DayCor®

SUPERB

OFIL SYSTEMS >>Make UVisible

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User's Guide

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Chapter 1

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Getting Ready

1. Assemble all accessories so that you have easy access to them

2. Adjust the shoulder straps to fit your body by fastening the straps

3. Fasten the front pad

4. Lean the camera against the front pad. Use the grooves to adjust the viewing angle of the camera.

5. hook the supporting harness clip

6. Remove the lenses cover

7. Insert the lenses cover in the pouch

8. Adjust the LCD display angle and the shade

9. Plug in the power

10. You are ready

Chapter 2

2

Operating tips *

Status Line

This function can be turned on/off through the Status function-key. The status line, positioned at the LCD bottom, shows the current status of the display mode, the focus mode, the UV gain, if long-integration is on and the counting value. This data is valuable when processing and analyzing the recorded information and for report generation.

Here is an example of a status line with and without counting:

Option 1: with counting

COMBINE AF GAIN 180 COUNTER 10000

Option 2: without counting

COMBINE AF GAIN 180 LI 0F

Legend:

Combine = Combined display mode …….(Optional Visible, UV)

AF = Auto Focus……...(Optional **MF** = Manual focus)

GAIN 180= UV gain with numerical value….(Optional values 0 to 250)

LI 0F = Long Integration 0 frames ……....(Optional values: 0 to 31F = Number of integrated frames)

COUNTER 10000 = Counting value……(Max value 32768)

Display Mode

The DayCor® Superb bi-spectral camera has 3 operating modes:

- Visible only mode
- UV only mode
- Combined mode

While in the UV only mode, the status line displays the UV gain value only .
The visible only mode is handy when there is a reflection on glass insulators that might be mistaken for corona. The camera enters the visible only mode during visible zooming.

* It is advised to read the warranty terms before operating the DayCor®

Focusing

By default the camera is set to auto focus, and the status line reads AF. The UV focus is synchronized with the visible focus and follows it as can be heard through the sound of the UV camera motor when the visible focus changes.

Changing to manual focus is done through pressing on the focus function-key. As a result a value of the current focus, between 16 and 80, appears on the LCD. The up and down arrows allow 64 steps of focusing. There is a correlation between the numbers and the distance of the camera from the corona source. 16 is the value for infinity and 80 is the value for a distance of 3 meters.

The focus scale is also used when the camera needs to be recalibrated, a procedure that can easily be performed by the camera operator (special instructions).

When to use manual focus

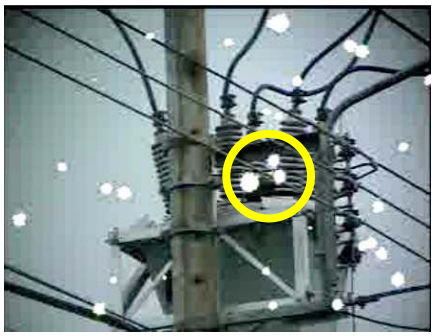
- When Corona is out of focus while background objects are in focus, as happens sometimes in substations. The camera is focusing on a prominent object which is not near the corona so that the corona appears non focused
- Poor illumination conditions might fade out details and slow down or prevent accomplishing auto focus
- To perform an accurate counting you might wish to defocus and re-focus (see below)

UV Gain

UV gain values are scaled between 0 and 250. 250 represents the highest sensitivity. It is recommended to start the inspection with a high gain of about 180 and decrease the gain when a corona is detected. This will enable pinpointing the source of the corona. Pressing on gain function-key reveals its value, pressing again will restore its default value. To change the default value, select a desired UV gain and press on the Save function-key for 5 sec. A confirmation message will appear on the LCD screen

LI – Long Integration

Long **I**ntegration supports inspection of very weak signals or inspection in areas with abundant non-corona UV background signals. This function affects the read-out frequency of frames. Below is an example taken from a distribution line in Costa Rica (a 35 kV line) where a nearby welding machine generated non-corona UV background.



No Integration LI=0 UV Gain 180

Long integration L3, UV Gain 90

While in long integration, the CCD of the UV channel is read-out in a lower rate and each read-out contains the accumulated UV events. Therefore, the UV signals that repeat in the same place (corona for example) form a larger signal while the random signals almost do not increase in size. By reducing the UV gain, the random UV signals can be removed while the repetitive signal, although decreasing in size, will still be visible on the screen. More in Chapter 3.

Counting

The counting function provides an indication of the corona strength. The camera displays the number of UV spots generated by corona per minute.(*)

Counting results depend on:

a. Distance and angle of the camera from the corona source

b. Relative ambient humidity. The higher the humidity, the more intense is the corona activity and the higher is the count

c. Camera settings. Each camera has its innate recommended gain range. This value is documented in the manufacturer's instruction manual supplied with each camera. Within this gain range the dependency of the counting on the UV gain is minimal (plateau range). In other words, within this plateau range the counting values will be similar in various gain values.

How to count

Enter the counting mode by pressing on the counting function-key. A small frame will appear on the display. By pressing the up and down arrows the size of the frame will change. Position the corona image in the center of the frame and wait until the count value stabilizes with only small fluctuations.

To count accurately

1) Set the UV gain default to the lower value recommended by the manufacturer, as appears in your supplied instruction manual.

2) Verify that the camera operates at normal video rate – LI0 (no long integration) in the status line.

3) Set the camera to manual focus and defocus. By defocusing the camera will count UV spots that were overlapping in the focused mode and were counted as a single spot.

4) The displayed counting is an average of the last 4 display values, it is therefore necessary to wait 4 successive displays, about 25 sec.

Compare counting

Counting can be used as a comparative tool. When comparing counting, it is important to compare just the reading but keep all other variables that affect counting such as distance, angle, same camera, and same ambient conditions – equal.

(*) The camera is not sold as an electrical measuring device and its output does not read directly the pC value of a corona

Exposure

The visible camera, by default, is set to automatic exposure mode.
Under certain light conditions details like cables may be invisible and changing manually the exposure might help. The exposure affects the recorded video clips and is a function of the visible channel only.

To switch to manual exposure, press on the exposure function-key and as a result an indication of the exposure value appears. Using the up and down arrows the exposure values are changed. The range of exposure is from 1/10000 down to 1/80 and further to field modes of 2, 4, 6 and 8 integrated frames.
When aiming against a strong light source or against the sun, never exceed exposure of 1/125 or the visible camera might get damaged.

Status Display

By default the status line is displayed. The status line includes information about the selected functions and the date and time. It is recommended to keep the status information while recording. This data is valuable for keeping logs, follow up, documentation etc.

To turn off press on the OSD key .

LCD Back Light

The LCD back light can be adjusted by the dedicated knob on the LCD. Note that the brightness does not affect the brightness of the video output.

Zoom

Visible Zooming

Visible zoom values are X25 optical and X12 digital.
When using the visible zoom, the UV camera shows only the visible channel. The combined mode, visible + UV, will reappear upon exiting zooming.

Rapid Visible Zoom

The camera is equipped with a rapid visible zoom mechanism, which means that the switch from normal to max optical zoom and backwards takes 1 second by a continuous key press or release.

Digital UV Zoom

When using the digital zoom the camera remains in combined mode, visible + UV and the corona is transparent. Zooming values are X2 or X4. Activating this function brings up the X2 zoom To toggle between the X4 and X2 zoom use the up/down arrows.

Video Recording

To capture Corona it is recommended to record video clips. Corona is a flickering phenomenon and will not appear in every frame. To capture video clips you need to use the Rec button. The recorded clips are stored in the SD card. To review the recorded video clips use the Play-Back option. Press on playback, select HVR. Use F1 to step into the nested folders that are created automatically by date and time. Use arrows to navigate within a folder. To run a video clip select a file and click on F1. To step back use the F2. To leave playback click on any other button.

Stills Recording

To capture still pictures use the snapshot button (camera icon). The recorded pictures are stored in the SD card in the PICTURE folder. To review the captured pictures use the Play-Back option. Press on the play-back button. Use F1 to step into the nested folders that are created automatically by date and time. Use arrows to navigate withing a folder. Display an image using the F1. Step back using F2. Leave playback by pressing any other button.

First tryout

It is suggested to perform the first tests with the camera away from places with UV signals, as in urban locations. Set the UV gain to 180, the camera display to UV only, and direct it slightly away from the sun. Only a few UV random spots should appear on the LCD screen. If you see abundant random spots and from time to time the screen becomes "clean" for a short time, you are probably near a workshop where a welding machine is operating. Under no condition should a non-random UV spot appear constantly at the same position on the screen (because the camera is fully **solar blind**).

Note also that some halogen lamps and mercury lamps that are not well-shielded may emit a lot of UV radiation in the UV Solar Blind band.

When looking for corona set the camera to combined mode, start with gain 180-200, and then reduce the gain to minimum possible to see exactly the position of the corona source.

Chapter 3

3

Inspection tips

Handling Non-Corona UV Background

Non-corona UV spots are characterized by their random manifestation.
Corona UV spots are characterized by their repetitive manifestation.

Sources of UV spots

- Usually near substations in industrial areas there is a lot of "non corona" UV background due to welding machines operating in factories and construction sites, or fires due to flares of refineries, or other chemical industries. In some locations lamps with very strong UV emission or mercury lamps with inadequate UV protection are installed. Welding machines produce thousand times more UV than corona. This yields random UV spots on the display, and might give an inexperienced camera operator the feeling as if the camera is not "solar blind". Although those random UV spots do not harm the camera, it is recommended not to look for a long time directly on a welding machine with the camera.

- A strong UV source, even a strong corona, will always scatter UV photons. This is a natural phenomenon occurring due to the short wavelength of UV, and is not a problem of the camera.

- In a substation with many strong corona sources, UV light scattering effects will also cause a lot of random background.

How to recognize a corona source

You will still be able to recognize a corona source because_corona is repeating at the same location while the background noise is random.

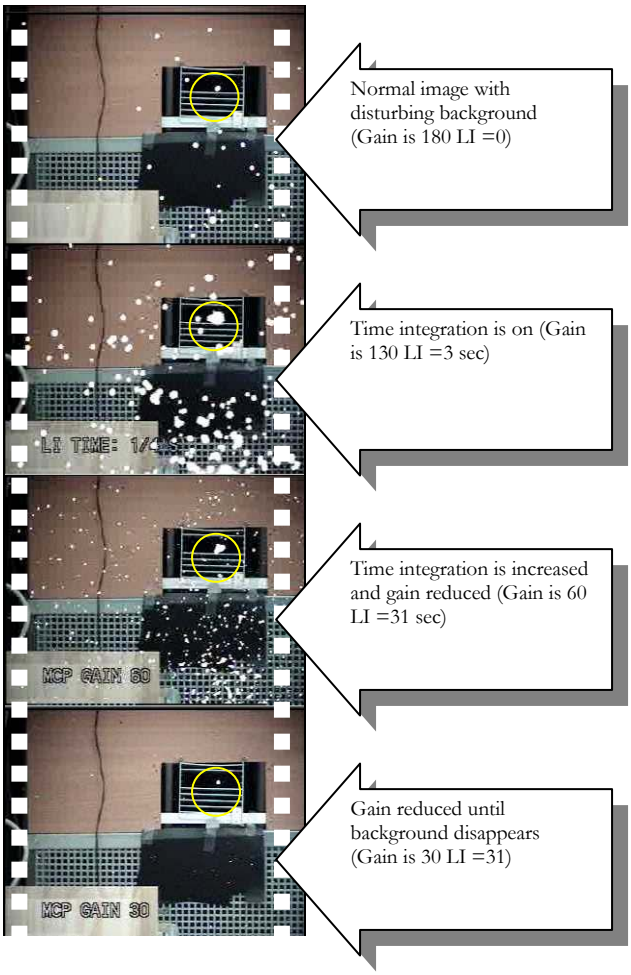
How to reduce the effect of non corona UV background

To reduce the effect of non corona random UV background:

- Reduce the UV gain to a minimum value of 100 - 120
- Activate the LI option and change its values until most spots disappear and only the corona is noticeable

- Further reduce the UV gain until you see a small repetitive corona spot and the screen is almost clean from random background.

Below is an example with Ofil's laboratory corona generator. The corona is in the yellow circle and the background noise is due to a nearby UV lamp.



When operating in the LI mode the UV channel of the DayCor® Superb camera turns into a slow response instrument. If the camera moves relative to the UV source the UV image will be smeared. When recording while operating in the LI mode, the camera should preferably be used from a tripod, or the operator should be able to hold the camera without moving it

Chapter 4

4

Troubleshooting

Checking Alignment of the UV and Visible Images

The UV image (corona) and the visible object on which corona is generated should remain aligned throughout the LCD display and their relative position should be kept whether in the center or off center. Or else, consult the manufacturer.

Focus

If the camera needs to be recalibrated, ask the manufacturer for the procedure to be performed by the camera operator.

To check alignment of the UV and visible displays: Use a candle behind a screen with a pinhole. Place a camera, set on auto focus, at a distance of about 12m from the screen. The UV and visible images of the pinhole should superpose whether their image is in the center or in the extreme left or right sides.