User Manual

TC7000
Thermal Imaging Camera

Supplied by

247able.com

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CorDEX

CONNECT

USER MANUAL

TC7000
INTRINSICALLY SAFE THERMAL IMAGING CAMERA

RUGGED AUTHORITY

www.cord-ex.com

Congratulations – You are the owner of the first fully **radiometric thermal imaging camera** designed and certified specifically for use in **hazardous (explosive) atmospheres.**

TC7000 is certified ATEX/IECEx as follows:

- Ex ib IIC T4 Tamb -10°C to +40°C (Vapour)
- Ex ib IIIC T200°C Db Tamb -10°C to +40°C (Dust)
- Ex ib I Mb (Mining)

Please ensure that the certification matches or exceeds the hazardous area characteristics that will be clearly displayed on site.

Whilst in a hazardous area, do not attempt to change batteries or download images, these tasks should only be undertaken after returning to a safe area.

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GETTING TO KNOW YOUR TC7000

1 Neck Strap Points

2 RFID Scanner

3 Focus Ring

4 Wrist Strap Points

5 USB Connection Point

6 135° Swivel Lens

1 Image Save

2 Power Switch

3 View Key

4 Menu Key

5 Span +

6 Span -

7 Level +

8 Level -

9 Joystick

GETTING STARTED

1

Check the contents of your TC7000. The shipping case should include the following items:

- TC7000 Thermal Imaging Camera
- USB Communication Wand
- USD Documentation Key
- Certificate of Conformity
- Neck Strap
- Rechargeable Battery Pack
- Lens Cleaner
- Wrist Strap
- Access key
- Battery Charging Station and Mains Charging unit

2

Please ensure that you fully charge the battery prior to use. The battery is charged using the docking station supplied.
(See page 7.)

3

Before using TC7000 consider the objects that you are going to image. Will you use comparative thermography (simply looking for temperature difference) or are you going to attempt to make an accurate temperature measurement?

4

For comparative thermography, do not amend the emissivity setting and leave this constant every time you carry out imaging. Temperature differences over time will then be valid although the ambient temperature may have changed as well as the electrical or mechanical load of the object.

5

For accurate thermal measurement the emissivity of the object will need to be considered and the camera emissivity setting corrected.

In addition background and reflected ambient will need to be considered as well as thermal and solar reflection and relative humidity.

Please Note: It is recommended that users attend formal thermography training to understand the implication of these parameters.

A GUIDE TO CHARGING YOUR TC7000

1

Remove the battery from the battery compartment of the camera.

2

Plug the mains charging unit to a mains circuit and plug the jack from the charging unit into the battery station.

3

Insert the battery into the battery charging compartment on the battery charging station. A green light will show that the unit has power. The charging light on the charging unit will flash amber whilst the charger assesses the charge held on the battery. Following this a solid amber light will be displayed showing that the unit is charging.

4

When the amber light is no longer displayed, the battery is fully charged.

5

Remove the battery from the charging compartment.

6

Insert the battery pack into the camera paying careful attention to the orientation of the pack.

7

Insert the battery pack into the camera paying careful attention to the orientation of the pack.

8

Remove battery when the camera is no longer in use. DO NOT REMOVE BATTERY WHILST IN HAZARDOUS AREA.

1
Rechargeable/Removable Battery

2
Mains Charging Unit

3
Battery Charging Station

A GUIDE TO YOUR HOME SCREEN

1
RFID Tag Status Bar

2
Temperature Reading Spot #1

3
Temperature Spot #1

4
Maximum Image Temerature

5
Temperature Scale

6
Minimum Image Temperature

7
Battery Charge Indicator

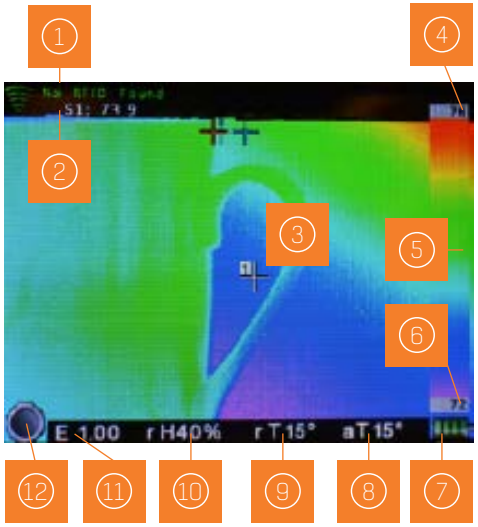
8
Ambient Temperature Selected

9
Reference Temperature Selected

10
Relative Humidity Selected

11
Emissivity Selected

12
IW Transmission Correction Icon



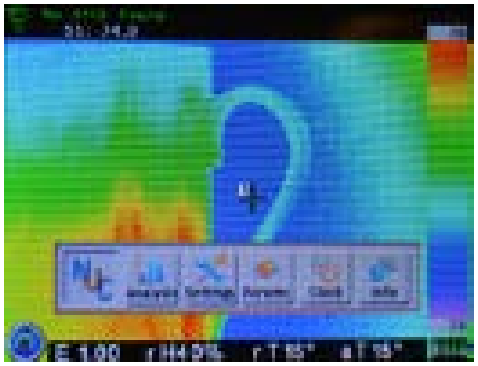
FOCUS

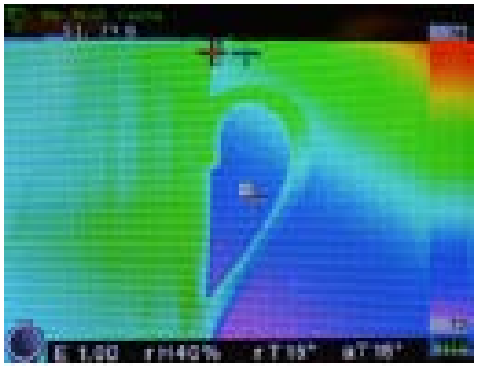
- Correct focus is critical in producing an effective thermal image. Slowly rotate the knurled orange Focus Ring on the front of the lens until the object is clearly in view. You may find that the best focus is easier to achieve using a grey scale palette. Make sure that you focus on the object to be measured rather than the background.

CREATING A THERMAL IMAGE

- Switch on the TC7000 by pressing and holding the power switch for at least 3 seconds.
- Ensure auto Level/Span is enabled. (See Settings section on P.13)
- Ensure that camera is correctly focused.
- You should now see a high quality thermal image and be able to discern small spatial and temperature differences.
- Spots (crosshairs) can be moved by using the joystick. The temperature at that point is displayed on the top left of the display. When the crosshair is highlighted, pressing and holding the joystick will allow the emissivity of that spot only to be changed.

- Pressing the joystick again will highlight each spot in turn. This is followed by the option for the TC7000 to scan for an RFID tag. Place the top front of the camera within 5 cm of an RFID tag and press/hold the joystick again. The RFID tag information will be displayed and can be edited. (See detailed RFID Section on P.11)





MENU SELECTION

- All other camera settings and features are selected through the menu button. Press this once to display 6 icons.
- When the NUC icon is highlighted one press of the joystick will perform a manual Non Uniformity Correction (NUC). This should not be required in normal use as the NUC is carried out automatically when required. A distinct click will be heard when the NUC is performed and the thermal image will be refreshed. A manual NUC may be required when moving to different ambient temperatures but very frequent NUC operation will seriously impact battery life.
- When the analysis icon is highlighted moving the joystick down will cycle through crosshair (spot) selection (0,1,2 or 3), maximum temperature display (within entire image), minimum temperature display (within entire image). (See detailed analysis section on P.12)
- The settings icon enables the user to select or deselect all of the display settings. (See detailed Settings section on P.13)
- The parameters icon allows all the measurement parameters of the thermal image to be altered to increase temperature measurement accuracy. These include emissivity, ambient temperature, atmospheric temperature, relative humidity and target distance. (See detailed parameters section on P.14)
- The clock icon enables setting of all time and date information.
- The info icon displays camera serial number, internal memory used, remaining internal memory and battery capacity.

RFID

- When an RFID tag is located an RFID details menu will be displayed which shows the hexadecimal identification of the RFID tag.
- It is recommended that an alias is then added for future identification the tag location . Use the joystick to highlight the alias section (complete with selecting OK) and then input a simple description through the qwerty options (complete with selecting OK - this can be edited later in CorDEX CONNECT)
- Select whether the RFID Tag is built into a CorDEX IR window (IW2000, IW3000, IW4000) or if it is a stand alone tag (NON CDX).
- With the RFID tag editing complete select SAVE to store this information for future use.

ANALYSIS

There are three settings in the analysis menu:

1

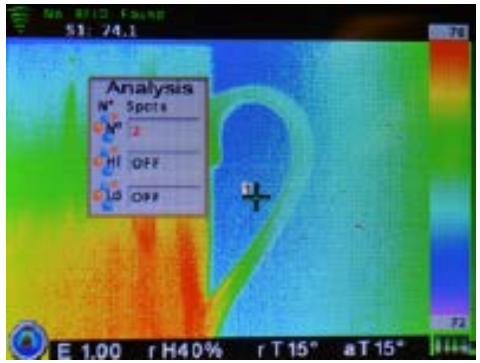
The No. spots icon allows choice of 0, 1, 2 or 3 temperature spots (crosshairs) within the display that will update in real time

2

The Hi icon enables and disables display of maximum temperature within the image as a red spot (crosshair). This temperature will be the same as the top of the temperature range in auto span/level.

3

The Lo icon enables and disables display of minimum temperature within the image as a blue spot (crosshair) This temperature will be the same as the bottom of the temperature range in auto span/level.



SETTINGS

There are 10 icons in the Settings Menu

1

The Scale Icon toggles the display of the temperature colour scale.

2

The Info Fields Icon allows display of relative humidity only, reference and ambient temperatures only, emissivity only or all.

3

To Save battery life the Auto Off Icon allows a choice of 2, 5 or 10 minutes of no activity before auto off. The off setting disables this feature.

4

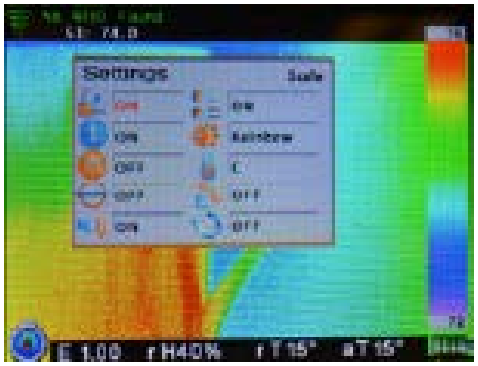
The Auto S/L Icon toggles between enabling the auto span and level setting where highest and lowest temperatures seen within the image are always displayed and manual level and span where the user can manually select span and level to adjust displayed temperature range.

5

The Voice Tag Icon enables and disables voice annotation when saving files.

6

The Text Tag Icon enables and disables text annotation when saving files.



7

The Palette Icon allows the user to choose between greyscale (black hot), greyscale (white hot), ironbow, hotmetal, rainbow, amber and sepia colour palettes.

8

The Temperature Units Icon allows the user to choose either Celsius, Fahrenheit or Kelvin temperature display

9

The Temperature Units Icon allows the user to choose either Celsius, Fahrenheit or Kelvin temperature display

10

The Periodic Save Icon allows the user to set the camera to automatically save an image every 10 seconds, 30 seconds or one minute. (This is the same as pressing the image save button on the camera)

PARAMETERS

There are 5 icons in the parameters menu all allowing the user to input temperature measurement parameters to increase measurement accuracy.

1

The Emissivity Icon accepts input of object emissivity.

2

The Amb Temp Icon accepts input of object ambient temperature.

3

The Atmos Temp Icon accepts input of atmospheric temperature.

4

The Rel Humidity Icon accepts input of relative humidity.

5

The Target Dist Icon accepts input of camera distance from target object.

LEVEL/SPAN

- Two settings are fundamental to obtaining an effective thermal image, the first is clear focus and the second is the correct thermal range which is adjusted by Level and Span Settings.
- With Auto Level and Span enabled in the Settings Menu the range is automatically adjusted to display both the hottest and coldest temperature within the field of view.
- When more sensitivity is required level and span must be set manually by disabling auto level/span in the Settings Menu and using the L+/Land S+/S- buttons on the rear of the camera. Start by increasing the span (sensitivity) to the required setting and then increase or decrease the level (range) so that the object is visible at the required sensitivity.

STORING AND ANALYSING IMAGES

- The Image Save Button on top of the handgrip is used to store images (except when periodic save is enabled).
- When you want to save an image, press the Image Save Button and a Save Image menu will appear. Use the joystick to select yes and press joystick to save.
- If RFID scan is enabled in the Settings Menu you will be asked to scan an RFID tag to link the saved image to a location.
- If text annotation is enabled in the Settings Menu you will be asked to select one of 4 pre-programmed text comments. After this the image is stored in the camera memory.
- If voice annotation is enabled in the Settings Menu you will be asked to record your message. Press the joystick on the Record Button, speak (maximum ten seconds) and then press the joystick on the Stop Button to finish.
- To review saved images within the camera press VIEW on the rear of the camera and use the joystick to select the image required. Pressing the joystick will display the stored image full size on the camera display showing all of the parameters displayed when the image was saved. Moving the joystick up and down will change the display colour palette.

Certificate Information	
ATEX / IECEx Certificate No	TRAC12ATEX0037X / IECEx TRC 12.0019X
ATEX / IECEx Certificate Types	• Ex ib IIC T4 Gb Tamb -10°C to +40°C (Vapor) • Ex ib IIIC T200°C Db Tamb -10°C to +40°C (Dust) • Ex ib I Mb (Mining)

Temperature Information	
Measurement Range	-4°F to 1112°F (-20°C to +600°C)
Accuracy	± 2°C or 2% of reading

Imaging	
Image Frequency	9Hz
Detector	320 x 240 uncooled microbolometer
Thermal Sensitivity/NETD	50mK
Spectral Range	8µm to 14µm
Field of View (FOV)	25° x 20.5°
Spatial resolution (IFOV)	1.38 mrad
Minimum focus distance	≈ 4" (10cm)
Lens	F 1.2

Image Capture	
File Storage	8GB
File Formats	CDX (Radiometric) JPEG (Non-radiometric)
Voice Annotation	YES
RFID Tag Reader	• Operates with 13.54MHz passive tags • Detection range up to 5cm (1.9in) • SupportsISO/IEC15693-2,ISO/IEC18000-3 tag formats

General	
Operating Temperature	-4°F to 104°F (-20°C to +40°C)
Storage Temperature	-40°F to +158°F (-40°C to +70°C)
Display	3.2" Backlit LCD
Software	CorDEX CONNECT (Included)
Batteries	Removable and Rechargeable
Battery Life	Upto 8 hours

TRaC testing regulatory and compliance

EC TYPE EXAMINATION CERTIFICATE

2 Equipment or protective system intended for use in potentially explosive atmospheres – Directive 94/9/EC – Annex III

3 EC Type Examination Certificate No.: **TRAC12ATEX0037X (incorporating variation V1)**

4 Equipment: **Intrinsically Safe Digital Camera DC6000 and TC7000 Thermal Imaging Camera**

5 Manufacturer: **CorDEX Instruments Ltd.,**

6 Address: **Unit 1 Owens Road, Skippers Lane Industrial Estate, Middlesbrough, Cleveland, TS6 6HE, United Kingdom**

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 TRaC Global Ltd, Notified Body number 0891 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment or protective system intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential reports **TRA-010226-33-00A, TRA-010226-33-01A & TRA-017824-33-00A**.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in section 18 of the schedule to this certificate, has been assured by compliance with:
EN60079-0:2009 **EN60079-11:2012**

10 If the sign "X" is placed after the certificate number then this indicates that the equipment or protective system is subject to special conditions of safe use specified in the schedule to this certificate.

11 This EC-Type Examination certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of this equipment or protective system shall include the following:
II 2G Ex ib IIC T4 Gb **Tamb -10°C to 40°C**
II 2D Ex ib IIIC T200°C Db
I M2 Ex ib I Mb

This certificate and its schedules may only be reproduced in its entirety and without change. This certificate is issued in accordance with the TRaC Ex Certification Scheme.

S P Winsor, Certification Officer
Issue date: 2014-03-28
Copy No.: 1e
Page 1 of 7
Form RF355 is16A

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www.tracglobal.com

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx TRC 12.0019X	Issue No: 1	Certificate history: Issue No. 1 (2014-03-28)
Status:	**Current**	Page 1 of 5	Issue No. 0 (2013-03-22)
Date of Issue:	**2014-03-28**		

Applicant: **CorDEX Instruments Ltd.,**
Unit 1 Owens Road,
Skippers Lane Industrial Estate,
Middlesbrough,
Cleveland,
TS6 6HE
United Kingdom

Electrical Apparatus: **Intrinsically Safe Digital Camera DC6000 and TC7000 Thermal Imaging Camera**

Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking:

Ex ib IIC T4 Gb Tamb -10°C to 40°C

Ex ib IIIC T200°C Db

Ex ib I Mb

Approved for issue on behalf of the IECEx Certification Body: Stephen Winsor

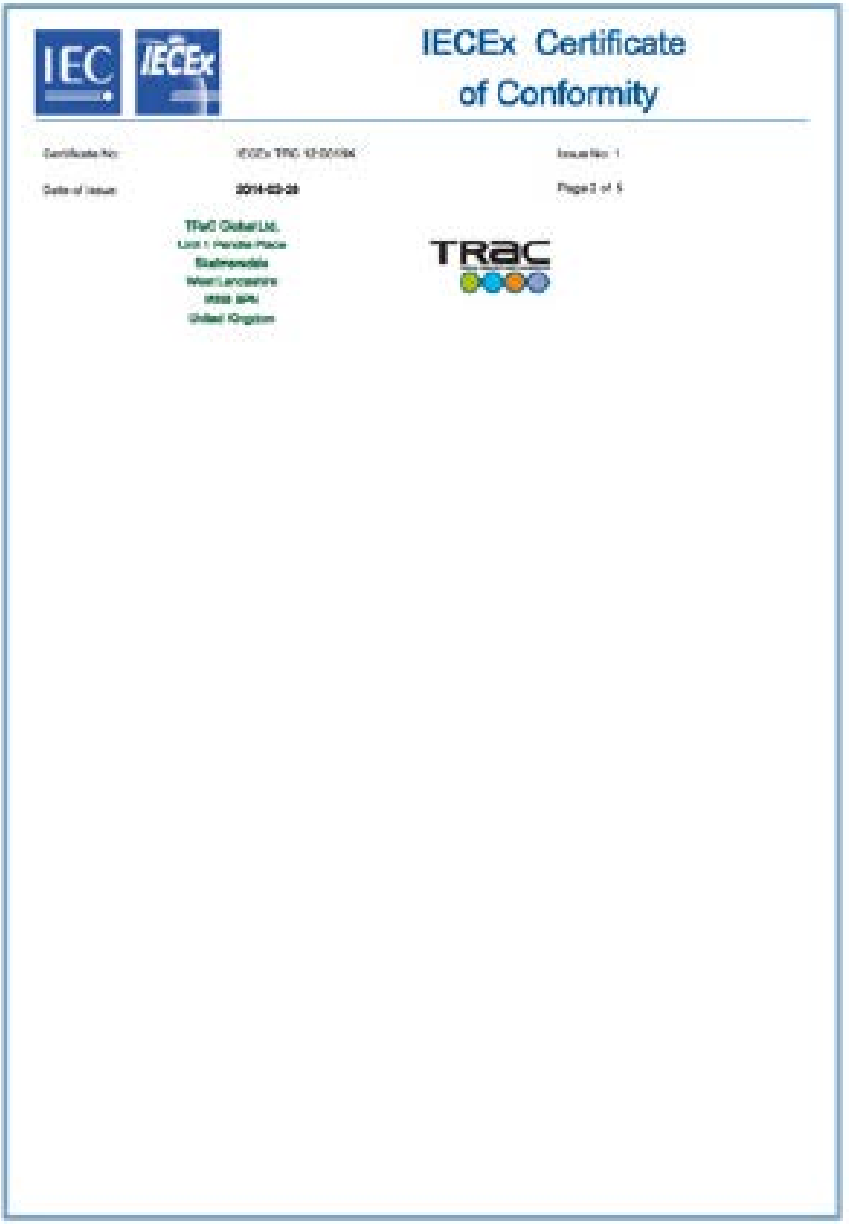
Position: Certification Officer

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:



TEN SUGGESTIONS FOR THERMOGRAPHY BEST PRACTICE

1

Ensure that the electrical or mechanical system you are imaging is running fully loaded to highlight thermal anomalies. A fully loaded system will generate higher temperature differential making it simpler to identify problems.

2

Ensure your image is in focus – this is important not only for image clarity but also accurate temperature discrimination and measurement. Focus should always be set to the object being measured even if this means that a surrounding area may be out of focus.

3

If working in a Zone 1 Hazardous area, ensure that your thermal imaging camera is marked with the appropriate certification to avoid risk of explosion. Employers are required to identify hazardous areas clearly for both employees and contractors.

4

If you are looking for temperatures above or below a temperature threshold, use an isotherm or maximum temperature within an area feature to clearly highlight any excess. These features save time and increase awareness as surveys can take several hours where fatigue could cause an important anomaly to be overlooked.

5

Observe a scene from different angles to minimise thermal reflection as an unusual warm area could just be your own thermal reflection. Minimise solar reflection on display screens outdoors by changing your stance or swivelling the lens to eliminate reflection.

6

Always consider the object emissivity first if you want to come close to an accurate temperature measurement, but remember that regular comparative thermography will also show temperature changes leading to potential failure.

7

For comparative thermography, ensure that thermal camera settings and especially emissivity remain consistent. Ideally system load should also be similar although this is often impractical.

8

Use infrared windows to image electrical switchgear under full load in safety. Never open cabinet doors or override protection devices, this will put you at serious risk of injury from arc flash. Even a change of airflow or dust and debris being dislodged can trigger an arc flash incident.

9

Always store images and relate them where possible to visible images when building a Report. This makes it easier to pinpoint the fault for scheduled maintenance. Choose a reporting software package that makes this process simple and consider installing RFID tags to link measurements from different technologies to one specific location.

10

Report critical items separately in the Report and draw attention to them clearly – the whole idea of thermography for preventive maintenance is to find faults and fix them before they cause a breakdown and loss of production or uptime. Choose a report software package that creates a scheduled job sheet to pass straight to the maintenance engineer.

Ref.ID 7000-MAN, Rev.A

CorDEX

CONNECT

INSTRUCTIONS FOR SAFE OPERATIONS

TC7000
INTRINSICALLY SAFE THERMAL IMAGING CAMERA

RUGGED AUTHORITY

www.cord-ex.com

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Safety Regulations 3
Special conditions for safe use 3

Labelling **4**

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ATEX / IECEx Certificate 8

READ THIS FIRST

The CorDEX Instruments TC7000 intrinsically safe thermal imaging camera is designed for non-contact temperature measurement. Read and understand all Warnings and Cautions before using this product.

Safety Information

This instruction manual contains information and warning that must be observed for safe operation under the conditions described.

Faults and Damage

If there are any grounds for believe the unit is no longer safe to use, it must be taken out of service and measures taken to prevent its further unintentional use. The safety of the device may be impaired if, for example:

- External damage to the unit is visible
- The device has not been stored correctly
- The unit has suffered transport damage

Safety Regulations

When using the TC7000, the appropriate regulations must be observed to avoid incorrect operation of the unit.

ATTENTION! Ensure that the case is securely fastened when using the device. The device must not be opened in the hazardous area.

Special Conditions for Safe Use

- The TC7000 Intrinsically safe thermal imaging camera is powered by a Lithium Ion, rechargeable battery pack.
- Do not remove or replace batteries within the hazardous area.
- The battery pack must be removed from the equipment in the safe area when charging and the battery pack can only be charged in the safe area.
- USB terminal must only be connected in the safe area.
- For M2 only, the equipment must be de-energized and removed from the hazardous atmosphere is detected.

LABELLING

CorDEX Instruments Ltd. 1 Owens Rd, Middlesbrough, TS6 6HE, UK

TC7000- Thermal Camera

I/II M2/2 GD

0518

Ex i.b. IIC T4 GbTamb -10°C to +40°C
Ex i.b. IIIC T200°C DbTamb -10°C to +40°C
Ex i.b. I Mb
ATEX - TRAC12ATEX0037X
IECEx - IECEx TRC 12.0019X
Serial Number- XXXX-XX-XXXX
Year of Construction- YYYY
Powered by - Refer to Manual

DO NOT OPEN WHEN EXPLOSIVE ATMOSPHERE PRESENT

OPERATIONAL CAUTIONS

The cautions contained in this section do not relate specifically to safe use in hazardous area applications but should be followed to help prevent damage to the device or personnel.

- Keep out of reach of children
- The TC7000 is a precision instruction. Do not drop it, strike it or use excessive force when handling

Maintenance

For safety critical maintenance, please refer to EN60079-17

CERTIFICATION

Model	TC7000
ATEX Certificate No.	TRAC12ATEX0037X Standards EN60079-0:2009, EN60079-11:2012
ATEX Coding	CE 0518 Ex II 2G Ex ib IIC T4 Gb II 2D Ex ib IIIC T200°C Db I M2 Ex ib I Mb Tamb -10°C to +40°C
IECEx Certificate No	IECEx TRC 12.0019X Standards IEC60079-0:2007, IEC60079-11:2011
IECEx Coding	Ex ib IIC T4 Gb Ex ib IIIC T200°C Db Ex ib I Mb Tamb -10°C to +40°C
USB Terminal Parameters	Um= 253V
Ambient Temperature	-10 to +40°C
Power Supply	2 x Lithium Ion cells

EC DECLARATION OF CONFORMITY

CorDEX

Cordex Instruments Limited
1 Owens Road
Skippers Lane Industrial Estate
Middlesbrough
TS6 6HE

Declaration No. SO/10 Rev 1

EC Declaration of Conformity
in accordance with EEC ATEX Directive 94/9/EC

We,

CorDEX Instruments Ltd.

Hereby declare that the products described below

Product: Thermal Imaging Camera
Model: TC7000

are in conformity with the essential health and safety requirements of Council Directive 94/9/EC relating to equipment intended for use in potentially explosive atmospheres (ATEX Directive) I/II M2 2GD, Ex ib IIC T4 Gb Tamb -10°C to 40°C, Ex ib IIIC T200°C Db, Ex ib I Mb equipment, by the application of the following Standards:-

EN 60079-0:2009 Explosive atmospheres - Equipment: General requirements

EN 60079-11:2012 Explosive atmospheres. Equipment protection by intrinsic safety "i"

as certified by Notified Body Number 0891 TRaC Global Ltd, UK by EC-Type Examination Certificate: TRAC12ATEX0037X and IECEx Certificate: IECEx TRC 12.0019X

and are subject to the procedure set out in Annex VII of Directive 94/9/EC and these procedures are in conformity with the requirements of EN 13980:2002 under the supervision of Notified Body Number 0518, SIRA Certification Service Rake Lane, Eccleston, Chester, CH4 9JN.

It is ensured through internal measures that the products conform at all times to the requirements of the current EEC Directives and relevant standards.

Signed by: Antony James Holliday

Signature: _____ Authorised Person

Position: MANAGING DIRECTOR on behalf of CorDEX Instruments Ltd

Date: 15th March 2013

C:\Users\User\Desktop\EC Declaration of Conformity (TC7000) Rev 1.docx

EC DECLARATION OF CONFORMITY

TRaC testing regulatory and compliance

1 EC TYPE EXAMINATION CERTIFICATE

2 Equipment or protective system intended for use in potentially explosive atmospheres – Directive 94/9/EC – Annex III

3 EC Type Examination Certificate No.: **TRAC12ATEX0037X (incorporating variation V1)**

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7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 TRaC Global Ltd, Notified Body number 0891 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment or protective system intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports **TRA-010226-33-00A, TRA-010226-33-01A & TRA-017824-33-00A**.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in section 18 of the schedule to this certificate, has been assured by compliance with:

EN60079-0:2009 **EN60079-11:2012**

10 If the sign "X" is placed after the certificate number then this indicates that the equipment or protective system is subject to special conditions of safe use specified in the schedule to this certificate.

11 This EC-Type Examination certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of this equipment or protective system shall include the following:

II 2G Ex ib IIC T4 Gb **Tamb -10°C to 40°C**
II 2D Ex ib IIIC T200°C Db
I M2 Ex ib I Mb

This certificate and its schedules may only be reproduced in its entirety and without change. This certificate is issued in accordance with the TRaC Ex Certification Scheme.

S.P. Winsor

S P Winsor, Certification Officer
Issue date: 2014-03-28
Copy No.: 1e
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IEC IECEx

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx TRC 12.0019X
Issue No: 1
Certificate history:
Issue No. 1 (2014-03-28)
Status: **Current**
Page 1 of 5
Issue No. 0 (2013-03-22)

Date of Issue: **2014-03-28**

Applicant: **CorDEX Instruments Ltd.,**
Unit 1 Owens Road,
Skippers Lane Industrial Estate,
Middlesbrough,
Cleveland,
TS6 6HE
United Kingdom

Electrical Apparatus: **Intrinsically Safe Digital Camera DC6000 and TC7000 Thermal Imaging Camera**

Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking:
Ex ib IIC T4 Gb Tamb -10°C to 40°C
Ex ib IIIC T200°C Db
Ex ib I Mb

Approved for issue on behalf of the IECEx Certification Body: Stephen Winsor

Position: Certification Officer

Signature:
(for printed version)

Date:

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