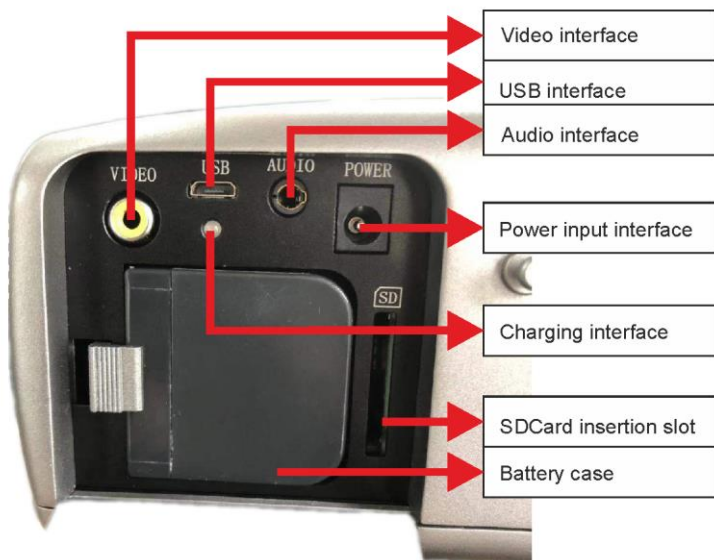




# **USER MANUAL**

## **CORONA CAMERA**

### **UV-260**





## **USER MANUAL**

# **CORONA CAMERA UV-260**



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UV-260 Corona Camera is a device for detecting and precise locating corona discharge occurring in devices under high voltage. It helps to locate and determine the power of a discharge, basing on UV radiation released during corona discharge and providing a reliable way of technical assessment of high voltage equipment.

The camera allows user to overlay recorded images of the corona onto the visible image. Images are displayed in real time on a TFT screen. Displayed image may be stopped and saved as a still image; observed discharge may be also recorded as a video file. Recorded images and videos are stored on a removable SD card in a format compatible with personal computers.

### **Main features of UV-260:**

- high, adjustable UV sensitivity,
- automatic or manual focus adjustment for real image and UV image
- combining real images and UV images
- automatic reduction of noise and interference,
- 5.7" TFT touch screen,
- insensitivity to solar radiation during the operation,
- UV discharge detection alarm,
- built-in GPS system,
- precise location of UV discharge sources,
- recording discharges with real image in the form of photos or videos that may be played on a PC,
- a program for generating reports -included in the set

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# 1. Introduction

Thank you for choosing UV-260 camera.

UV-260 Corona Camera is a modern, high-quality tool, easy and safe to use. To prevent errors and problems while operating the device, carefully read this manual before the first use.

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

The device has been designed, developed and manufactured in accordance with ISO 9001 quality systems.

We reserve the right to introduce changes that modernize the device.

Copyright of this manual and software are the property of Sonel SA

# 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**

Avoid strong shocks and stroking the device during its handling and transportation.

**NOTE**

Targeting the lens at objects that emit very high temperature (e.g. the sun), also when switching the device ON/OFF may damage it.

**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, as all vibrations adversely affect the accuracy.

**WARNING:**

Using the device with a damaged housing is a threat to the health and life of 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 guarantee.

### 3. The principle of the operation

Corona discharge is one of the three distinguished types of partial discharges i.e. breakdowns caused by high voltage, which does not cause a short circuit. In addition to the corona discharge (the least harmful of partial discharges), there are surface discharges, related mainly to contaminated insulator surface and internal discharges caused by the degradation of the internal insulation.

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

Individual types of electromagnetic radiation have wavelengths as shown in Figure 1.

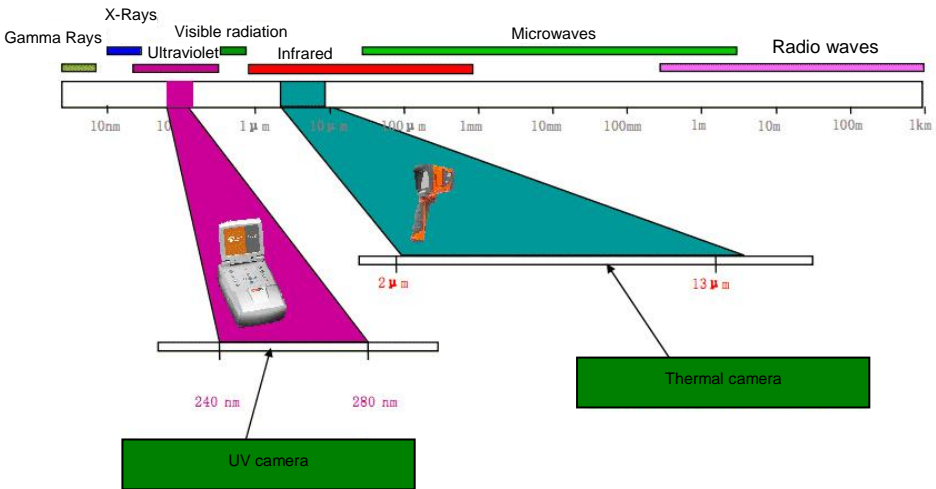


Figure 1: Electromagnetic waves of different lengths.



### 3.2. Mechanism of corona discharge

Corona discharge is a current flow, usually in the air, from a discharge electrode which is under high voltage.

High voltage is a source of air ionization, which creates plasma around the electrode - it is ionized matter containing electrically charged particles. The resulting ions carry the load to places of lower potential.

If the discharge electrode, which may be any object under high voltage, has a proper "sharpened" shape, then a high potential gradient is generated around this part generates, which may lead to a discharge. At very high voltage it may be a spark or arc - if a 'plasma channel' is created. In contrast, corona discharge is formed when a voltage that causes ionization is too low at the moment to create the plasma channel.

The discharge is invisible in daylight (in total darkness - rarely occurring in outdoor conditions - it is hardly visible as a blue-violet afterglow), as most of the radiation generated is in the ultraviolet range, invisible to human eye, and therefore, the development of UV radiation detectors causes gradual replacement of acoustic-based detection methods with UV-based detectors.

Corona discharges generate the electromagnetic spectrum in the range of 200...405 nm; solar radiation also contains (in addition to visible light) both infra-red and ultraviolet radiation. Using an appropriate filter (wavelength range of 240...280 nm) suppress UV radiation generated by the sun, so the camera may operate well in daylight without interference.

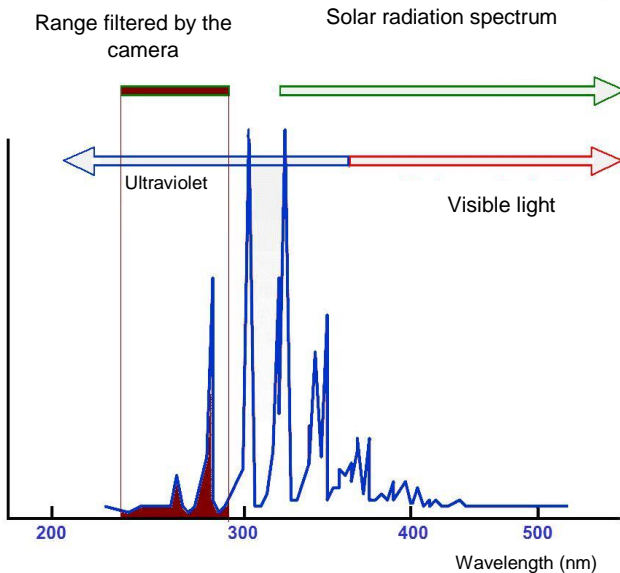


Fig. 2: The spectrum of corona discharge

Depending on the polarity of the discharge electrode, the corona discharge may be positive or negative. In case of both negative and positive discharges, photons are the main source of electrons. These photons are formed by induced atoms creating plasma, which return to lower energy states, therefore the equipment is scaled in "UV photons."

Positive discharge is homogeneous, as the majority of charges are concentrated close to the electrode. Negative discharge at the same voltage takes a larger area, but because the energy is spread over the wider area, it seems to be weaker and it may be difficult to locate.

In practice, controlled corona discharges, are used for example in industry to remove dust in the gases, air, or to remove unwanted electric charges (even in household air ionizers). Charges are generated on certain surfaces and this phenomena may be observed in many everyday items e.g. a laser printer or photocopier.

### 3.3. Why corona discharge?

Unwanted corona discharge influence adversely the devices, where they occur, for example by causing radio interference (often problems with the reception of radio signals near high voltage power lines), or by causing a loss of energy (energy "escapes" to the air). The most adverse effect of corona discharges, is the impact on the insulation elements, resulting in the need to disconnect entire power transmission systems. Therefore, it is required to prevent corona discharges and reduce them at their early stage, as the next stage results in creating an arc and permanent damage.

Even the presence of small discharges in one place may cause adverse effects, because the current flow and contamination generate corrosive substances, which deteriorate the condition of insulators, enable the moisture access to the internal components and accelerate degradation. Locating corona discharges is a useful cautionary measure, similarly to infra-red methods that help to discover potential problems before they arise.

### 3.4. Detection of corona discharge

UV-260 detects and locates corona discharges by detecting the UV signal generated during the discharge, then they can be counted to assess the level of discharge. In practice, the number of discharges in a certain time is represented graphically - by so called 'UV image'. Precise overlay of UV image on the real image provides an accurate and most importantly, safe (performed from a distance) method of locating places where equipment degradation started, without the need to turn off power of the tested facility.

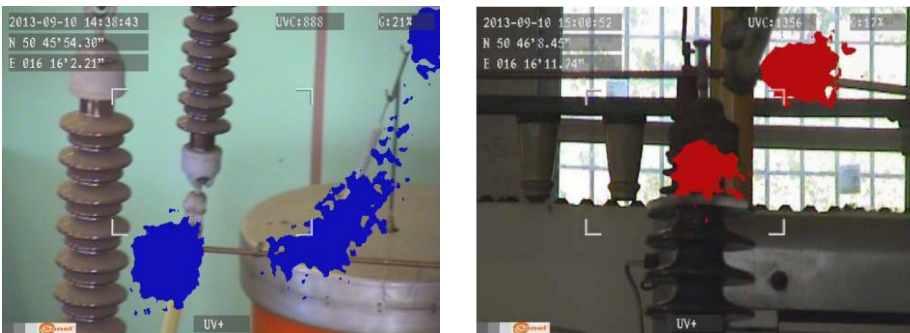
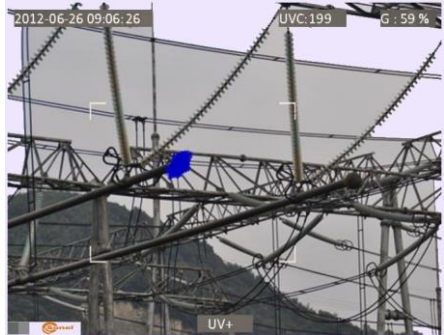
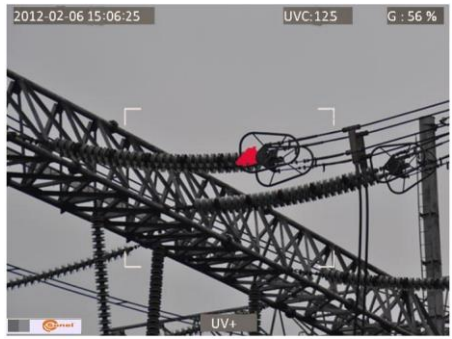
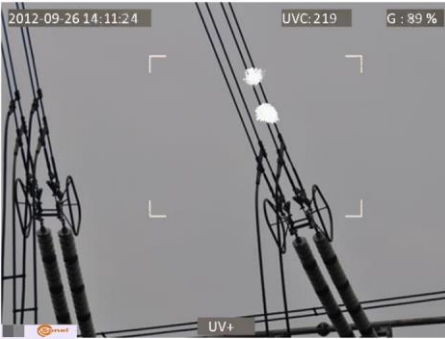
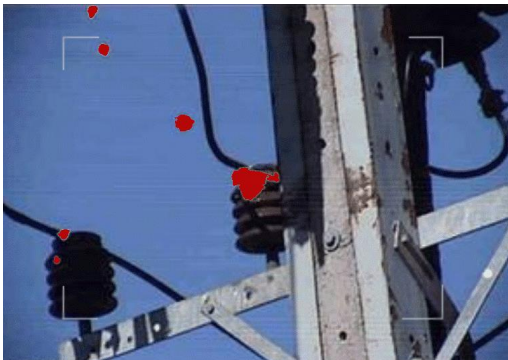


Fig. 3, 4. Corona discharge in laboratory conditions.



*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

UV-260 is a compact device, which is simple and ergonomic to use. It may be operated on a tripod or used as a hand-held tool.

Arrangement of its individual elements is illustrated in Figures 11 and 12



*Fig. 11. Parts of Camera UV-260.*

## 4.2. Mounting on a tripod

For long observations and in order to eliminate accidental vibration and shocks the camera can be mounted on a tripod (Fig. 12).

In the bottom of the camera a suitable threaded opening is provided for mounting on a tripod (standard thread for photographic tripods).

**Note.** The device should be firmly mounted (screwed) to a tripod to prevent accidental damage.



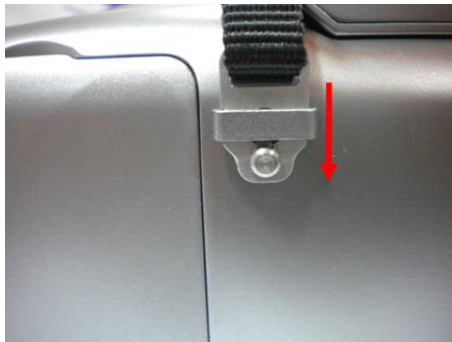
*Fig. 12 UV-260 mounted on a tripod.*

### 4.3. Moving the camera

UV-260 may be used as a hand-held device, but it is much more convenient to use a strap fixed to holders, enabling the operator to freely use hands during the operation (Fig. 13, 14).

**CAUTION!**

Fastening and unfastening of the strap must be carried out in the upright position of the device (fig. 13), otherwise the camera may slip out of the holder, resulting in a drop and damage.



*Fig. 13. Fixing strap to the holders.*

The camera suspended on the strap allows user easily operate the keyboard, as shown in Figure 14).



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

## 5. Ports and buttons

### 5.1. External ports

Camera interfaces, 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).

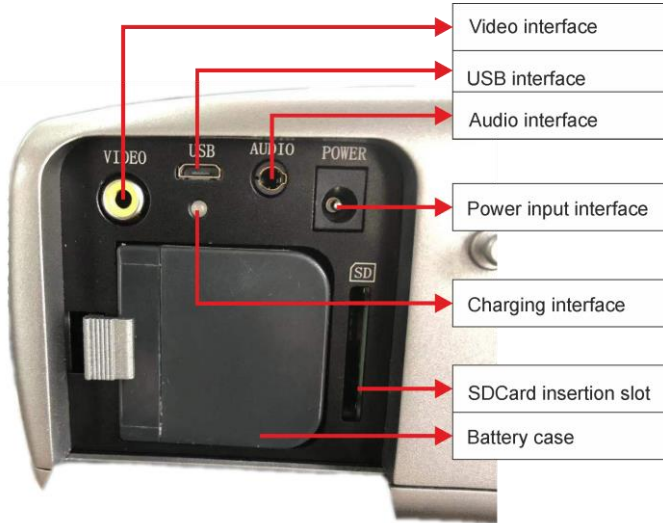


Fig. 15. Arrangement of ports under the cover.

Video output may operate in PAL or NTSC system.

The SD card must be formatted in FAT32.

When recording a voice note - approach maximally to the microphone. The microphone + headphone set is plugged 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 in combined (mixed) image mode (real image +UV).



## 5.2.2. Operating mode buttons



- image display mode switch, repeated pressing of the button causes switching into the following modes: UV image only - visual image mode - UV/visual mixed mode (UV image overlay on the 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

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

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

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 (the battery remains inside the camera) to the device using the input located slot under the battery compartment cover [4].

Charging in the external charger is indicated by red colour of charging indicator. Completed charging process is indicated by green colour of charging indicator.

Charging inside the camera is indicated by red colour of the indicator, its completion by green colour (Fig. 15).

Charging also takes place during operation of the camera.

**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

Charging of the batteries can take place only indoors - it is unacceptable charge them outside, especially during rain, etc.

**WARNING.**

**Do not short-circuit the battery, avoid accidental short circuits (e.g. when moving the battery loose with other metal objects).**


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

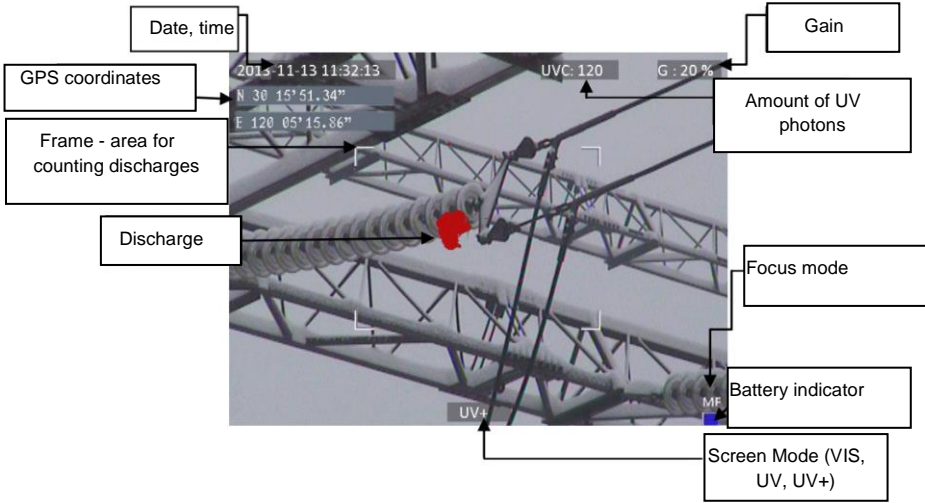
When charging is finished, disconnect the external power supply adapter from the mains.

When replacing the battery, with the camera connected to the power supply adapter, first connect the battery to the camera, and only then connect the AC adapter.

It is forbidden to 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 (real, UV, 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+**, i.e. combined UV and visual image; visual image **VIS**, or UV image only: **UV**.

White frame on the screen is an area for photon counting (effective area), where discharges are recorded - (amount of UV photons), the user may select 3 frame sizes - large, medium and small.

## 7.1. Operation of the buttons



Below, we describe the operations available by pressing buttons in the working screen mode.

### 7.1.1. Recording a video

Press  to start recording a video and saving it on a SD card (real time recording of images displayed on the screen). When recording video, you may add a voice note - after plugging the microphone + headphones set into the audio input. Video is recorded in "avi" format, it may be played both in the camera and on a PC.


### 7.1.2. Recording a static image

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


When the image is recorded, the screen displays message "record a voice note", at this point, you can record 20-second voice memo, press  to start voice recording (microphone connected to the audio input) - then the image is saved and the camera returns to the real-time mode (recording); press  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 switch displayed image into the following modes: visual image only VIS, discharge mode only (UV) and mixed mode (UV+).

### 7.1.4. "Freezing" displayed image



Press  "freeze" 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 after starting is set to auto focus mode. In case of a complex image (objects at different distances), focus may not be set automatically to the correct point (object), it is helpful to switch into 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, but also accidental interference; decreasing the sensitivity allows the user to observe only high-power discharges, and thus precisely locate their source.







### 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 or 4x. 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 . In order to listen the voice note, you may use earphone + microphone set connected to the audio input.





### 7.1.11. Zooming **UV+** image

In mixed image mode **UV+** and in **UV** mode, press  to enlarge (zoom) the image by 1x, or 2x. This makes it easier to find physical damage of the observed object, by finding the most radiant places.





## 7.2. Operating the menu

UV-260 does not display the menu on startup. Enter the main menu by pressing  in the real time image mode or after touching any place on the screen - the main menu is displayed;

press  or touch the screen in the place where menu is not displayed to close the menu.

**Note.** All the operations in the menu are performed by touching the individual items on the screen in the drop-down menu sections or by navigating through the menu using the cursor keys  or , then confirm the selection by pressing . At any stage, you may press  to exit the menu.

### 7.2.1. Main menu

With opened drop-down menu, select the desired option by touching the line 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.

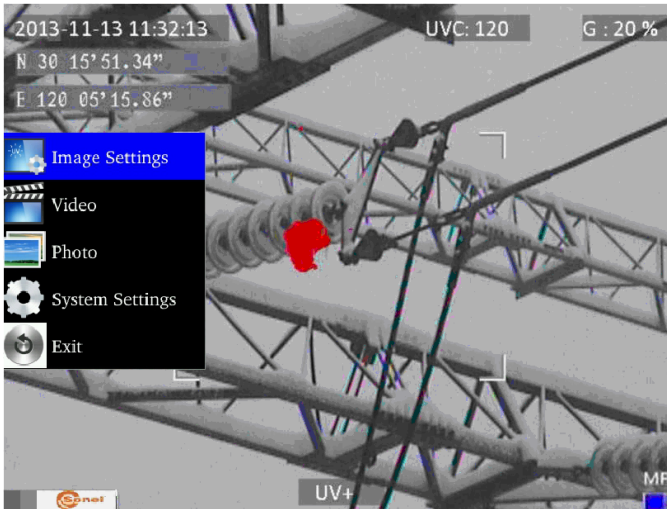


Fig. 18. Main menu.

## 7.2.2. Image Settings

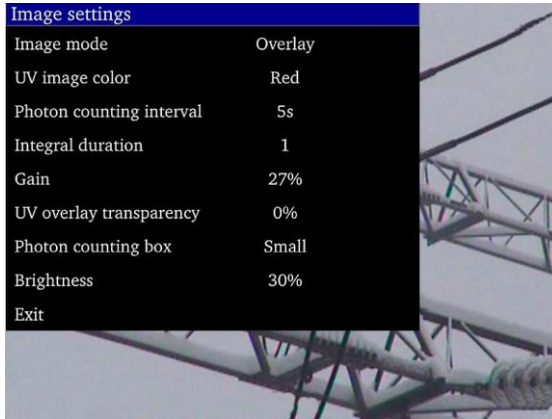





Fig. 19. Menu – Image Settings.



"Image Settings" menu allows you to configure the mode effects of UV image display. Specific options are presented below. Select/change options in the same way as in the main menu (use "arrow" key and confirm by pressing , exit to the previous menu by ; or touch selected area of the screen).

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

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

**Photon counting interval:** Set the interval time for photon counting, There are 10 time intervals of 1s, 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s.

**Integral duration** - integration time length: Set the integration duration, which can be set to 1, 2, 4, 8, 16 and 32. The integration function is used to accumulate the UV signal to filter out the random interference. Within the selected integration time, the discharge point appears repeatedly in the same place and is accumulated into larger signal, while the random interference signal will not be accumulated into a large signal, when the gain is reduced, the random interference will be filtered.

**Gain:** adjust the sensitivity of UV detector (similarly as adjustment - use buttons  and  in UV image mode UV or mixed mode UV+).

**Note.** Setting the high gain allows you to receive weak UV signals and detect very small discharges, but it should be remembered that:

- large gain may affect the accuracy of locating discharges, as the UV image will cover large area of the visible image making difficult to determine the exact location.

- in addition to the actual discharge signal, also interfering signals will be gained and they usually appear in random places (not in the same location). Therefore, in the first phase of discharge detection it is recommended to set a high gain level to preliminary determine the discharge location, and then gradually reduce the gain to a level that will allow precise location of discharges.

- for relatively large interferences, extend the averaging time and simultaneously reduce the gain level - this will eliminate the noise (background) and accurately determine the appropriate points of corona discharges.

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

**Photon counting box:** select the area where discharges are counted (frame with 3 sizes: large, medium, small).

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

**Exit:** return to the main menu.

### 7.2.3. Video

Provide a set of operations on video files saved on the SD card: view, delete files, and view detailed information about recorded video files. File names correspond to the dates of their creation.

### 7.2.4. Image

Viewing or deleting images saved on the SD card. While viewing images, you can zoom in and play a voice note (if you 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 and the user may change:

- system settings (included in the next sub-menu, as described below),
- time settings,
- factory settings,
- format the SD card,
- display information about the SD card,
- display information about the system.



Fig. 20. System menu.



## 7.2.6. Sub-menu "System Settings"

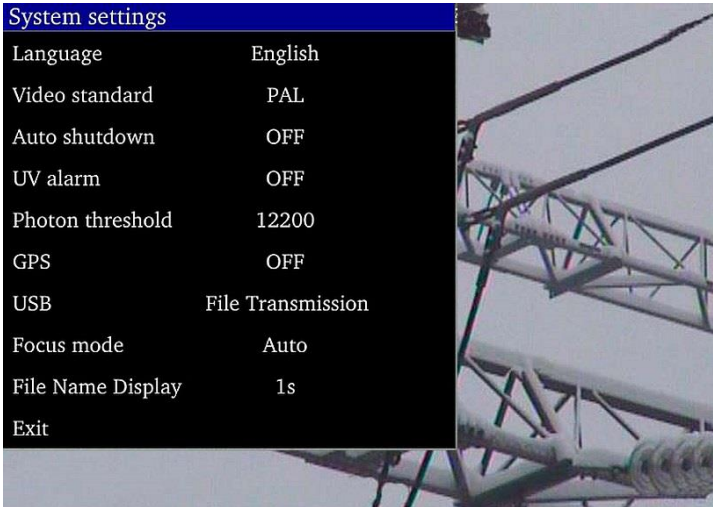


Fig. 21. "System Settings" Menu.

**Language:** Select the interface language.

**Monitor:** select system (PAL, NTSC) for the external screen.

**Auto shutdown:** the device is automatically turned-off, when no button is pressed during the set time.


**UV alarm:** audible alarm after detecting UV discharge.

**Photon threshold:** level of corona discharge (the amount of recorded photons), which triggers the alarm.

**GPS:** Turn GPS function on or off.

**USB:** There are two modes: video and file transmission.

- ① Video: Video needs to be used with Report software. In the device system settings, select video in USB. After the device is connected to the computer, open the video management button installed in theReport software on the computer, click the search button, search the device and then play it.
- ② File transmission: Select file transfer. After the device is connected to the computer, a removable storage device will appear on the computer. Double click to open it and select the required file or picture.

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

**File name display:** Set the display duration of file name from available: 1s, 2s, 3s, 4s, 5s.

## 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:

- CPU 2.0GHz processor or faster;
- 2Gbytes or more system memory;
- 80G or bigger hard disk;
- 1440×900 or higher resolution screen (Suggestion).

The software runs under Microsoft Windows 2000, XP, Vista and Windows 7.

### 8.2. Software Operation

#### 8.2.1. Starting-up Software

After unzipping the software, click the software icon to open the software as shown in figure 22.

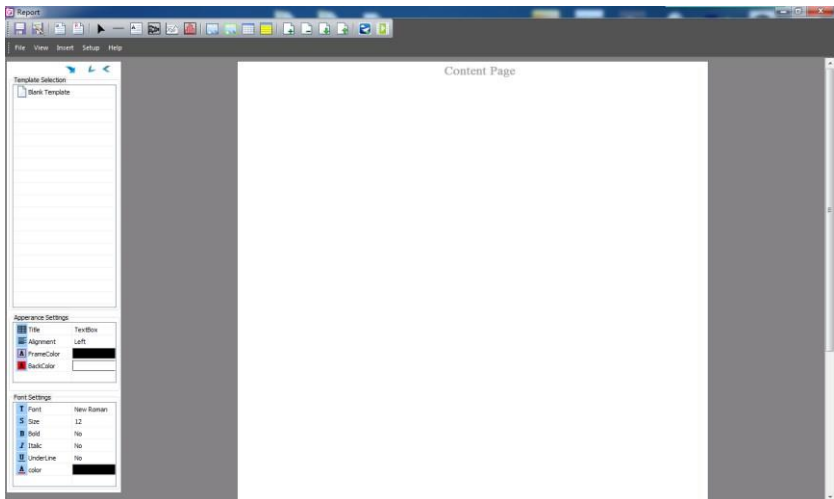


Figure 22

There will be a hint reminding users to download templates. After adding, users can also delete the template when you right-click the template name and select "Delete Template".

## 8.3. Software Operation

### 8.3.1. Main Function Area

There are five main functions in this area: File, View, Insert, Setup and Help.

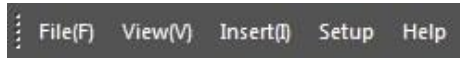


Figure 23

#### a. File

It can save file as template or save template directly. And it can output words, manage files and videos, as well as batch export gray images.

Batch export gray images: Firstly, users have to click “File→Batch export gray image analysis”. Secondly, select the templates and documents you need. And then click “output Word” to export gray images. If there are some documents that users don’t need, you can click the “Delete” to delete them. As shown in the figure 24.

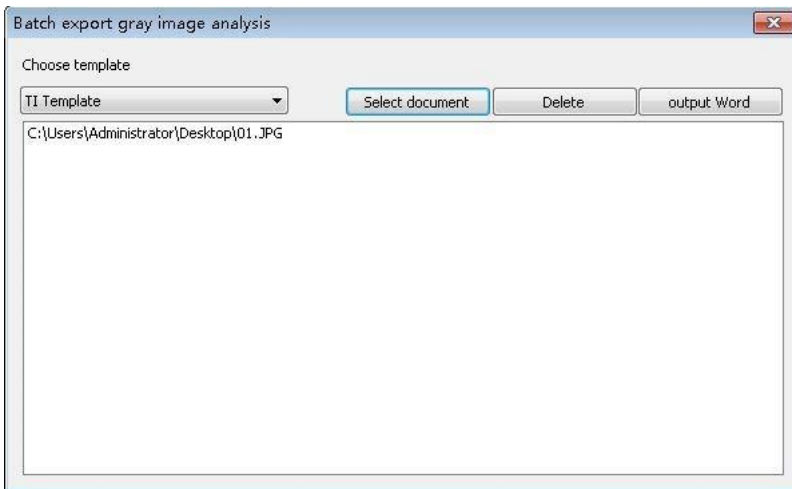


Figure 24

#### b. View

In this part, there is “ToolBar and Window” which can show or hide the toolbar and the status bar. As shown in the figure 25.



Figure 25

### c. Insert

In this part, users can add the lines, edit boxes, original pictures, line analyses, picture boxes, LOGOs, list boxes and vertical lists. Besides, users can add or delete pages, as well as flip pages.

### d. Setup

In this part, users can set up the temperature and add grid.

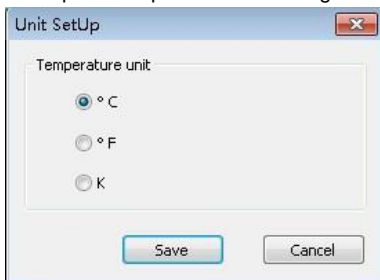


Figure 26

### e. Help

In this part, users can look through the user manual of software when you click the "Doc"; get the information of the version when you click the "About"; and change the language when users click the "Language".

### 8.3.2. Toolbar

It includes all tools to edit report. Users can use the tools according to needs.

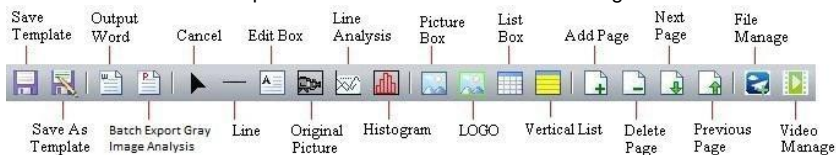


Figure 27

### 8.3.3. Template Selection

When users edit the report, there are several kinds of templates you can choose, blank

template, IR template, UV template, and Gas template. Click



in the left side to load template you need.

**a. Blank Template**

When you choose the blank template, the edit area is blank and users can add things you needed.

**b. IR Template**

This template is compatible with the first-hand pictures shot by IR devices. Users can download templates by themselves. The edit area is setup already in order to save your time, but users can still add or delete things.

**Infrared Detect Report**

Rransformer Substation	XXX	Weather	XXX
Device Name ,Position	XXX	Device History Max Current(A)	1540
Rating Current(A)	3150	Load Current(A)	1435
GPS N		GPS E	

**IR Image**



Pic Info	Data
Create Date	2015-09-19
Create Time	18:30:54
MessageObject	Data
NO_1_1MaxTemp	24.31°C
NO_1_2MaxTemp	69.33°C
NO_1_3MaxTemp	22.65°C
NO_1_4MaxTemp	24.43°C
NO_1_5MaxTemp	24.31°C

**Visible Image**



Figure 28

**c. UV Template**

This template is compatible with the first-hand pictures shot by UV devices, which called UV template.


In UV template, users could look through the picture information of pictures which are shot by UV device, such as photon number, GPS, create time and so on. And users could make some records below in the template.


The edit area is setup already in order to save your time, but users can still add or delete things.

**d. Gas Template**

This template is compatible with the first-hand pictures shot in gas mode.

### 8.3.4. Appearance Setting & Font Setting

This area is the shown area by default. If users want to hide it, you have to click the left button of . According to your needs, you can set up the way of alignment, frame color and back color when you select a picture, a text box, a list box or a vertical list. Besides, you can set up the front, such as size, bold, colour and so on. As shown in figure 29.

Click  to hide all the menu bars on the left, including template selection, appearance settings and font settings.

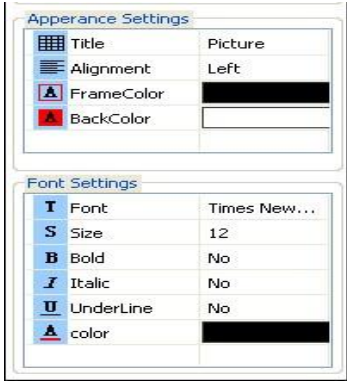


Figure 29

### 8.3.5. Cancel

When you click the tool in the toolbar unintentionally, users can click "Cancel" to cancel operation.

### 8.3.6. Line

Click "Line" if users want add horizontal lines, vertical lines or black boxes.

### 8.3.7. Edit Box

Users can add edit boxes to take down notes.

### 8.3.8. Add Pictures

#### a. Original Picture

Select "Original Picture" in the toolbar, and then add the picture box to the ideal position, as shown in figure 30 and 31. (The box in figure 30 is unchecked so that it can't add picture. You need to select it with your left mouse button clicking, so that you can add a picture, as shown in figure 31.)

Select "File Manage" in the toolbar. When the menu bar appears, please double click the left mouse button to add pictures, as shown in figure 32. (Take the thermal image as example.)

**Attention: The pictures in this part should be the first-hand pictures shot by IR or UV device, not including the visible images.**

For images shot by IR device, users can set up the image attributes and play audios as clicking the right mouse button. For images shot by UV device, users can set up the image attributes as well. But the audio play function is not available for UV images. See also sec. 8.3.9 and 8.3.10.

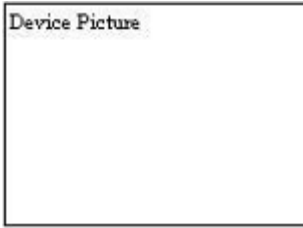


Figure 30



Figure 31

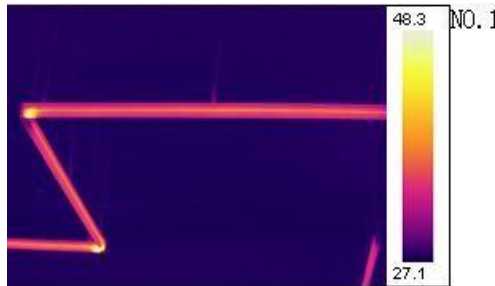


Figure 32

## b. Picture Box

This function is compatible with the “Original Picture”. This function works only if there is a picture in the original picture box. By default, the box will show the visible picture of NO.1 original picture. Users can set up the property, original object number and device number in the menu bar, as shown in figure 33.

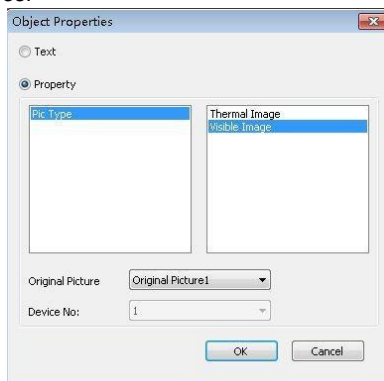


Figure 33

### c. LOGO

Select "LOGO" in the toolbar, and then add the picture box to the ideal position. Click the right mouse button and select "Change LOGO" to add picture. In this function, any JPG/JPEG files could be added.

### d. UltraMax Picture

**It is not available for the device without ultramax function.**

Please turn on the UltraMax of device and take pictures before using this function.

Select "Original Picture" in the toolbar, and then add the picture box to the ideal position. Click the right mouse button and select "File Manage" in the toolbar. When the menu bar pops up, please select the ultramax picture, click the right mouse button and select "Ultrapix Picture", as shown in figure 34.

In this function, the picture will be much more clearer and the temperature analysis will be much more accurate.



Figure 34

In Icon mode, the unchecked ultramax pictures are highlighted by yellow background, and the checked ultramax pictures are highlighted by blue background. In list mode, the ultramax pictures are distinguished by the mark **S**.

Click the right mouse button, and users can set up the attributes and temperature range, as well as play videos.

## 8.3.9. Image Setup

### a. IR Non-gas Image

After adding pictures, please click right mouse button and select "Attribute settings". The menu bar pops up, as shown in Picture 35.

- The image setup is on the left, and the temperature range is on the right. Users can adjust the temperature range automatically or manually. In addition, users can add points, lines, regions, ellipse or polygon to the pictures, one at a time. And users can also delete one of them, delete all information, or initialize the adding operation. When adding polygon, click right button to finish drawing.
- There are 12 color bars in total. And you can choose to show or hide temperature objects.
- Users can set up the attributes of object, such as equipment materials, equipment distance, equipment name, max temperature and min temperature. And you can adjust the temperature range automatically or manually.
- Please save the operation after setting, and then click "quit".



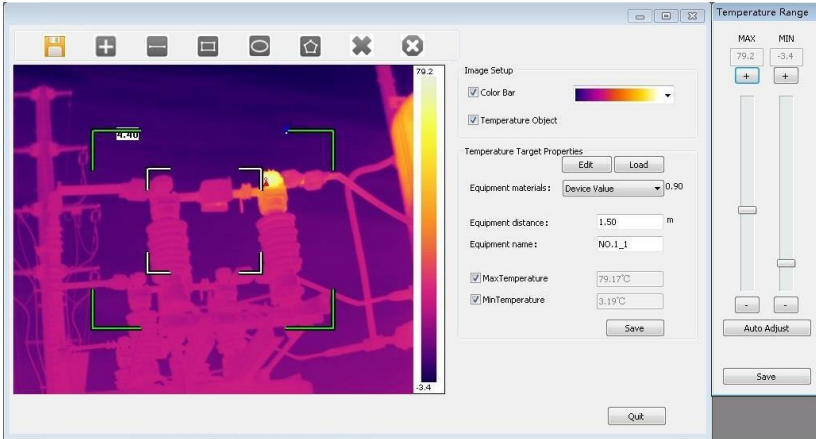


Figure 35

## b. IR Gas Image

After adding pictures, please click right mouse button and select "Attribute settings". The menu bar pops up, as shown in Picture 36.

- a. Switch the display between IR and Gas mode.
- b. The operations of image attributes are the same as IR Non-gas Image.
- c. UV images are not available for this function!

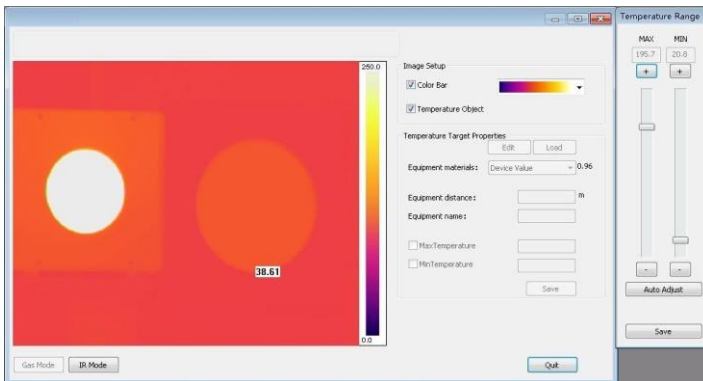


Figure 36

## 8.3.10. Audio Play

Select the pictures you added by the function of original picture, and click right mouse button. Then select "Play Audio". The play interface will pop up automatically. However, this function is merely available for the pictures with voice annotations.

### 8.3.11. List box

Select “List Box” in the tool bar, and add it into template. You can adjust row number and cow number upon you needs.

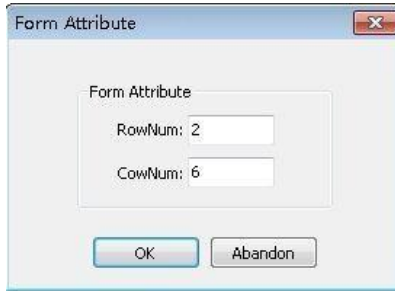


Figure 37

After addition, users can edit the table. For example, you can set up the appearance and font (refer to sec 8.3.4). However, cell merging is unavailable so that you have to splice tables by yourself. As shown in 38.

Rransformer Substation	XXX	Weather	XXX
Device Name_Position	XXX	Device History Max Current(A)	1540
Rating Current(A)	3150	Load Current(A)	1435
GPS N		GPS E	

Figure 38

Users can change the display information when you select one certain cell, click right mouse button and select “Cell Properties”. As shown in figure 39.

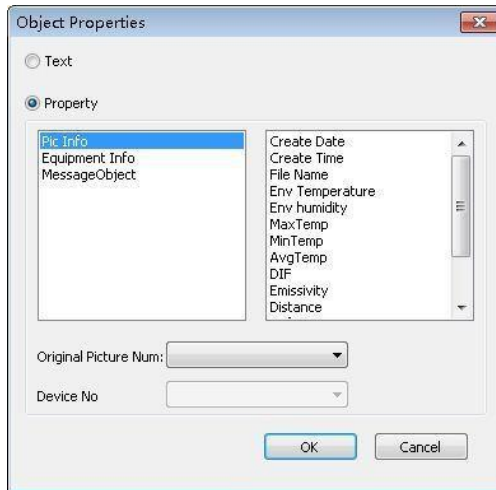


Figure 39

### 8.3.12. Vertical list

Select “Vertical list” in tool bar, add it into template, click right mouse button and choose “Picture Attribute”. Users can add picture information and message object, as well as change the original picture number. As shown in figure 40.

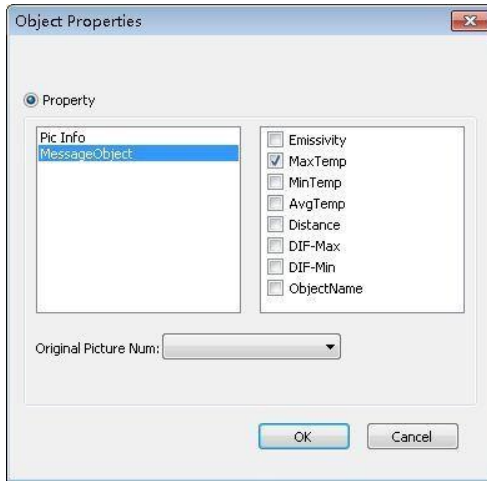


Figure 40

### 8.3.13. Line Analysis

In order to use this function, users have to add lines to the added pictures in “Image Setup” beforehand.

Select “Line Analysis” in tool bar, click right mouse button and choose “Attribute Settings”. Then the menu bar pops up, as shown in figure 41. According to needs, users can check grid line, legend and lines. As shown in figure 42.

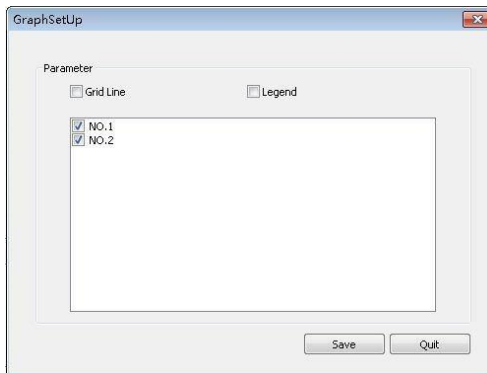


Figure 41

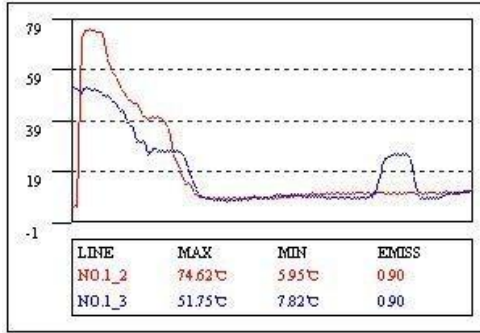


Figure 42

### 8.3.14. Histogram

This function aims to display the line analysis in histogram. And users also need to add lines to the added pictures in “Image Setup” beforehand.

Select “Histogram” in tool bar, click right mouse button and choose “Attribute Settings”. Then the menu bar pops up, as shown in figure 43. Users can choose the picture, measuring line, histogram number and colour. And you can add grind line according to needs.

There is an example in the figure 44.

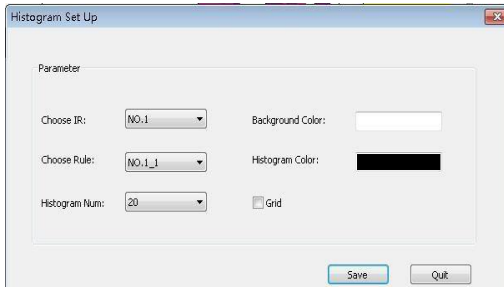


Figure 43

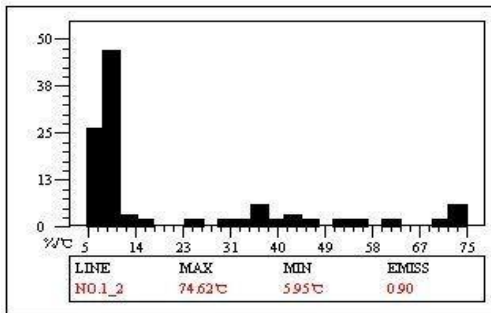


Figure 44

### 8.3.15. Page Attribute

Click right mouse button at the blank of the template, and select the option “Page”. Here, the page attribute can be set up to “Cover Page”, “Head Page”, “Content Page” and so on.

If all pages are “Content Page”, users can add any number of pages, or any number of pictures on the same page. If one of the pages are not “Content Page”, then users can only add one page of “Content Page” which just has one single picture.

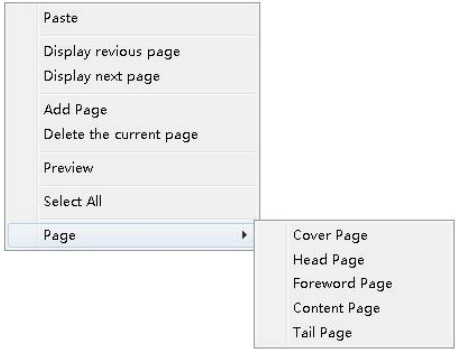


Figure 45

### 8.3.16. Video Transmission

#### a. Preparation: USB Driver Installation of C-type Win10

**If users prefer connecting device to PC by USB, you'd confirm that you have installed the USB driver files firstly! For some devices, USB driver files need to be installed manually!**

There are the installation steps.

Firstly, please click the win button. Then click “Settings”, and in this menu, please click “Update & security”. Here, select “Recovery”, and then click “Restart now” which is at the menu of “Advanced startup”.

Waiting for some seconds, a new interface will pop up automatically. Please select “Troubleshoot” here, and click “Startup settings”. Then click “Restart”. In the new interface, press 7 in the number keyboard to select “Disable driver signature enforcement”.


Thirdly, select “Set up → System setup” in the device, and then select “Video” in the “USB” option. And then connect the device with PC by USB wire.

After connecting and restarting, please open the “Device manager”, and then find the corresponding device here. Right-click it and select “Update Driver Software”, then click “Browse my computer for driver software”, and add the file folder of driver.

#### b. IR Device

Please connect the device to the PC firstly. There are two connecting ways.

The first one is to select “Setup → System Setup → USB”, and then select video as transmission mode. By this way, please confirm the condition of USB driver files.

Open the software, Select , and then the “video player” box will appear. As shown in figure 46 and 47.

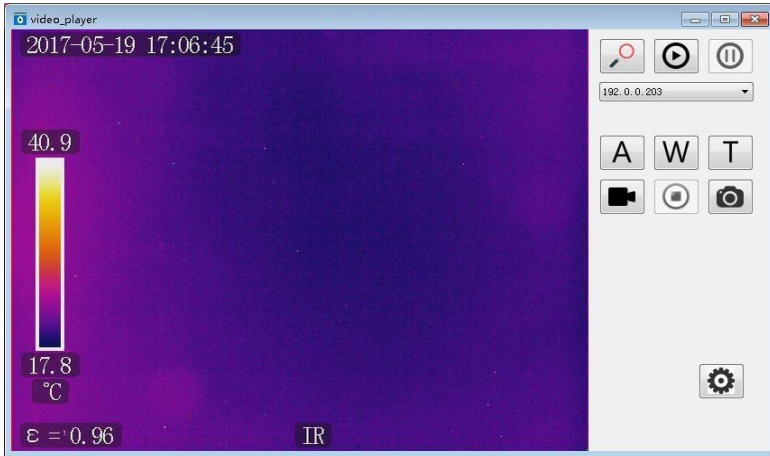










Figure 46



Figure 47





Click  and users can reach the devices nearby. Click  to connect the device, and click  to disconnect.  the device box can help users to select the devices they need.

**For IR devices, there are two types of devices.** For one kind of device, it could merely be shown as USB instead of the

IP address in the device box. In this situation, the functions of ,  and  are unavailable. For another kind, the device box shows the IP address, and the functions of ,

**W** and **T** are available. Users can achieve auto focusing when you click **A**, and adjust far-focus or near-focus when you click **W** or **T**.

**For Gas devices,** **A**, **W** and **T** are unavailable as gas device don't have the function of auto focusing.

Click   to record videos or stop recording. Click  to take photos. Click  to set up the save path of videos and photos.

### c. UV Device

Please connect the device to the PC firstly. There are two connecting ways.

The first one is to select "Setup → System Setup → USB", and then select video as transmission mode. By this way, please confirm the condition of USB driver files.





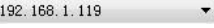




Open the software, select , and then the "video player" box will appear. As shown in figure 48.



Figure 48

Click  and users can reach the devices nearby. Click  to connect the device, and click  to disconnect.  can help users to select the devices they need.

Click **A**, **W** or **T**, users can achieve auto focusing, far-focus or near-focus. Click   to record videos or stop recording. Click  to take photos. Click  to set up the save path of videos and photos. Click to adjust the gain and mode.

## 9. Other information

### 9.1. *Cleaning and maintenance*

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

The lens may be cleaned only by compressed air or special tools.

Electronic circuits of the device do not require maintenance.

Equipment and accessories may be dried at a temperature not exceeding the maximum storage temperature.

### 9.2. *Storage*

During the storage of the device, the following recommendations must be observed:

- make sure that the device is dry,
- when the device is to be stored for longer time, remove the battery
- the device must be stored in a dry place at the temperature specified in the technical specifications.

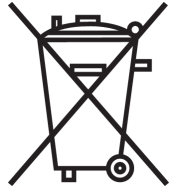
### 9.3. *Dismantling and Disposal*

Worn-out electric and electronic equipment should be gathered selectively, i.e. it must not be placed with waste of another kind.

Worn-out 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 any elements.

Observe local regulations concerning disposal of packages, waste batteries and accumulators.



### 9.4. *Transport*

It is recommended to carry the device and accessories in its original packaging (case). Never carry the camera loose, as it may be damaged due to shocks and vibration. It is recommended to remove the battery from the camera during transport.



## 10. Technical specifications

### UV optical parameters:

Image .....	monochrome video
Corona shades .....	white, red, blue
Minimum UV sensitivity .....	$2.2 \times 10^{-18} \text{ W / cm}^2$
Minimum Discharge Detection .....	1 pC at 10 meters
Spectral Range.....	UV 240 - 280 nm
Field of view (HxW).....	$5.5^\circ \times 4.0^\circ$
Focus .....	automatic or manual
Focus range.....	above 2 m
Detector life .....	no degradation
Frequency .....	50Hz

### UV optical parameters:

Image .....	true colour
Overlay accuracy for UV/visible radiation image.....	better than 1 milliradian
Minimum Sensitivity .....	0.1 lux
Zoom .....	25x optical and 12x digital

### Display:

Type .....	5,7" VGA TFT, tilted, touch-screen
Video standard .....	PAL/NTSC
Display Modes.....	combined (UV + visual) / UV only / visual radiation only

### Processing and Communication:

Video standard .....	H.264
Alarms .....	audio, LED
Operation.....	buttons and TFT 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 .....	USB, card reader

### Power system:

Rechargeable .....	Li-Ion battery, dedicated
Power Consumption.....	10W
Charging.....	external charger or camera built-in charger
Mains.....	power adapter 110..240V AC, 50..60Hz / 12V DC, 3,8A
Power supply from a car socket .....	9..14V, 10VA
Battery life .....	about 2 hours

### Other:

Degree of housing protection acc. to EN 60529.....	IP54
Operating temperature .....	$-10^\circ\text{C}..+50^\circ\text{C}$
Storage temperature .....	$-25^\circ\text{C}..+60^\circ\text{C}$
Humidity .....	5%..95%, non-condensing
Weight.....	2.5kg
Dimensions.....	238 x 165 x 91 mm
Video Output.....	CVBS
Audio input / output.....	combined jack for microphone and headphones

## 11. Accessories



*Fig. 49 Standard accessories for UV-260.*

Components of the set:

Camera UV-260 .....	1 pc.
Charger .....	1 pc.
Rechargeable battery .....	2 pcs
AC Adapter .....	1 pc.
Car adapter 12V .....	1 pc.
SD card 8GB .....	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.
USB cable .....	1 pc.

## 12. Manufacturer

The manufacturer of the device and provider of guarantee and post-guarantee service:

**SONEL S.A.**

Wokulskiego 11

58-100 Świdnica

Poland

tel. +48 74 858 38 60

fax +48 74 858 38 09

E-mail: [export@sonel.pl](mailto:export@sonel.pl)

Web page: [www.sonel.pl](http://www.sonel.pl)

**NOTE**

**Service repairs must be performed only by the manufacturer.**

## NOTES

## NOTES

## NOTES





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