Sonel®

OPERATING MANUAL

CORONA CAMERA

UV-260

$C\,E$

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The UV-260 Corona Camera detects and precisely locates corona discharge emanating from high-voltage devices. It will help locate and determine the power of a discharge by capturing UV radiation released during corona discharge and provides a reliable method for the technical assessment of the operation and behaviour of high-voltage equipment.

When corona discharges are detected, the camera will overlay images of the corona on the visible image. Images are displayed in real time on the camera's screen. Under user control the images may be also recorded as a video file. Images may be stopped and saved as a still image. Recorded images and videos are stored on a removable SD card in a format compatible with viewing on personal computers.

Main features of UV-260:

- high UV-sensitivity, user adjustable
- automatic or manual focus adjustment for real image and UV image
- combining of visible-spectrum images and UV-spectrum images
- automatic reduction of noise and interference
- 5.7" TFT touch-screen
- designed to operate in sunlight
- UV discharge detection alarm
- built-in GPS system for recording location
- precisely locates UV discharge sources
- UV discharges and visible images recorded as photos or videos in common PC format
- report generator program included

CONTENTS

1.   Introduction.

Thank you for choosing the UV-260 corona camera. The UV-260 Corona Camera is a high-quality imaging device that is easy and safe to use. Carefully read this manual before the first use to prevent errors and problems while operating the device.

This manual contains three types of warnings that describe the possible risks both for the user and the device. Information with a "WARNING" describe situations which may endanger the user's life or health when instructions are not followed. "CAUTION!" describes of a situation which may result in damage to the device when instructions are not followed. Indication of possible problems is preceded by "**Note**".

The device has been designed, developed, and manufactured in accordance with ISO 9001 quality systems. Sonel reserves the right to change device specifications without prior notice. Copyright of this manual and software are the property of Sonel.

2.   Safety.

WARNING
Do not attempt to open the device as none of the components can be repaired or calibrated by the user. Any maintenance activities may be carried out only by authorized service personnel.

NOTE
Do not drop, or subject the camera to rough handling or shocks during operation, handling, and transportation.

NOTE
Avoid pointing the lens directly at the sun or objects that emit very high temperature as this may cause damage. Take care to observe this precaution and make sure the camera is not pointed at the sun when switching the device ON/OFF.

NOTE
Never touch the lens. Dust accumulated on the lens may be removed only by using special tools or compressed clean air.

The camera should be stored in cool, dry place, away from sources of strong electromagnetic fields. When the camera is not used for a long time remove the batteries.

During operation the camera should be securely fastened to minimize shake and vibrations that will adversely affect the accuracy.

WARNING
Do not use the camera if the enclosure is damaged in any way as this is a safety hazard to the user.

When working with the device observe the technical conditions specified in this manual.

Damage to the camera, resulting from improper use, alteration, and obvious negligence are not covered by the warrantee.

3.   Principle of Operation.

Corona discharge is one of three types of partial discharge. Partial discharge is the breakdown of an insulator (or dielectric) caused by high voltage stress, usually in a portion or area between two conductors that does not result in a complete short circuit. In addition to corona discharge there are surface discharges, due to contaminated insulator surfaces, and internal discharges caused by the degradation of the insulation that results in voids or pockets that provides paths for partial discharge to develop. These situations are progressive in that discharge currents exacerbate further degradation ultimately leading to complete insulator failure. Corona-type partial discharge is the localized ionization of a gaseous insulation system, such as air, usually confined to a limited distance between two conductors. Corona can occur within voids in insulators as well as at the surfaces where conductors and insulators meet.

3.1.   Electromagnetic radiation: visible, infra-red, ultraviolet.

Individual types of electromagnetic radiation have wavelengths as shown in Figure 1.
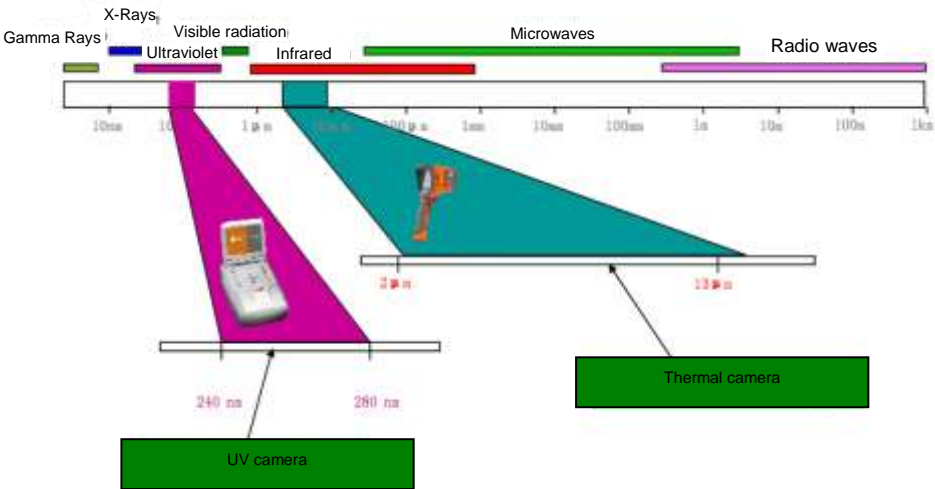
Figure 1: Electromagnetic waves of different lengths.

3.2.   Mechanism of Corona Discharge

Corona discharge is a current flow, usually in a gas such as air, from a discharge electrode under high voltage conditions that causes ionization of the gas. High voltage is a source of air ionization that creates a plasma around the electrode; ionized matter containing electrically charged particles. The resulting ions in the plasma create an electrical path that carry electrons to lower potential.

If the discharge electrode, which may be any object under high voltage, has a sharp or pointed shape, a high-voltage potential gradient is generated around the point. If the potential gradient is high enough to cause ionization a discharge will occur. At very high voltage it may be a sparking phenomena, or an arc whereby a plasma is created that establishes a path of continuous electron flow. Corona discharge occurs when the ionization levels are not quite sufficient to develop a plasma of high volume electron flow, yet a lower level of discharge or electron flow occurs.

Corona discharge is invisible in daylight. Even in total darkness it may be barely visible as a blue-violet afterglow as most of the radiation generated is in the ultraviolet range, invisible to human eye. Attempting to observe corona at night is virtually impossible since total darkness cannot be achieved in urban environments. Other methods of detection attempted to use acoustics to detect the crackling sounds that can accompany discharges but these methods are unreliable and cannot precisely locate the source of corona generation. Thus, acoustic-based detection methods are being replaced with UV-based detectors that are far more effective.

Corona discharges are generated in the electromagnetic spectrum wavelengths in the range between 200 to 405 nm. Solar radiation contains visible light, infra-red, and ultraviolet radiation. By using an appropriate filter with wavelength between 240 to 280 nm to suppress UV radiation from the sun the camera is designed to detect corona even in daylight conditions.
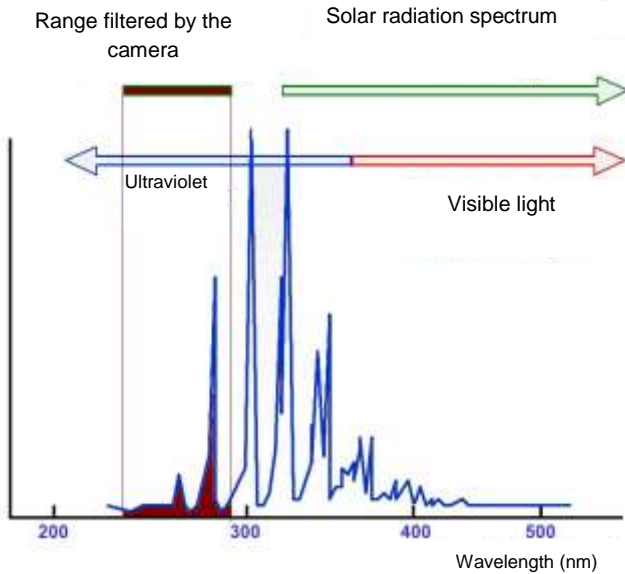

Fig. 2: The spectrum of corona discharge

Depending on the polarity of the discharge electrode, the corona discharge may be positive or negative. In either case of negative or positive discharges photons are the main source of radiation. When the gas atoms are ionized their electrons are "excited" and kicked up to a higher energy states. Photons are released by the ionized atoms as they return to lower energy states. The corona camera shows a display scale in "UV photons" to provide an indication of the volume of photons generated.

Positive discharge is said to be homogeneous; the majority of charges are concentrated close to the electrode so the discharge area is well defined and easily located. Negative discharge at the

same voltage may be weaker and more difficult to locate since the energy is more spread out over a wider area.

3.3. Why Corona Discharge?

Corona discharges are a loss of energy. Unwanted corona discharge also causes a variety of problems such as radio interference i.e. poor reception of radio signals due to noise coming from nearby high voltage power lines. The most adverse effect of corona discharges is the impact on the condition of insulation elements resulting in "wear and tear" over time; i.e. the gradual deterioration of the insulator and its ability to provide a dielectric barrier. Even the presence of small discharges cause adverse effects. The discharge current flow generates corrosive substances that contribute to the breakdown of insulators creating voids and cracks. These enable the ingress of moisture to internal components, further accelerating degradation.

If left unchecked bad insulation can bring about the failure of entire power transmission systems. Since high voltage transmission systems are the main arteries of power that serve millions of consumers, any disruption to the electrical grid's transmission systems is both economically and socially disastrous. Therefore, it is prudent to detect the early stages of corona discharges to catch incipient problems before they develop and lead to permanent damage that results in costly repairs and wide-area blackouts. Locating corona discharges is a sensible cautionary preventative maintenance measure, similar to infra-red thermal camera inspection methods, to discover potential problems before they arise.

3.4. Detection of Corona Discharge

The UV-260 detects and locates corona discharges by detecting their UV radiation. The level of discharge is quantified and the number of discharges in a certain time-frame is represented graphically by the 'UV image'. The camera operates in both the visible light and the UV spectrums. By pointing the camera at a desired object and viewing it as a real image, in the same way as any video camera, any detected UV emissions are precisely overlaid on the visible image. The UV radiation is represented as a white, blue, or red video image rendered against the visible image. This provides an accurate method of locating the source of emissions and therefore the point of degradation that would otherwise be difficult to distinguish in high voltage transmission systems, or complex substations with multiple conductors and equipment. Inspection for corona with the UV-260 is inherently safe when high voltage systems are live since inspection is performed from a distance.

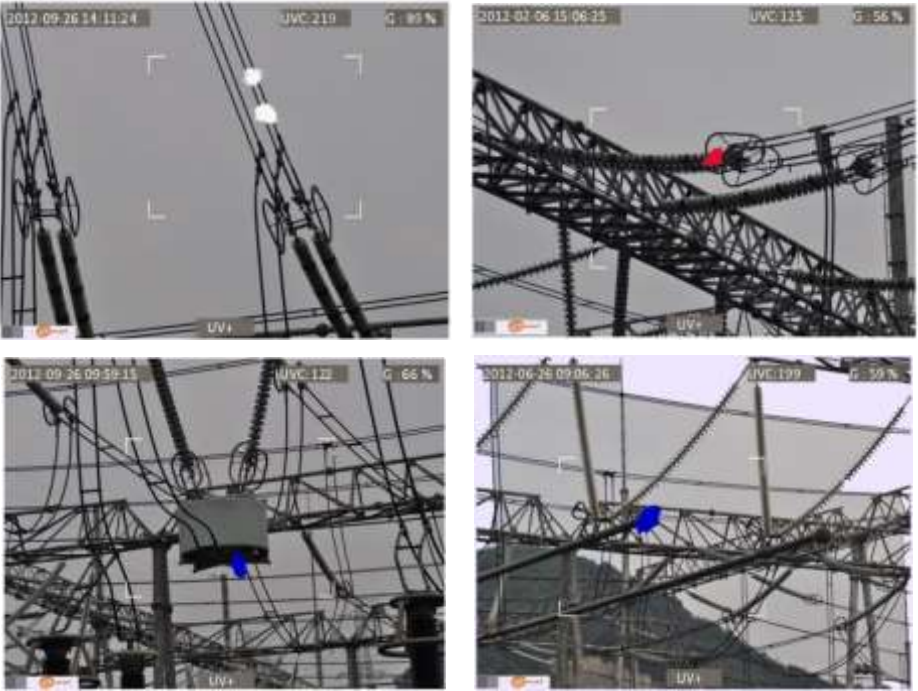*Fig. 3, 4. Corona discharge in laboratory conditions.*

Fig. 5-8. Corona discharge in real power grids.

Fig. 9, 10. Corona discharge and its effects.

4.   Preparing the Camera for Operation

4.1.   External design of the camera

The UV-260 is compact, simple, and ergonomic camera to use. It may be operated on a tripod or used as a hand-held tool. Its features are illustrated in Figures 11 and 12.

1) Folding touch-screen display
2) Lens
3) Keyboard
4) Cover for inputs and battery compartment
5) Holder for straps
6) Tripod mounting point

Fig. 11. Parts of Camera UV-260.

4.2.   Mounting on a Tripod.

For long periods of observation mounting the camera on a tripod is recommended to eliminate shake and vibration (Fig. 12). A standard, threaded tripod mount is provided at the bottom of the camera.

Note. Firmly attach the camera to the tripod to prevent accidental damage.

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Fig. 12 UV-260 mounted on a tripod.

4.3. Moving and Holding the Camera.

The UV-260 may be used as a hand-held device, or the operator can use the more convenient strap to ease fatigue from holding for long periods. The strap also frees the operator's hands during operation (Fig. 13, 14).

CAUTION!
To prevent dropping and damaging the camera when fastening and unfastening of the strap place the camera on a table or other surface, and fasten or unfasten the strap in the upright position (fig. 13). Test the strap is securely fastened before operation.

Fig. 13. Fixing strap to the holders.

The camera when suspended on the strap allows the operator to easily use the keyboard (Figure 14).

Fig. 14. The camera securely mounted on the strap.

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5. Ports and Buttons.

5.1. External Ports

Camera interfaces (video output, audio input/output), charging indicator, power adapter input, SD card slot, and the battery compartment are located under the cover on the side of the camera (Fig. 15).
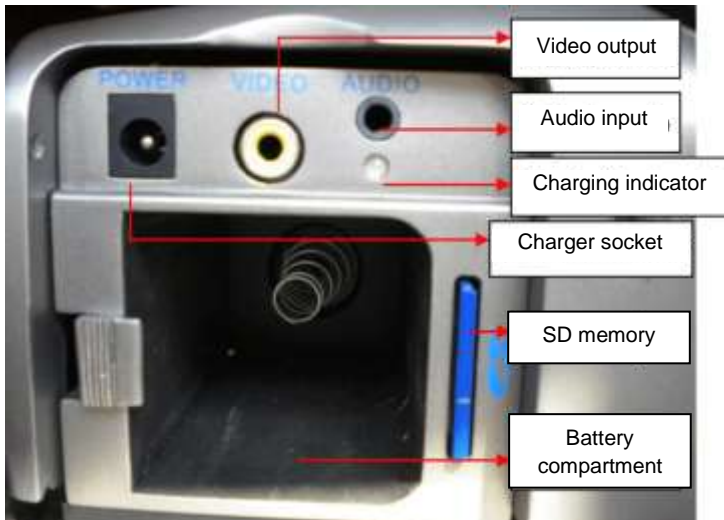

Fig. 15. Arrangement of ports under the cover.

Video output may operate in PAL or NTSC system.

The SD card must be formatted in FAT32.

When recording voice notes speak closely into the microphone. Plug the microphone headset into the audio input located under the cover.

CAUTION!

When inserting the battery pay attention to the correct polarity.

Voltage connected to power input cannot exceed 12V.

5.2. Layout and functions of buttons

Fig. 16. Arrangement of the control panel buttons.

5.2.1. Navigation buttons.

Buttons for menu operation and image functions:

- Up,

- Down,

- Left,

- Right,

- confirm,

- exit without confirmation.

In addition to menu navigation, functions of the buttons are as follows:

- "freezing" the displayed image,

- switching into the focus adjustment mode,

- playing a voice note

- zooming x1, x2, x4 in combined (mixed) image mode (real image +UV).

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5.2.2. Operating mode buttons.

 - image display mode switch, repeated pressing of the button causes toggling of the following modes: UV image only - visible image mode - mixed mode (UV plus visible image)

 - saving the still image,

 - video recording,

 and - manual focus adjustment,

 and - zoom in/out

5.2.3. Control of power supply / charging and alarm - corona discharge indicator

 - switching on / off,

 - power indicator,

 - corona discharge indicator.

6.   Operation and Battery Charging.

The UV-260 is powered by a dedicated lithium-ion rechargeable battery, which should be charged only with the charger included with the camera. Any other batteries, even of the same shape, and other chargers may damage the camera and present a danger to the user.

The battery may be also charged by the camera via an AC adapter or a car adapter (12V) - both included with the camera.

When battery level is low a message will be displayed on the screen indicating the need for recharging.

6.1.   Inserting the Battery

Insert the battery into the battery compartment located under the cover for inputs and battery compartment (Fig. 15).

6.2.   Charging the Battery.

The battery may be charged using the external charger or by connecting the AC adapter with the battery inserted into the camera using the power socket located slot under the battery compartment cover 4 .

The charging indicator light is red during charging. When charging is completed the charging indicator light is green.

WARNING.
At high temperatures do not turn on the camera while charging the battery, as it may decrease battery life, or even cause fire.

6.3. Guidelines for Using the Battery.

Charge the batteries in a dry indoor location. Do not charge the batteries outside, especially during rain, etc.

WARNING.
Do not short-circuit the battery, and avoid accidental short circuits by preventing the battery terminals from coming into contact with other metal, or loose objects.

The battery should be stored at a temperature not exceeding 60°C / 140°F.

When charging is finished disconnect the external power supply adapter. When replacing the battery disconnect the power supply adapter first. Insert the battery into the camera, and then connect the AC adapter. Do not use non-original batteries and chargers.

7.   Working with UV-260 Camera.

In order to switch the camera on press and hold ⏻ button for approx. 2 seconds. The camera starts by performing auto-tests for about 25 seconds, then it switches on the operating screen (Figure 17).
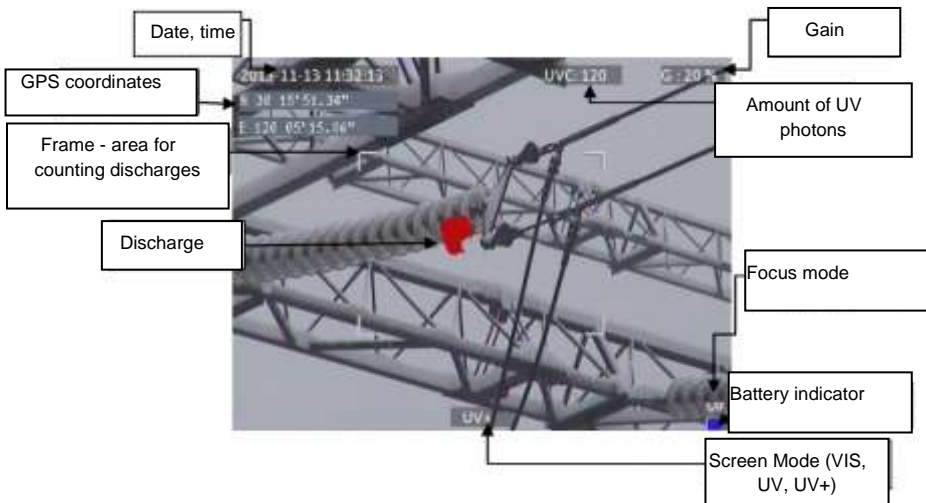
Fig. 17. Working screen in mixed image mode - detecting corona discharges.

The screen, in addition to the image in the selected mode (UV, visible, mixed), displays the following information:
- current date and time,
- GPS coordinates of the measurement location
- signal gain level
- battery charge status
- focus adjustment mode (auto or manual),
- image mode indicator: mixed UV+ , visible image VIS , or UV image only: UV

The white frame is the effective area for photon counting, where discharges are recorded and the amount of UV photons indicated. The operator may select 3 frame sizes - large, medium, and small.

7.1.   Operation of the buttons.

Description of the operations available by pressing buttons in the working screen mode.

7.1.1.   Recording a Video.

Press [icon] to start recording a video and saving it on a SD card. This allows real-time recording of images that are displayed on the screen. When recording video you may add a voice note using the headset connected the audio input. Video files are recorded in "avi" format that can be played in the camera or on a PC.

7.1.2.   Recording a Static image.

Press [icon] to save the image displayed on the screen into the SD card.

When the image is recorded the screen displays the message "record a voice note". At this point you can record 20-second voice memo, press [OK] to start voice recording (with a microphone headset connected to the audio input). The image is saved and the camera returns to the real-time mode. Or press [EXIT] to save the image without recording a voice note.

Note. For the best quality it is recommended to 'freeze' the image on the screen before saving it - see below.

7.1.3. Switching the Image Mode

Use ⬤ button to toggle and switch between the following modes: Visual image only VIS , UV discharge mode only (UV) and Mixed mode (UV+).

7.1.4. "Freezing" Displayed Image

Pressing ❮ "freezes" the image allowing you to make a decision about saving it into memory. At this point:

- press 📷 to save image to the SD card and return to detection mode in real-time

- press ❮ again to return to the detection mode (real-time) without saving the image.

7.1.5. Changing the Focus Mode.

Press ❯ to change the focus mode from manual to automatic and vice versa. By default, the camera upon powering on is set to auto focus mode. In case of a complex image with many objects at different distances the focus may not be set automatically to the desired object. If so the operator can switch to the manual focus mode.

7.1.6. Gain Adjustment.

In UV image mode or in mixed mode (UV+) buttons ⊕ and ⊖ are used to increase or decrease the sensitivity of the camera UV detector. Increasing the sensitivity results in displaying both high and very low discharges, and may display unwanted UV interference. Decreasing the sensitivity allows the operator to observe only high-power discharges, and more precisely locate their sources.

7.1.7. Zoom.

In the visual image mode, use buttons ⊕ and ⊖ to zoom in/out the image by reducing or increasing the camera angle of view.

7.1.8.   Manual Focus.

In manual focus mode (see 7.1.5), use buttons and to manually adjust the focus of the image.

7.1.9.   Zooming In.

In the image preview mode, press to zoom the image by 2x, 4x or 8x. When the image is enlarged, use buttons , , , to navigate through the image. Press to enter the real-time image mode.

7.1.10.   Playing a Voice Note.

When the image was saved with a voice note it may be played in the image preview mode by pressing . Use a headset connected to the audio input to listen to voice notes.

7.1.11.   Zooming │UV+│ Image.

In Mixed image mode │UV+│ and in UV mode │ UV │, press to enlarge (zoom) the image by 2x, 4x or 8x. This makes it easier to precisely locate the source of UV emissions and the most probable location of physical damage or deterioration of the observed object by finding where the most UV emissions are originating from.

7.2.   Operating the Menu

The UV-260 does not display the menu on startup. Enter the main menu by pressing in the real-time image mode or by touching any place on the touch-screen. Press or touch the screen where the menu is not displayed to close the menu.

Note. Menu options are simple and intuitive. All operations in the menu are performed by touching the individual items on the screen in drop-down menu sections, or by navigating through the menu using the cursor keys.

7.2.1.   Main menu.

With any opened drop-down menu, select the desired option by touching where it is displayed, or move the highlighted area in the menu with cursor keys or , then confirm the selection by pressing . At any stage you may press to exit the menu.
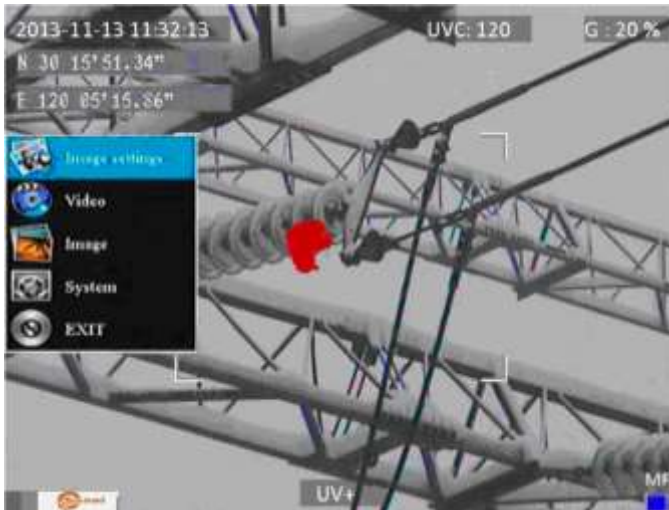
Fig. 18. Main menu.

7.2.2. Image Settings.
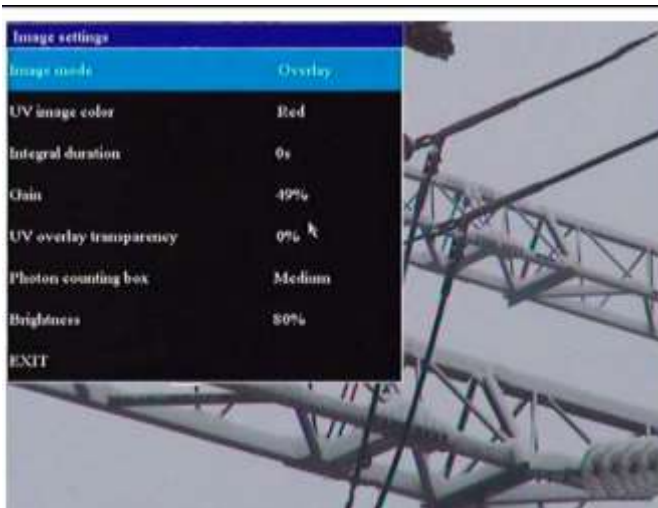
Fig. 19. Menu – Image Settings.

The "Image Settings" menu allows you to alter how UV images are displayed. Specific options are presented below. Select/change options in the same way as in the main menu (use "arrow" key and confirm by pressing ![OK], exit to the previous menu by ![EXIT]; or touch selected area of the screen).

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Image mode: function is analogous to pressing button , selecting between Visible image, UV image and Mixed image.

UV Image Color: select colour for displaying UV discharges (available colours: red, white and blue).

Integral duration: recording UV signals takes place at a designated time. The UV value is averaged to filter out random interference.

UV discharges may repeat in the same places. Especially when high sensitivity is set on the detector, random discharges can appear; this is noise. Selecting the appropriate averaging time for the gain level will capture the signals of the relevant discharge and filter-out random, interference noise-signals.

Gain: adjusts the sensitivity of UV detector (similarly - use buttons and in UV image mode UV or mixed mode UV+) to increase or decrease.

Note. Setting high gain allows you to capture weak UV signals and detect very small discharges, but it should be remembered that high gain may affect the accuracy of locating discharge sources. This is because as the UV image will cover a larger area of the visible image making it difficult to determine the exact location. All UV radiation from both the actual discharge source, as well as unwanted, interfering sources will be detected. The unwanted detection usually appears scattered and in random positions.

A good technique is to first set a high gain level to roughly determine the discharge location, and then gradually reduce the gain to a level that will show the precise location of discharges.

For relatively large interferences extend the averaging time and simultaneously reduce the gain level to eliminate background noise and better pinpoint the sources of corona discharges.

UV overlay transparency: sets the transparency of UV image overlaid onto the real image (0% - opaque, 50% - translucent)

Photon counting box: selects the area where discharges are counted. The frame can be set in 3 sizes: large, medium, and small.

Brightness: sets the brightness level of the screen, depending on external conditions.

Exit: return to the main menu.

7.2.3.   Video

Provides functions for video files saved on the SD card: i.e. view, delete files, and view detailed information about recorded video files. File names correspond to their dates of creation.

7.2.4.   Image.

For viewing or deleting images saved on the SD card. While viewing images the operator can zoom in and play a voice note if previously recorded. Image file names correspond to the dates of their creation. The images are displayed in the form of a list or thumbnails.

7.2.5.   System.

After selecting "System" option a sub-menu is displayed where the user may change
system settings to change:
- time settings
- factory settings
- formatting the SD card

- displaying information about the SD card
- displaying information about the camera
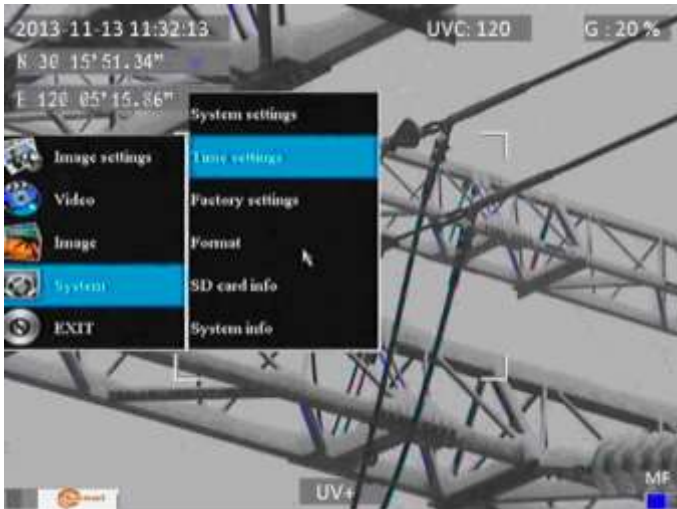
Fig. 20. System menu.

7.2.6.   Sub-menu "System Settings"

Fig. 21. "System Settings" Menu.

Language: selects the interface language.
Monitor: selects the video standard (PAL or NTSC) for the camera display screen.
Auto shutdown: sets the camera to automatically turn-off when no button is pressed for a set time.

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UV alarm: turns the audible alarm, after detecting UV discharges, On or Off.
Photon threshold: sets the level of corona discharge (the amount of recorded photons) to trigger the alarm.

Focus mode: selects manual or auto focus (the same as pressing button).

8. "Sonel UV Analyse" Software.

8.1. System Requirements

Due to the large size of video files, you must provide enough disk space on your computer and meet the following requirements:
- processor: CPU PENTIUM III; 1.4GHz CPU or better,
- memory: 256 MB or more,
- disk space: 20 GB or more,
- screen resolution: 1024×768 or more, the recommended resolution: 1600x900.
The software runs under Windows 7 or higher.

8.2. Installing the Software.

Open the setup.exe file from the supplied CD or from software downloaded at www.sonel.pl www.soneltest.com/download, and perform a standard installation procedure of software operating on MS Windows. You may specify or confirm the installation location on your computer:
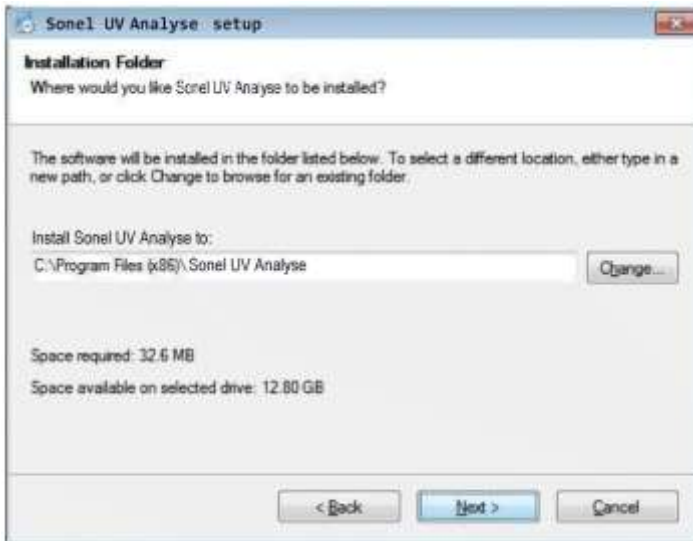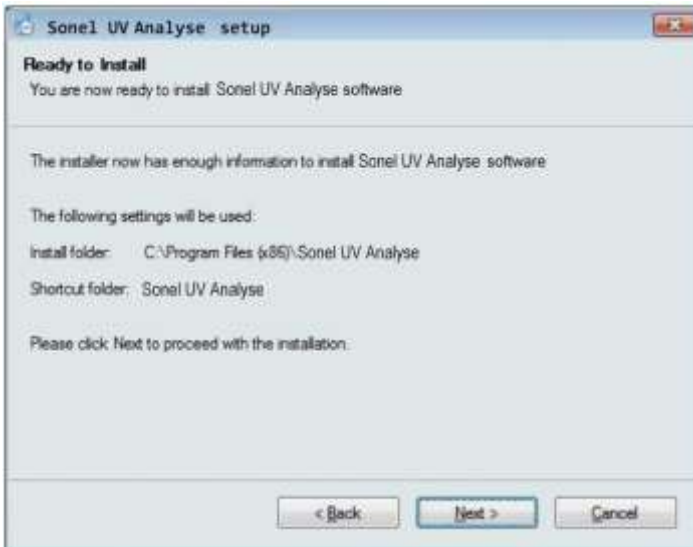
Fig. 22..24. Installation of the program.

Note. After installing the program some computers may ask to install Microsoft Visual C++ libraries. Click OK and the installation will start automatically:

Fig. 25. Installing libraries of MS Visual C + +.

8.3. Starting the Program.

After you install the program a shortcut will appear in the "Start" menu, and the program icon will appear on your desktop:

Fig. 26. "Sonel UV Analyse" Icon

Clicking the icon starts the program.

8.4. Main Window of the Program.
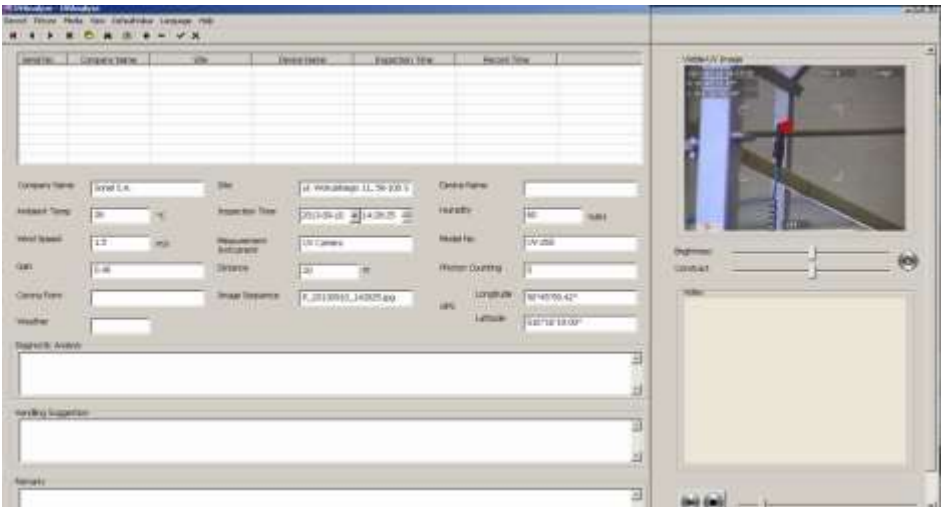
Fig. 27. The main window of "Sonel UV Analyse".

The software organizes UV camera measurement files in records. As new records are created they are saved consecutively, and are added to a list. Each record is completed by filling in data in the available fields in the main window. Commonly used or shared information (e.g. data related to camera, or company performing the measurements) and the most common values for certain fields

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(e.g. humidity, temperature) may be saved as "default values" and will be filled-in automatically into newly created records. These data may be edited for individual records if necessary.

For each record you can import an image or a video recorded with the UV camera. Images and video files are imported from the top menu by selecting "Image", "Video", or by right-clicking on the image or video. Double-clicking on a displayed Visible image or Mixed image (UV+Visible) enlarges it. Double-clicking the video preview starts the video. If the image also has a voice note recorded it will also be imported and will be reproduced after pressing 'play' button [image] at the bottom of the screen.

All record fields (Fig. 27) may be edited in the main window of the program, including default data fields.

Note! Any change in the record must be confirmed and saved (top menu: Records -> Save record changes). If the change is not confirmed, moving to another position in the list (record) will cancel unsaved changes.

Record data may be exported to a report file.

8.5. Main menu.

The main menu contains the following items (Fig. 28):
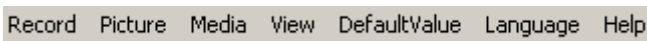
Fig. 28. Drop-down main menu.

The button bar below also activates commands (Fig. 29):
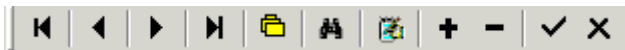
Fig. 29. Button bar.

Individual items of the main menu provide sub-menus for specific activities, described below; together with the corresponding function from the button bar.

8.5.1. Records
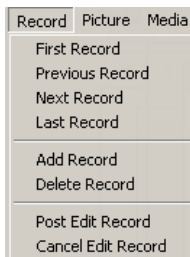
Fig. 30. Record menu

First record: go to the top of the list (or button [image]),

Previous record: goes to the previous item in the list (or button ◀),

Next record: goes to the next item in the list (or button ▶),

Last record: goes to the last item in the list (or button ▶),

Add record: adds a new item (or button ✚),

Delete record: deletes the selected (highlighted) item (or button ▬),

Post edit record: selecting this option after any editing or modification of the record saves the modification (or button ✔),

Cancel edit record: returns to the state before modifications (or button ✗).

8.5.2. Image.

Fig. 31. Image Menu.

Add image: adds the saved image to a record, along with the pertinent measurement parameters such as: amount of discharges/UV photons, gain value, name of the image etc. are included. Alternatively the user can right-click the image area to choose to save images.

Delete image: deletes the saved image from a record. Alternatively the user can right-click the image area to choose to delete images.

8.5.3. Video
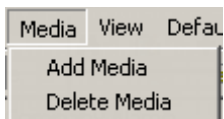
Fig. 32. Video Menu.

Add media: adds the saved video to a record. Alternatively the user can right-click the image video view area to choose to add media/

Delete media: deletes the saved video from a record. Alternatively the user can right-click the video view area to choose to delete media.
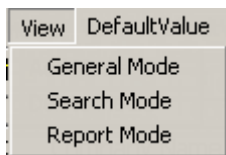
Fig. 33. View menu.

General mode: allows viewing of the main window to manage individual records, edit data, etc. (Alternative button: 🗗)

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Search Mode: allows searching of records for specified data or conditions (Alternative button: 🔍)

Fig. 34. Search window

Report mode previews the record report with options for printing or exporting report to files in several standard formats (e.g. Excel, Word, or pdf). (Alternative button: 📇)
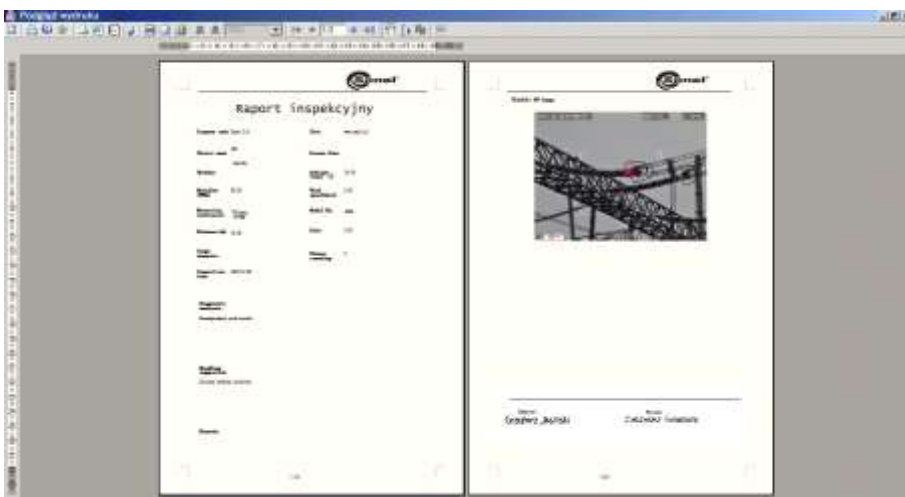
Fig. 35. Report Mode.

Fig. 36. Button bar in the report mode.

In the report mode a preview of the report to be generated is shown. The user has access to a button bar for executing specific commands.

Functions of individual buttons:

📇 activates additional preview or table of contents of the report on the right side:

Fig. 37. Thumbnails of pages or the contents of the report.

 prints the report,

 sets page layout of the report (margins, paper, etc.)

 printer settings

 exports the report to selected file format: MS Excel, MS Word (RTF), pdf, html, csv, a text file, image (formats: bmp, tif, jpg, png)

 exports data to a MS Excel file

 exports report to a .pdf file

 exports to a file in a specific format and sending via e-mail,

 icons used for managing the preview display: continuous (page by page), single page or multiple pages on one screen
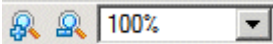
 in continuous viewing mode and in page-by-page mode you can zoom in/out of the previewed report

 navigation icons on the following pages of the report

 screen navigation mode

 selects and copies text to the Windows clipboard

 exits from the report mode

8.5.4. Default settings

After selecting this option the user may set various frequently used values to be recalled automatically whenever adding a new record item to avoid entering them repeatedly. The logo of the measurement company can also be added as a default. Individual entries may be changed or edited at any time.

Fig. 38. Window with default settings.

Note. Logo files must be a graphic file in jpg or bmp format with a ratio of 4.5:1.

8.5.5.　　Language.

Selects the software language.

9.　　Other Information

9.1.　*Cleaning and Maintenance*

The casing and accessories of the camera may be cleaned with a soft, damp cloth using dilute all-purpose detergents. Do not use any solvents or cleaning agents (powders, pastes, etc.) as they can damage or scratch the casing

Only clean the lens by compressed air or special tools.

The electronic circuits of the camera do not require adjustments, or maintenance.

When drying the camera and accessories do not exceed the maximum storage temperature: 60°C / 140°F .

9.2.　*Storage*

When storing the camera observe the following:
- make sure that the camera is dry and is stored in a dry place
- if the device is to be stored for longer time remove the battery
- do not exceed the maximum storage temperature: 60°C / 140°F

9.3. Dismantling and Disposal.

Disused and scrapped electric and electronic equipment should be disposed of safely and ecologically responsibly according to local regulations, i.e. it must not be placed with waste of another kind.

Scrap electronic equipment should be sent to a collection point in accordance with the law of waste electrical and electronic equipment.

Before the equipment is sent to a collection point do not dismantle or disassemble any part of the camera.

Observe local regulations concerning the disposal of electronic waste, packaging, and expired batteries.
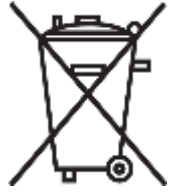
9.4. Transport

Always carry the camera and accessories in its original packaging or carrying case. Never carry the camera loose as it may be damaged due to shock and vibration. It is recommended to remove the battery from the camera during transport.

10. Technical specifications.

UV optical parameters:

Image ....Monochrome video

Corona image rendering .... white, red, blue

Minimum UV sensitivity ....3×10^{-18} W / cm^2

Minimum Discharge Detection .... 1.5 pC at 8 meters

Spectral Range .... UV 240 - 280 nm

Field of view (HxW) .... 5.5° x 4.0°

Focus .... Automatic or manual

Focus range .... above 2 m

Detector life .... no degradation

Frequency .... 50Hz / 60Hz

Visible optical parameters:

Image .... true colour

Overlay accuracy for UV/visible radiation image .... better than 1 milliradian

Minimum Sensitivity .... 0.1 lux

Zoom .... 26x optical and 12x digital

Display:

Type .... 5.7" VGA TFT, folding touch-screen

Video standard .... PAL/NTSC selectable

Display Modes .... Mixed (UV + visible) / UV only / Visible radiation only

Processing and Communication:

Video standard H.264

Alarms .... LED

Operation .... buttons and touch-screen

Audio module .... Microphone input for voice notes, headphone output

GPS Module .... built-in

Data Storage:

Memory Type .... SD memory card

Image format .... JPG

Video Format .... AVI

Memory .... 8000 photos or up to 4 hours of video (for 2GB card)

File Transfer .... card reader

Power system:

Rechargeable .... Li-Ion battery, dedicated

Power Consumption 10W

Charging .... via power adapter, or external charger

Mains .... power adapter 110 to 240V AC, 50/60Hz / 12V DC, 3.8A

Power supply from a car socket .... 9 to 14V, 10VA

Battery operating time .... about 2 hours

Other:

Degree of enclosure protection acc. to PN-EN 60529 .... IP54

Operating temperature .... -10°C to +50°C / 14°F to +122°F

Storage temperature .... -25°C to +60°C / -13°F to +140°F

Humidity .... up to 95%, non-condensing

Weight .... 2.5kg / 5.5 lbs

Dimensions .... 238 x 165 x 91 mm / 9.4 x 6.5 x 3.6 ins

Video Output .... BNC
Audio input / output .... combined jack for microphone and headphones / headset

11. Accessories

Fig. 39 Standard accessories for UV-260.

Corona camera UV-260.. 1 pc.
Charger .... 1 pc.
Rechargeable battery .... 2 pcs
AC Adapter .... 1 pc.
Car adapter 12V .... 1 pc.
SD card min. 4GB .... 2 pcs
External SD card reader (USB) .... 1 pc.
Headset with microphone .... 1 pc.
Strap .... 1 pc.
Transport case .... 1 pc.
Video cable .... 1 pc.

12. Manufacturer

Camera manufacturer and provider of warranty and service:

SONEL TEST & MEASUREMENT
Santa Clara, California, USA
www.soneltest.com

Tel: (408) 898 2215

e-mail: testsupport@soneltest.com

SONEL S.A.
Świdnica, Poland
www.sonel.pl

Tel: (74) 858 38 79
Fax: (74) 858 38 08

e-mail: export@sonel.pl

NOTE
Service repairs must only be performed by an authorized Sonel service center.

NOTES

Corona Camera UV-260 Operating manual.