

# DR 7 NDT



EN Installation and operating instructions



21.221.00011L02 2304V004



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# ! Important information

## 1 About this document

These installation and operating instructions represent part of the unit.

 Failure to comply with the instructions and information in these installation and operating instructions means that Dürr NDT will not be able to offer any warranty or assume any liability for the safe operation and the safe functioning of the unit.


The German version of the installation and operating instructions is the original manual. All other languages are translations of the original manual.

### 1.1 Warnings and symbols


#### Warnings

The warnings in this document are intended to draw your attention to possible injury to persons or damage to machinery.

The following warning symbols are used:

 General warning symbol

The warnings are structured as follows:

 **SIGNAL WORD**  
**Description of the type and source of danger**

Here you will find the possible consequences of ignoring the warning


➤ Follow these measures to avoid the danger.


The signal word differentiates between four levels of danger:

- **DANGER**  
Immediate danger of severe injury or death
- **WARNING**  
Possible danger of severe injury or death
- **CAUTION**  
Risk of minor injuries
- **NOTICE**  
Risk of extensive material/property damage


#### Other symbols

These symbols are used in the document and on or in the unit:

 Note, e.g. specific instructions regarding efficient and cost-effective use of the unit.

 Refer to the accompanying electronic documents.

 CE labelling

 Conformity mark for the United Kingdom of Great Britain and Northern Ireland

 Manufacturer

 Dispose of correctly in accordance with EU Directive 2012/19/EU (WEEE).

 Order number

 Serial number

### 1.2 Copyright information

All names of circuits, processes, names, software programs and units used in this document are protected by copyright.

The Installation and Operating Instructions must not be copied or reprinted, neither in full nor in part, without written authorisation from Dürr NDT.

## 2 Safety

DÜRR NDT has designed and constructed this unit so that when used in accordance with its Intended Use there is no danger to people or property.

Despite this, the following residual risks can remain:

- Personal injury due to incorrect use/misuse
- Personal injury due to mechanical effects
- Personal injury due to electric shock
- Personal injury due to radiation
- Personal injury due to fire
- Personal injury due to thermal effects to skin

### 2.1 Intended use

The sensor is designed exclusively for the generation of X-ray images in an industrial context. The sensor is designed for use of up to 70 kV and a total dosage of up to 20 Gy. Any use above this value can result in deterioration of the image quality and its informative value. In such a case, the guarantee claim expires.

### 2.2 Improper use

Any other usage or usage of the sensor beyond this scope, especially its application for medical purposes is deemed to be improper. The manufacturer accepts no liability for damage resulting from improper usage. In such cases, the user/operator will bear the sole risk.

### 2.3 General safety information

- › Always comply with the specifications of all guidelines, laws, and other rules and regulations applicable at the site of operation for the operation of this unit.
- › Check the function and condition of the unit prior to every use.
- › Do not convert or modify the unit.
- › Comply with the specifications of the Installation and Operating Instructions.
- › The Installation and Operating Instructions must be accessible to all operators of the unit at all times.

### 2.4 Guarantee claim

The guarantee claim will expire if the surrounding conditions are not maintained in operation or the sensor suffers damage as a result of exterior force or overly-high exposure values.

## 2.5 Specialist personnel

### Operation

Unit operators must use their training and knowledge to ensure safe and correct handling.

- › Instruct or have every operator instructed in the handling of the unit.

### Installation and repairs

- › All installation, resetting, alteration, extension and repair work must be carried out either by DÜRR NDT personnel or by a suitably qualified person approved by DÜRR NDT.

## 2.6 Electrical safety

- › Observe and comply with all the relevant electrical safety regulations when working on the unit.
- › Replace any damaged cables or plugs immediately.

## 2.7 Only use original parts

- › Use only those accessories and optional accessories specified or approved by DÜRR NDT.
- › Only use only original wear parts and replacement parts.



DÜRR NDT accepts no liability for damages resulting from the use of non-approved accessories or optional accessories, or from the use of non-original wear parts or replacement parts.

The use of non-approved accessories, optional accessories or non-genuine wear parts / replacement parts (e.g. mains cable) can have a negative effect in terms of electrical safety and EMC.

## 2.8 Transport

The original packaging provides optimum protection for the unit during transport.

Original packing for this unit can be ordered from DÜRR NDT as required.



DÜRR NDT does not accept liability for any damage to the unit resulting from transport in unsuitable packaging, even during the guarantee period.

- › Only transport the unit in its original packaging.
- › Keep the packing materials out of the reach of children.

## 2.9 Disposal

### Unit



The unit must be disposed of properly. Within the European Union, the unit must be disposed of in accordance with EU Directive 2012/19/EU (WEEE).

- › If you have any questions concerning the correct disposal of the product, please contact DÜRR NDT or your specialist supplier.

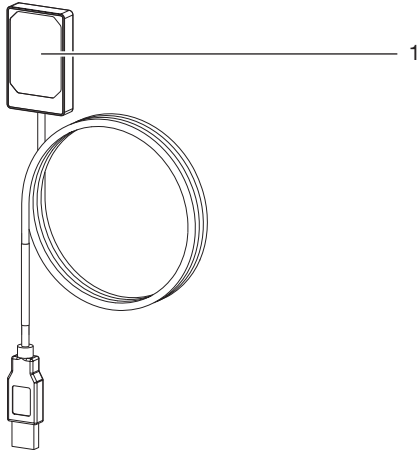
## 2.10 Protection from threats from the Internet

The unit is to be connected to a computer that can be connected to the Internet. Therefore, the system needs to be protected from threats from the Internet.

- › Use antivirus software and update it regularly. Look for evidence of possible virus infection and, if applicable, check with the antivirus software and remove the virus.
- › Perform regular data backups.
- › Restrict access to units to trustworthy users, e.g. via a user name and password.
- › Make sure that only trustworthy content is downloaded. Only install software and firmware updates that have been authenticated by the manufacturer.

 Product description

### 3 Overview



1 Sensor

#### 3.1 Scope of delivery

The following items are included in the scope of delivery:

**DR 7 NDT** . . . . . **2122100013**

– Sensor

#### 3.2 Optional accessories

The following optional items can be used with the device:

USB cable extension 4.8 m . . . . . 2106-155-63

DR 7 holder complete SET . . . . . 2122100015

DR 7 mounting frame SET . . . . . 2122100023

## 4 Technical data

### 4.1 Unit

#### Electrical data

Rated voltage	V DC	5
Nominal current	mA	100

#### General technical data

Dimensions W x H x D	mm	31.5 x 50.0 x 8.3
	in	1.24 x 1.97 x 0.33
Cable length sensor	m	4.5
	in	177.17
Max USB cable extension	m	4,8 (see "3.2 Optional accessories")
	in	188.98
Computer connection		USB 2.0 Compatible with USB 3.0

#### Sensor characteristics

Active sensor size W x H	mm	26 x 36
	in	1.02 x 1.42
Min. pixel size	µm	19
Max. no. pixels		1368 x 1896
Theoretical resolution	LP/mm	26.3
Sensor type		CMOS
Scintillator		Structured CsI scintillator on fibre-optics
Maximum voltage in free beam path	kV	70
Maximum total dosage	Gy	20

### 4.2 Ambient conditions

#### Ambient conditions during operation

Temperature	°C	10 - 35
	°F	+50 to +95
Humidity	%	< 80
Air pressure	hPa	750 - 1160
Height above sea level	m	< 2000
	ft	< 6562

#### Ambient conditions during storage and transport

Temperature	°C	-20 to +60
	°F	-4 to +140
Humidity	%	10 to 95
Air pressure	hPa	750 - 1160



**Ambient conditions during storage and transport**

Height above sea level	m	< 16000
	ft	< 52493

### 4.3 Type plate

The type plate is located on the sensor cable and on the case.

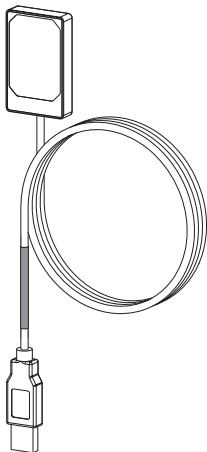


Fig. 1: Type plate on the sensor cable

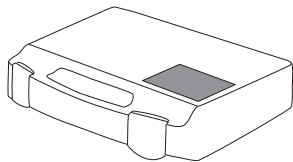


Fig. 2: Type plate on the case

REF Order number/type number

SN Serial number

### 4.4 Evaluation of conformity

This device has been subjected to conformity acceptance testing in accordance with the current relevant European Union guidelines. This equipment conforms to all relevant requirements.

## 5 Operation

The X-ray sensor is connected to the computer via the sensor cable.

The sensor is placed and activated via an imaging software (e. g. D-Tect).

During the X-ray procedure, the x-rays are received by the scintillator (luminescent material) installed on the sensor and are converted into beams of light. These light beams are recorded by the sensor as image information, digitalised and transferred to the computer. If an error occurs during the transfer, the image information is sent again.

No further X-ray image is possible during data transmission.

 Assembly

## 6 Requirements

- › The unit may only be operated given compliance with the locally-applicable legal specifications (e. g. Röntgenverordnung (German X-ray Directive)).
- › The unit must not be operated in a damp or wet environment (closed room / outside) (see "4 Technical data").
- › Do not subject the unit to direct sunlight or heat.
- › The setup room may not contain any major interference fields (e. g. strong magnetic fields). They could cause faults in the unit.

### 6.1 System requirements



For details of the system requirements for computer systems, refer to the separate information sheet (order number 9000--608--02) or visit the website at [www.duerr-ndt.de](http://www.duerr-ndt.de).

## 7 Installation

### 7.1 Electrical connections

#### Combining devices safely

Take care when connecting units together or to parts of other systems as there is always an element of risk (e.g. due to leakage currents).

- › Only connect units when there is no danger to the operator or to the environment.
- › Only connect units when it is safe to do so and when there is no risk of damage or harm to the surroundings.
- › If it is not 100% clear from the unit data sheet that such connections can be safely made or if you are in any doubt, always get a suitably qualified person (e.g. the manufacturer) to verify that the setup is safe.
- › Only connect peripheral units (e.g. computer, monitor, printer) that conform at least to the requirements set out in the standards IEC 60950-1 (EN 60950-1) or IEC 62368-1 (EN 62368-1).

#### Connecting the unit to the computer



#### NOTICE

##### Damage to the sensor

The interior parts of the sensor can be damaged by mechanical forces.

- › Do not drop the sensor.
- › Do not subject the sensor to any pressure.
- › Do not fold, clamp or crush the cable.
- › Do not carry the sensor by the cable.

- › Connect the sensor USB connector to a free socket on the computer.

### 7.2 Install driver(s)

The drivers for the DR 7 NDT are automatically installed with the installation of D-Tect (from version 9.5) or D-Tect X.

- › Connect the sensor USB connector to a free socket on the computer.  
The unit is initialised automatically.


## 8 Configuration

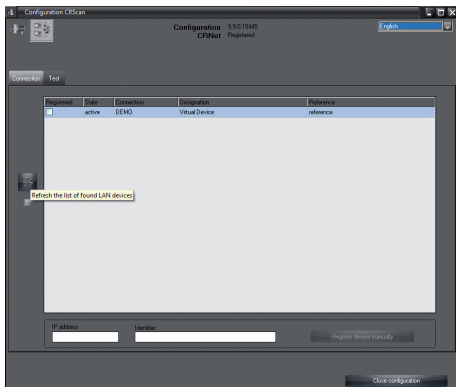
The unit supports the following imaging programs:

- D-Tect
- ScanX View
- D-Tect X
- Third-party software on request

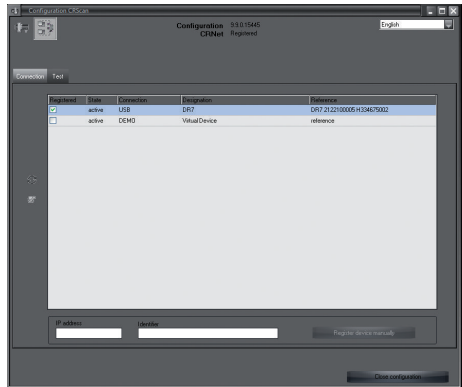
### 8.1 Configuring the device in CRConfig / D-Tect 9.x.x and ScanX View

Requirements:

- ✓ DR 7 licence for D-Tect software present.
- › Select *Start > All programs > Duerr NDT > D-Tect9.x.x.*
- or
- In D-Tect go to the tab page *Config. > Modules*  and double-click *CRNet*.
- › Activate the connected unit in the *Registered* column.




- › Change the unit name (*Designation*) as required.

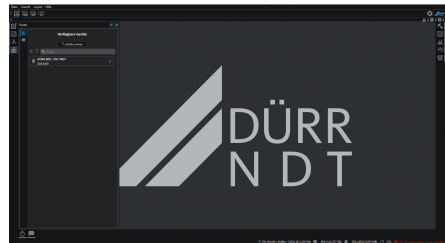


- › Click *Apply* to save the configuration.

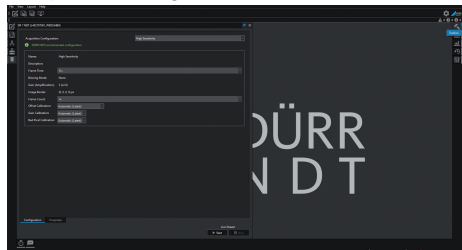
### 8.2 Configuring the unit in D-Tect X

- › Select *Start > All programs > D-Tect X.*
- › Start *D-Tect X.*
- › In D-Tect X click .

The connected device is displayed.



- › If the device is not shown, enter the device name in the *Find* field and click the button *Find devices.*
- › Double-click the displayed device.
- › Adjust the configuration.



- › Click Live Stream *Start.*

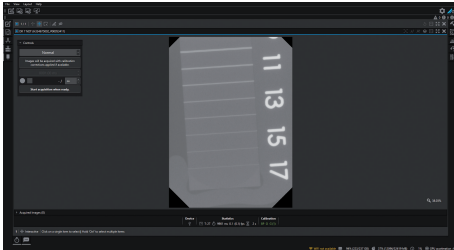
› Start irradiation.



**NOTICE**

**Sensor damage and deterioration of the image quality resulting from high exposure values in the free beam path**

- › With exposure values > 70 kV, protect the sensor accordingly.
- › Comply with the maximum total dosage of 20 Gy.

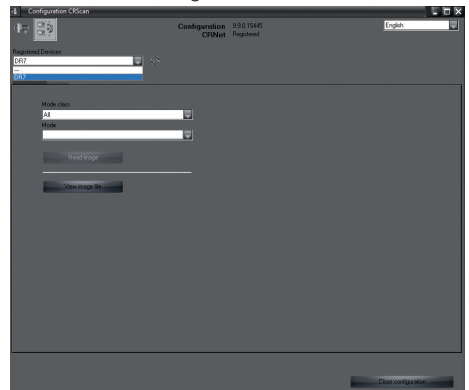


› Close the imaging program.

## 9 Testing the device

A X-ray image can be taken to test whether the unit has been connected correctly.

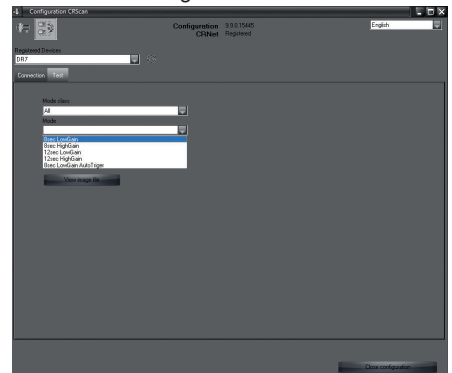
› Select the **Test** registration card.



› Select the unit from the *Registered Units* list.

› Select the mode class and mode.

› Click on **Scan Image**.



› Acknowledge the warning message W10014 .

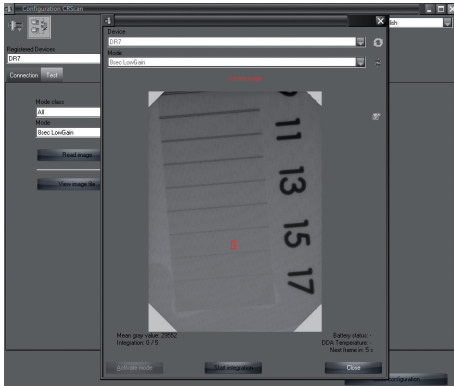
› Start irradiation.



**NOTICE**

**Sensor damage and deterioration of the image quality resulting from high exposure values in the free beam path**

- › With exposure values > 70 kV, protect the sensor accordingly.
- › Comply with the maximum total dosage of 20 Gy.



› Close the imaging program.

 Usage

## 10 Operation

Before creating X-ray images, first calibrate the device with the aid of the imaging software.

- Offset calibration
- Gain calibration
- Pixelmap calibration.



Further information about calibration and image acquisition can be found in the relevant handbook for the imaging software.



### NOTICE

#### Damage to the sensor

The interior parts of the sensor can be damaged by mechanical forces.

- › Do not drop the sensor.
- › Do not subject the sensor to any pressure.
- › Do not fold, clamp or crush the cable.
- › Do not carry the sensor by the cable.



### CAUTION

#### A damaged sensor can result in the issue of materials which damage health

- › Check the sensor and cable for damage before every use.
- › Do not use a damaged sensor.



### NOTICE

#### Short circuit due to the build up of condensation

Strong temperature fluctuations can damage the unit.

- › Only commission the unit once it has warmed up to room temperature.
- › Do not subject the unit to strong temperature differences (heating max. 3 °C/min). Exception: short-term use of the sensor at a temperature of up to 45 °C. This could produce increased levels of inherent noise in the image.

## 11 Cleaning



### NOTICE

#### Equipment damage from moisture in the plug

- › Do not spray the USB connector.

- › Unplug the unit.
- › Remove any soiling with a soft, damp, lint-free cloth.
- › Allow the unit to dry completely before using it.

## 12 Maintenance

The appliance is maintenance-free.



# Troubleshooting

## 13 Tips for operators and service technicians



Any repairs exceeding routine maintenance may only be carried out by qualified personnel or our service.

### 13.1 Poor X-ray image

Error	Possible cause	Remedy
No image transmission, despite X-ray image having been triggered	X-ray dose too low	› Correct the exposure values.
Artefacts in image	The sensor is damaged from mechanical force	› Replace the sensor.
	The sensor has suffered damage from excess exposure values (see "4 Technical data")	› Replace the sensor.
X-ray image too dark/bright	Incorrect exposure time set	› Correct the exposure time.

### 13.2 Software error

Error	Possible cause	Remedy
The operating system does not recognise the unit	A different USB unit is blocking the USB port	› Remove the blocking USB unit.
Error code E-0012	The unit driver has not been installed correctly	› Install the unit driver afresh (see installation and configuration manual).
Error code E-0077	Software installation corrupt	› Inform your Service Technician.
Error code E-1001	The unit is not connected	› Connect the unit to the USB port.
	Unit is defective	› Inform your Service Technician.
Error code E-1002	Multiple sensors are connected to the computer at the same time	› Disconnect the sensors not required. Only a single sensor may be connected to the computer at any one time.
Error code E-1008	Sensor connected with over-long or incorrect USB extension	› Only use the USB extension listed in the optional accessories.
	The computer USB port is unsuitable for the data rate	› Connect the sensor to a different USB port.
Error code E-0012	The unit driver has not been installed correctly	› Install the unit driver afresh (see installation and configuration manual).

Error	Possible cause	Remedy
<b>Error code E-1020</b>	The current state of the sensor does not permit image acquisition	› Disconnect and reconnect the USB connection cable.
	Sensor defective	› Inform your Service Technician.
<b>Error code E-1026</b>	Incorrect acquisition mode	› Select a different acquisition mode › Inform your Service Technician.
<b>Error code E-2006</b>	No acquisition mode selected	› Select the desired acquisition mode.
<b>Error code E-10014</b>	Sensor calibration data not installed	› Install the sensor calibration data (see installation and configuration manual).
<b>Error code E-10016</b>	Sensor calibration data incorrect	› Inform your Service Technician.





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