tool
- Angle : Angle measurement tool
- Zoom : Image zoom in/out
- Magnify : Image magnify glass window
- Pan : Image panning
- Fit Image : Auto fitting to window size
- 1:1 View : Display 1:1 mapped image between monitor pixels and detector pixels or the real size on screen
- Image Crop : Image crop function / Supported by left double-click mouse
- Image Recovery : Recover the original image
- Image Bright/Contrast control : Supported by right-click mouse
- Module3 Processing Type function (Soft, Standard, Strong)
- Hip Measurement

### 4) CD Burning

- DICOMDIR based CDR data generation
- Support CD/DVD Recording
- Include internal DICOM Viewer
- Support multi-study data

## 5) DICOM Features : DICOM PRINT

- DICOM 3.0 compatible
- Support Print Preview
- Support Film Orientation : Portrait / Landscape
- Support Film Size : 8X10 / 10X12 / 10X14 / 11X14 / 14X14 / 14X17 / 24X24 / 24X30 / 25X30
- Support Film Layout : 1:1 / 1:2 / 2:1 / 2:2 / 3:1 / 1:3 / 3:3 / 4:4
- Support Real size printing
- Support image swap in layout

## 6) DICOM Feature : DICOM STORAGE

- DICOM 3.0 compatible
- Support DX/CR modality ( can be extended for DR and other )
- Support RDSR(Radiation Dose Structured Report)
- Support the modification of Transfer Syntax

## 7) DICOM Feature : MPPS

- Support Modality Performed Procedure Step feature
- Provides only three state : FAILED / IN PROGRESS / COMPLETED

## 8) DICOM Feature : WORKLIST

- Support DICOM Modality Worklist Standard
- Support DICOM Query/Retrieve
- Support Search Filter ( ID / Name / Access Number )

## 9) DICOM Feature : STORAGE COMMITMENT

## 10) DICOM Feature : QUERY/RETRIEVE

## 11) DICOM Feature : VERIFICATION

12) DICOM Feature : TLS

13) Overlay Display on image

- Projection description
- Patient Name / Sex / Age
- kV / mA / Time / mAs
- Feed-back mAs / Feed-back Time for AEC
- EI(Exposure Index) / DI(Deviation Index)
- Window Width/Level
- Overlay can be set by user

14) Image Stitching

- Support 2 ~ 5 images stitching
- Support zoom in/out of all images simultaneously
- Moves single image or all images simultaneously
- Support automatic stitching using 2 point
- Support image clipping
- Adjust window level of single image or all images simultaneously

|                     |                                |               |               |
|---------------------|--------------------------------|---------------|---------------|
| Tube Model          | E7884X                         | DXT-10M       | DXT-12M       |
| Manufacturer        | CANON                          | DRGEM         | DRGEM         |
| Focal Spot Size     | 0.6/1.2mm                      | 0.6/1.2mm     | 0.6/1.2mm     |
| Rating(0.1s)        | 22/54kW@60Hz                   | 17/48kW@60Hz  | 22/54kW@60Hz  |
| Max. Anode HU       | 300kHU(210kJ)                  | 150kHU(111kJ) | 300kHU(210kJ) |
| Target Angle        | 12°                            | 12°           | 12°           |
| Max. kV             | 150kV                          | 125kV         | 150kV         |
| Weight              | 16kg(35.3lbs)                  | 16kg(35.3lbs) | 16kg(35.3lbs) |
| Inherent Filtration | 0.9mmAl/75kV                   | 1.0mmAl/75kV  | 1.0mmAl/75kV  |
| 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.

● **Collimator**

|                     |  |   |
|---------------------|--|---|
| Model               | R108/R108F                                     | DXC-RML   |
| 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<br>(Typ. 250LUX)      | Over 160LUX at 100cm SID  |
| Light source        | Single LED                                     | LED   |
| Standard            | Tape measure, Rotating flange                  | Rotating flange with fixing knob  |
| Option              | Line laser,<br>near port shutters              | Line laser+shutter, Measure tape<br>Near port moving shutters,<br>Mounting flange mechanical detent<br>Accessory guides spring<br>Additional filter, DAP rail |
| Electrical Rating   | 20~30Vac, 30VA, 50/60Hz                        | 12~45V DC 35VA /<br>20~30VAC 35VA - 50~60Hz   |
| Dimension / Weight  | 223(W) x 246(D) x 140(H) mm /<br>6.6kg(14.6lb) | 196(W) x 250(D) x 171(H) mm /<br>7.1kg(15.6lb)  |

## 2.6 OPTION & ACCESSORIES

- **Option**

- **AEC Ion Chamber**

|                 |   |
|-----------------|---|
| Model           | Mobil-AID   |
| Manufacturer    | Mobil-Aid   |
| Field           | 2 Fields  |
| Field size      | Nominal 76 mm (3 inch) diameter by 10mm (0.38 inch) thick |
| Reproducibility | <0.05 coefficient of variation                            |
| Dimension       | 135(W) x 13(D) x 545(H) mm                                |
| Weight          | 1.0kg (2.2lb)   |

- **Accessory**

- **DAP (Dose Area Product) meter**

|                         |  |
|-------------------------|--|
| Model                   | 120-131HS (RS485)                                    |
| Manufacturer            | IBA  |
| DAP Resolution          | 0.01 $\mu\text{Gym}^2$                               |
| Interface               | RS485  |
| Active area             | 115 x 115mm / 146 x 146mm                            |
| Display                 | Integrated or separate display (single or dual line) |
| Dimension               | 158 x 134.5 x 17mm / 180 x 156 x 17mm                |
| Inherent Filtration     | 0.5 mm Al  |
| Power input             | 12 – 29 VDC, 100mA                                   |
| Measurement Uncertainty | $\pm 25\%$   |

- **Detachable High Resolution Grid**

|                |                           |
|----------------|---------------------------|
| Model          | Grid 1000                 |
| Manufacturer   | JPI                       |
| Focal distance | 100, 130, 150, 180cm      |
| Line number    | 103 lpi, 200 lpi, 215 lpi |
| Reason         | 8:1 ~ 12:1                |

#### 4. EXTERNAL VIEWS



TOPAZ (Basic type)