

TNT 12000

X-Ray Test Device

Technical Data



The TNT 12000 X-Ray Test Device is the newest and most versatile instrument available for measuring key x-ray imaging parameters. It sets up in seconds and measures kVp, dose, dose rate, time, and half value layer (HVL) in a single exposure. A totally-wireless ZigBee® interface enables quick and easy setup and the wireless detector can be used with the companion wireless display or a laptop computer.

X-ray imaging QA, calibration, and maintenance in today's demanding digital environment require very high productivity and compliance with local and regional regulations. The TNT 12000 delivers high productivity through 100 % wireless connectivity to either a display, which instantly responds with all values in a single exposure, or a laptop, where measured values are displayed and categorized in organized templates. Instant HVL with just a single exposure further enhances productivity.

Key features

- 100 % ZigBee wireless operation between detector and hand-held display or laptop
- Compact hand-held design for maximum portability and ease-of-use
- Simple user interface with minimum menu routines means setup in seconds
- Fluke Biomedical ruggedness provides reliable operation. It's tough!
- 40 kHz sampling rate to ensure accuracy with the most difficult applications
- Global support network delivering prompt service and peace-of-mind to Fluke Biomedical customers worldwide

Product positioning

The TNT 12000 takes over where other technology leaves off. Featuring all-in-one-exposure measurements and ZigBee wireless communication combined with the rugged, reliable, and accurate design that is a Fluke trademark, the TNT 12000 is truly a new breed of non-invasive x-ray test tool. TNT 12000 is ideal for use by OEM factory and field service engineers, independent service organizations, physicists, biomedical and clinical engineers, and local and regional field inspectors of x-ray imaging equipment. Its small, lightweight design enhances portability and 100 % wireless operation ensures setup can be accomplished in seconds. Because the TNT 12000 measures all parameters with every exposure, there is no need for complicated menu selection, further enhancing user

productivity. TNT 12000 always defaults to the last use when powered on, so when used often for repetitive procedures it is truly a one-button (power-on) solution. The TNT 12000 has the expanded functionality needed for modern applications and can be managed with minimum keystrokes. Users can identify and select custom measurement protocols and save them for future use. Full test automation and documentation software is available for TNT 12000, creating the advantage of accurate, repeatable testing processes. Ansur Test Automation Software is only available from Fluke Biomedical.

Primary end benefit

Productivity and accuracy are central goals when performing any maintenance or QA process on diagnostic imaging equipment because image system uptime is critical to patient care objectives. TNT 12000 is small, portable, and wireless. It is easily transported to the imaging room, set up in seconds, and all results are instantly available on the hand-held display or on the user's laptop. The latter application places measured values into templates that are standard with the Excel software provided with TNT 12000. Because the TNT 12000 Excel package is a spreadsheet, users can customize their templates and create their own reports to send to others. Accuracy, reproducibility, and reliability are also critically important and Fluke Biomedical is the industry standard customers count on to deliver uncompromised performance.

Technical specifications

Physical specifications

Display

320 × 240 Color LCD

Size (WxDxH)

Display: 15.2 cm x 11.4 cm x 4.45 cm (6 in × 4.5 in × 1.75 in)
 Detector: 15.2 cm x 11.4 cm x 4.45 cm (6 in × 4.5 in × 1.75 in)

Weight

Display: 0.422 kg (0.93 lb)
 Detector: 0.68 kg (1.5 lb)

Electrical specifications

Battery

Battery type: Lithium-ion, 3.7 V, 4000 mAh
 Battery charge time: Approx. 5 hr
 Battery discharge time: Approx. 8 hr
 Battery cutoff voltage: 2.75 V

AC adapter

Input voltage: 100 V ac to 240 V ac
 Input frequency: 50/60 Hz
 Input current: 0.5 A (rms)
 Output voltage: 6 V dc

Environmental specifications

Operating temperature

0 °C to 35 °C (32 °F to 95 °F)

Storage temperature

-35 °C to 50 °C
 (-31 °F to 122 °F)

Operating humidity

20 % to 80 % RH
 (non-condensing)

kVp measurements

Units

kVp Average (average of peaks during a specified interval)
 kVp Max (highest peak during a specified interval)
 PPV (peak practical voltage)



Ranges

Radio/Fluoro modes

40 kV to 150 kV

Mammo modes

Mo/Mo: 22 kV to 35 kV

(standard calibration)

Rh/Rh: 25 kV to 49 kV (optional calibration)

Mo/Rh: 22 kV to 40 kV (optional calibration)

Mo/Al: 22 kV to 49 kV (optional calibration)

Rh/Al: 25 kV to 49 kV (optional calibration)

W/Rh: (optional calibration)

W/Ag: (optional calibration)

Resolution

0.1 kV

Accuracy

Radio/Fluoro modes: $\pm 2\%$ or

± 1 kV, whichever is greater

Mammo modes: $\pm 2\%$ or

± 0.7 kV, whichever is greater

Reproducibility

$\pm 1\%$ (std of 5 readings)

Filtration correction range

Radio/Fluoro modes: 1 mm Al to

10 mm Al or equivalent

Mammo mode: 0 mm Al to

0.4 mm Al added filtration

Dose/Exposure measurements

Units

Roentgens, grays

Range

0.5 mR to 999 R

5 μ Gy to 999 Gy

Resolution

1 μ R

0.01 μ Gy

Accuracy

$\pm 5\%$

Reproducibility

$\pm 0.5\%$ (std of five readings)

Filtration correction range

Radio/Fluoro modes: 1 mm Al to

10 mm Al or equivalent

Mammo mode: 0 mm Al to

0.4 mm Al added filtration

kV correction ranges

Radio/Fluoro modes: 40 kV to

150 kV

Mammo mode: Mo/Mo: 22 kV

to 35 kV

Dose/Exposure rate measurements

Units

Roentgens or grays per hour, minute, second, pulse

Range

8 mR/s to 5 R/s

70 μ Gy to 50 mGy/s

130 μ R/pulse to 80 mR/pulse (@ 60 PPS)

1.2 μ Gy/pulse to 0.7 mGy/pulse (@ 60 PPS)

Resolution

1 μ R/s

0.01 μ Gy/s

0.02 μ R/pulse (@ 60 PPS)

0.2 nGy/pulse (@ 60 PPS)

Accuracy

$\pm 5\%$

Filtration correction range

Radio/Fluoro modes: 1 mm Al to

10 mm Al or equivalent

Mammo mode: 0 mm Al to

0.4 mm Al added filtration

kV correction range

Radio/Fluoro modes: 40 kV to

150 kV

Mammo mode: Mo/Mo: 22 kV

to 35 kV

Exposure time—radiographic modes

Units

Milliseconds, pulses

Range (@ stated accuracy)

Milliseconds: 10 ms to 9999 ms

Pulses: 1 pulse to 999 pulses

Resolution

Milliseconds: 0.1 ms

Pulses: 1 pulse

Accuracy

Milliseconds: 1 % or 0.5 ms

Pulses: ± 1 pulse

Reproducibility

Milliseconds: 1 % or 0.5 ms

Pulses: ± 1 pulse

Elapsed time—fluoro modes

Range

10 sec to 9999 sec

Resolution

0.1 second

Accuracy

1 % or 0.5 sec

Average pulse rate—pulsed fluoro

Range

1 pps to 999 pps

(pulses per second)

Resolution

1 pps

Accuracy

1 pps

Average pulse width—pulsed fluoro

Range

10 ms to 999 ms

Resolution

0.1 ms

Accuracy

1 % or 0.5 ms

HVL

Range

Radio/Fluoro modes: 1.2 mm Al

to 10 mm Al (equivalent)

Mammo mode: 0.2 mm Al to

0.6 mm Al (equivalent)

Resolution

Radio/Fluoro modes: 0.1 mm Al (equivalent)

Mammo mode: 0.01 mm Al (equivalent)

Accuracy

Radio/Fluoro modes: $\pm 10\%$ or

0.2 mm Al (equivalent)

Mammo mode: $\pm 5\%$ or

0.05 mm Al (equivalent)

Ordering information

Models

Kit #1

3335763 TNT 12000 X-Ray Test Device

Standard accessories

1320005000 TNT 12000WD

Wireless Detector

1330005000 TNT 12000D

Wireless Display

14-445 (2) AC Adapters/Chargers

50-197 Cable, Type A to Mini B USB

50-198 Cable, Mini A to Mini B USB

1320003000 Excel Software/User

Manual on CD

1320033000 Carrying Case

90-183 ZigBee® USB Dongle

TNT12QRG Quick Start Reference Guide

Kit #2

3335774 TNT 12000WD Wireless

Detector

Standard accessories

1320005000 TNT 12000WD Wireless

Detector

14-445 (1) AC Adapter/Charger

50-197 Cable, Type A to Mini B USB

1320003000 Excel Software/User

Manual on CD

1320033000 Carrying Case

90-183 ZigBee® USB Dongle

TNT12QRG Quick Start Reference Guide

Kit #3

3335795 TNT 12000D Wireless Display

Standard accessories

1330005000 TNT 12000D Wireless

Detector

14-445 (1) AC Adapter/Charger

50-197 Cable, Type A to Mini B USB

50-198 Cable, Mini A to Mini B USB

1320003000 Excel Software/User

Manual on CD

TNT12QRG Quick Start Reference Guide

Optional accessories

35035 mA/mAs Meter

3337356 TNT 12000 Ansur Test

Automation Software Plug-in

About Fluke Biomedical

Fluke Biomedical is the world's leading manufacturer of quality biomedical test and simulation products. In addition, Fluke Biomedical provides the latest medical imaging and oncology quality-assurance solutions for regulatory compliance.

Today, biomedical personnel must meet the increasing regulatory pressures, higher quality standards, and rapid technological growth, while performing their work faster and more efficiently than ever. Fluke Biomedical provides a diverse range of software and hardware tools to meet today's challenges.

Fluke Biomedical Regulatory Commitment

As a medical test device manufacturer, we recognize and follow certain quality standards and certifications when developing our products. We are ISO 9001 certified and our products are:

- CE Certified, where required
- NIST Traceable and Calibrated
- UL, CSA, ETL Certified, where required
- NRC Compliant, where required

Fluke Biomedical.

Better products. More choices. One company.

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