xograph

innovation in medical imaging

Digit-X

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User manual

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1 Welcome

Xograph is a leading independent medical imaging equipment supplier serving both healthcare and NDT organisations in the UK and worldwide.

Since 1967 we have provided innovative imaging technology, supported by a team of manufacturer trained and certified engineers and clinical applications specialists.

Working closely with our corporate partners, we continue to ensure that the latest and most cost-effective technologies are available to all our customers.

2 Your Digit-X

2.1. Overview

The Digit-X is a portable, compact, high quality device for measuring X-ray film optical density.

It is a unique hand-held transmission densitometer combining ease of use with high accuracy and repeatability. The fine fibre-optic probe allows small areas of film to be measured accurately with the reading being displayed on the large clear LCD panel to two decimal places. Battery power means that the Digit-X is not limited in its areas of operation and it is so light – just 175 g – that carrying it from place to place is extremely practical.

Battery usage is minimal and a low battery warning indicator is provided on the digital display.

This manual is intended to provide basic information to help you understand how to successfully put your device into operation and how to operate it in daily use.

2.2. Further Help

Along with this product, you are entitled to email support from Xograph Healthcare's Technical Support Department, who will be happy to assist you with any questions that you may have.

Our contact details are:
Xograph Healthcare, Xograph House, Ebley Road, Stonehouse, Gloucestershire, GL10 2LU, UK.

Technical support: densitometer@xograph.com
General enquiries: enquiry@xograph.com

Latest information on the Xograph product range can be found on our website at xograph.com.

3 Preparing for Use

3.1. Before you Get Started

When you unpack your Digit-X check that you have all of the individual parts that are mentioned in section 3.2. Inspect for any damage that could have occurred during transportation, making sure that the delivery agrees with the delivery note. If you should discover any problems please contact Xograph Head Office where a member of the team will be happy to assist you. (See back cover for details).

3.2. In your Carry Case

- Densitometer
- User Manual

4 Setting up the Device

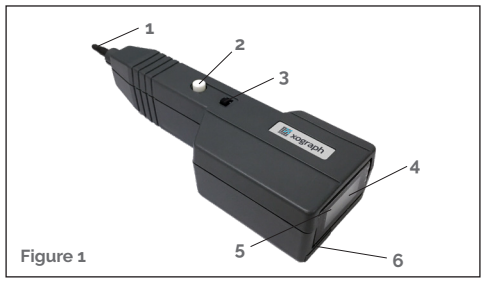

Figure 1

4.1. Indicators on the Device

1 Fibre-Optic Probe
2 Zeroing Button
3 On/Off Switch
4 Digital Density Read-Out
5 Battery Low Indicator
6 Battery Compartment

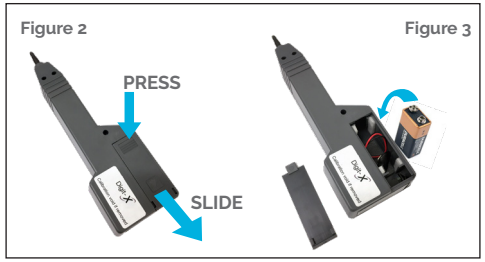

Figure 2

Figure 3

4.2. Step 1: Fitting the Battery

Before use, it is necessary to fit an MN1604 battery. Slide back the battery case cover located on the underside of the unit. Attach and insert a 9 volt battery and close the co

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4.3. Step 2: Taking a Measurement

Switch the device on, a digital readout will be displayed. Before a measurement can be taken it is necessary to zero the unit using the zeroing procedure. It is assumed that the viewing box has been switched on for long enough to have reached a stable light output.

4.4. Step 3: Zeroing Procedure

Select an area of the viewing box that corresponds to the location on the film that you wish to measure. Remove the film from the viewing box and place the probe tip of the Digit-X against the light source at your chosen location and apply slight forward pressure. It is essential that the unit is kept at right angles to the light source at all times during measurement.

Remove the probe tip from the light source and then press the zero button. Your Digit-X is now zeroed and the display reads 0.00, see figure 4.

Figure 4

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4.5. Step 4: Obtaining an Optical Density Measurement

Replace the film on the light box and position the area you wish to measure over the same point on the light source to ensure the validity of the zero point, apply slight forward pressure with the tip of the Digit-X on the surface of the film and then release the pressure, see figure 4. It is essential that the unit is kept at right angles to the light source at all times during measurement. The density reading of the film, including the base fog, is now displayed on the Digit-X.

Re-zeroing is not necessary for further readings on the same film provided that the measurements are taken at the same point used for zeroing, however re-zeroing is recommended when measuring a new film or after two minutes of use. The Digit-X is a stable device but typically there are significant variations in light box output with time and in the light levels across a box.

Important: All subsequent readings MUST be made on the same point of the viewer where the Digit-X was last zeroed.

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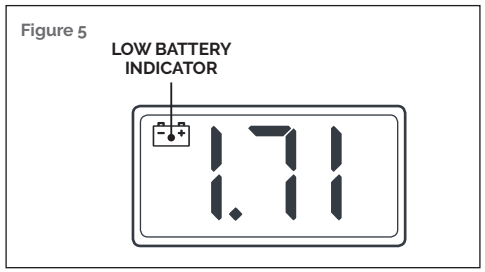
5. Taking Care of your Digit-X

After use it is recommended that you switch the Digit-X off and store in the protective case provided.

Low Battery - A battery symbol will appear in the top left of the display panel to indicate that the battery should be replaced, see figure 5.

Figure 5



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6. Troubleshooting, Hints and Tips

When first powered up the light box illumination levels vary significantly with time. Ensure that the light box is powered on for sufficient time to be stabilised before commencing density measurements.

Viewing box light levels vary both across the area of the platter and with time, be sure to perform the “zeroing procedure” whenever a measurement is to be taken in a different location on the viewing box and every two minutes to allow for variations in light box output.

The Digit-X is designed to measure optical densities in the range 0.00 to 4.00. Where densities greater than 4.00 are encountered requiring operation on light boxes greater than standard light levels, linearity problems can be encountered as the light levels used for zeroing can saturate the sensor preventing the correct readings being achieved.

The sensor must be held square to the face of the film/viewing box to ensure that the light path is closely coupled to the Digit-X sensor. If inconsistent readings are obtained be sure that this is followed.

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7. Calibration and Repair

The Digit-X is supplied fully calibrated on the day of dispatch using a Transmission Density Stepwedge as described under ASTM E 1079-00.

A certificate of calibration is provided with the device. Xograph recommend that the unit is returned to the Technical Support Department for recalibration annually.

For an immediate quotation or for details of our full repair service please contact our Technical Support Department via email at densitometer@xograph.com.

8 Technical Specification

Film Types:	Photographic and X-ray Film
Light box luminance range	
L Spec Digit-X (LED viewing box)	20,000 Cd/m2 to 200,000 Cd/m2
E Spec Digit-X (Line frequency type viewing box)	1500 Cd/m2 to 150,000 Cd/m2
Density Range:	0.00 - 4.00 OD
Aperture:	3 mm
Resolution:	0.01
Accuracy:	±0.05
Repeatability:	±0.02
Display:	3 Digit 12.5 mm LCD
Zero Drift:	Less than ±0.005 per minute
Sensor:	Silicon photodiode with polymer optical-fibre
Power Supply:	PP3 battery or equivalent
Battery Life:	Alkaline MN1604 - 2500 operating hours
Weight:	175 g
Dimensions:	L210 mm, W60 mm (rear), 25 mm (main body), H40 mm
Packed Weight:	720 g
Packed Dimensions:	255 mm x 220 mm x 85 mm
Operating temperature range	10˚ to 30˚C