User manual DVOC top light DVTL-002x

This manual explains the setup and operation of the custom red, blue, green (RGB) and white top lighting in the DVOC-0040 / DVOC-0041.

1. Connecting the components

The setup consists of a DanioVision ObservationChamber with built in custom top light (*Figure 1*), Desktop power supply, TTL-to-28V interface and cabling (*Figure 2*). With this setup, two of the LED colors, or the white light can be switched on and off from EthoVision. The TTL-to-28V interfaces enable switching the power from the desktop power supply.

Whenever you would like to use all three colors (R-G-B) within one experiment you'll need a second TTL-to-28V interface

The LED power cable (coming from the back of the DVOC) has 4 connectors, one for each LED color. The connectors belonging to the appropriate colors should be connected to the TTL-to-28V interface on outputs 1 and 2. The TTL network cable (green) should be connected between the TTL-to-28V interface and port 1 on the DVOC. A main power cable connects the desktop power supply to the input of the TTL-28V interface (*Figure 2* + *Figure 3*).

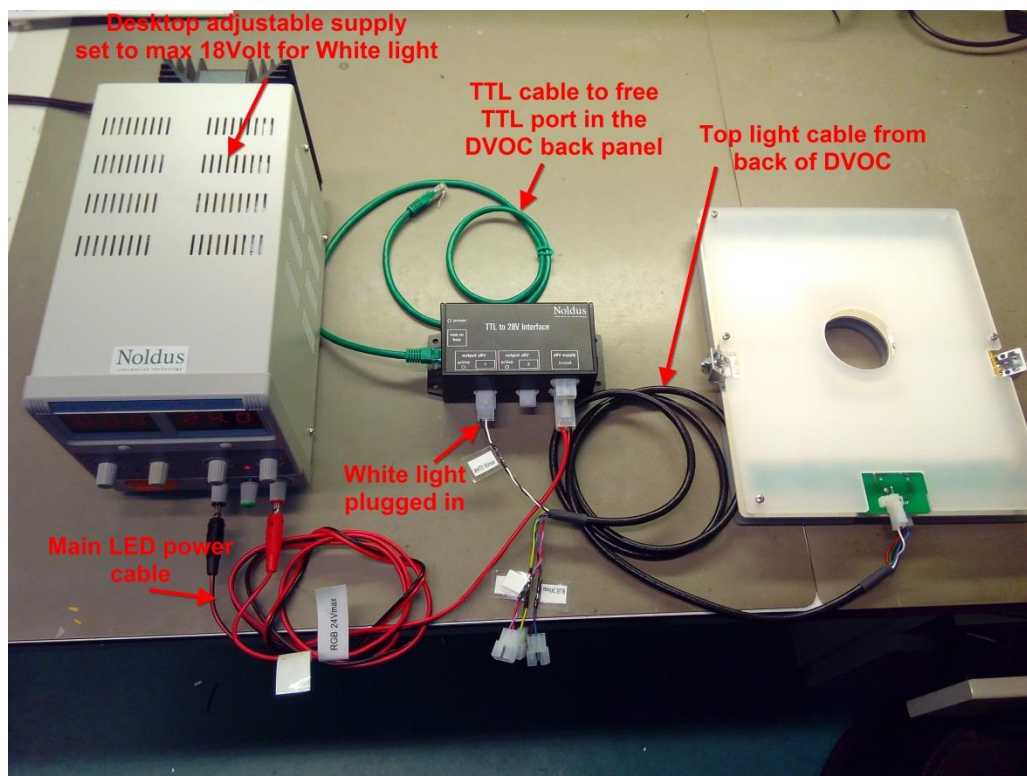*Figure 1: DVOC with custom ceiling light*
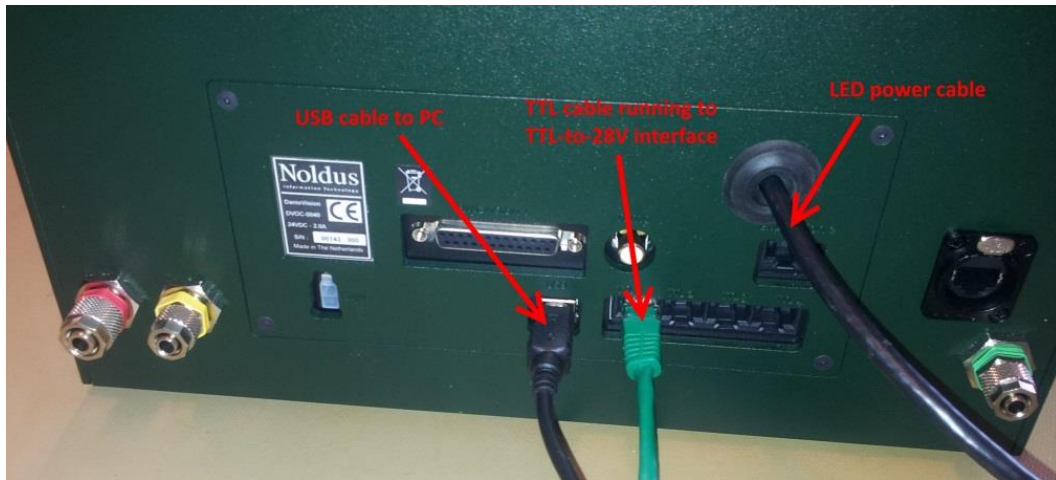

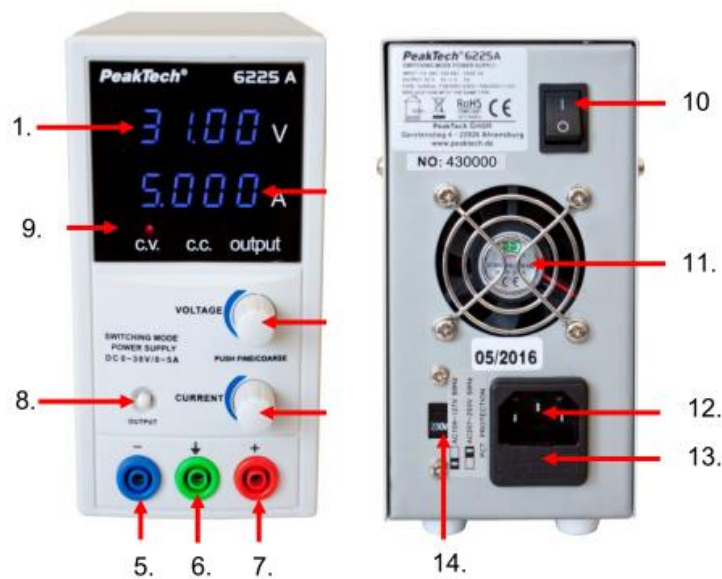*Figure 2: White light setup connections*

Figure 3: Back of the DVOC with LED power cable, TTL cable and USB cable

2. Operating the power supply

Supply version PeakTech 6225A

Prior to connection to a mains outlet, check that the mains voltage corresponds with the voltage setting of the supply. (*See figure 4*)

Front :

1. Voltage indication
2. Current indication
3. Coarse / Fine adjustment of output voltage
4. Coarse / Fine adjustment of current
5. Negative output terminal
6. GND-Output
7. Positive output terminal
8. Output ON/OFF switch
9. C.V. / C.C. and Output Indication

Rear :

10. ON/OFF Switch
11. Fan
12. Mains Socket
13. Fuse Holder
14. Voltage Selector

figure 4 : front and back of the supply

On the power supply the voltage can be set which determines the amount of light that the LEDs emit. The voltage may not exceed the maximum voltage for each LED color. This is **24V** for the Red, Green and Blue LEDs and **18V** for the white LEDs. Note that higher voltages may **damage** the LEDs.

To power up, use the power switch on the back.
The voltage can be adjusted by turning the 'Voltage' knob (press this knob to switch between coarse and fine adjustment).
Actual output voltage can be read from the display.

The "Current" knob can be used to set a current limiting value (maximum current).
We don't need this feature so just set to the maximum level.(turn full clockwise)
If not set properly the supply may come in Constant Current mode (CC) and will limit the output voltage.
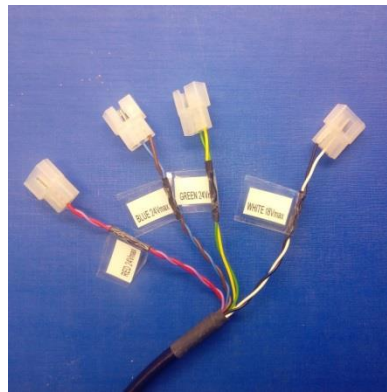
After you set to the desired values, the actual voltage output has to be switched ON using the pushbutton (8) on the front.

It is good practice to first set your desired voltage before actually connect the main LED power cable to the supply.

Refer to the supply manual for details.

3. Changing between Red, Green and Blue

To change between colors, simply unplug the current connector of the LED power cable from the TTL-to-28V interface and plug in the correct one. Each connector is labelled (*Figure 4*).
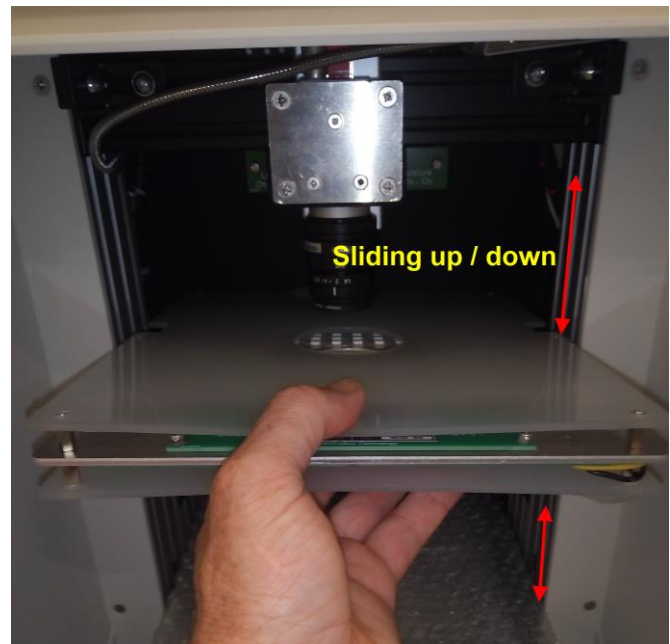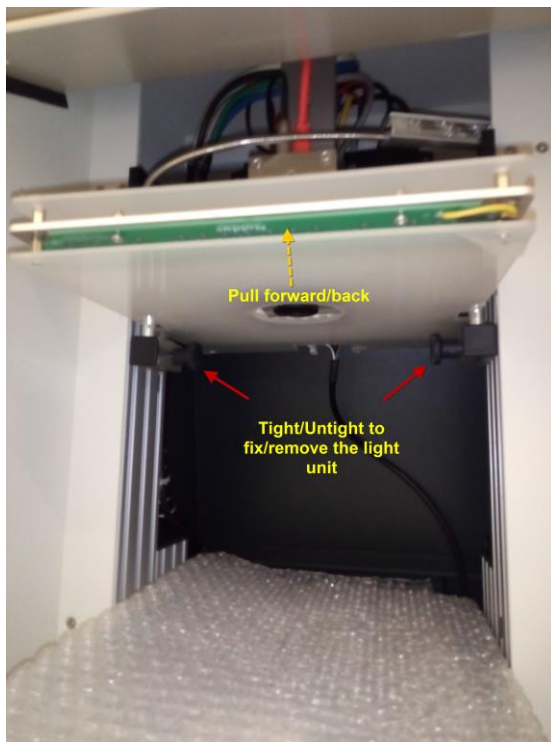

Figure 4: LED power cable with 4 connectors: one for each color

4. Changing between color and white light

If you want to "switch" function from RGB to white light (or vice versa), you've to turn the complete unit in order to have the right LED's facing down towards the well plate.
The RGB LEDs and white LEDs are mounted on the opposite sides of the same aluminum base plate and can be identified by the label "white" and "RGB" attached.

- Cover the lens bracket with some protective material.
- Untighten both left and right round black knobs to enable the unit sliding down a few centimeter, just below the camera
- Now you can pull the unit out and turn it upside down (facing the preferred LED's down now.)
  ! Be careful not twist the cable at the back, you may unplug temporarily both connectors to prevent.
- Insert the unit and slide it up again
- Tighten both round knobs

5. Settings in EthoVision XT for switching light on/off

Start EthoVision XT and create a new experiment using a template (File > New from template). During the guided setup, choose **Live Tracking**, **Zebrafish larvae**, **DanioVision** [with the type of well plate you use].

Choose **Setup** > **Experiment Settings**.

Under **Trial Control Hardware**, select **Use of Trial Control Hardware** and choose the options as in the figure below. Choose the TTL port that you connected (*Figure 3*). You can rename **Device ID** to something like "Ceiling Light" (*Figure 5*).
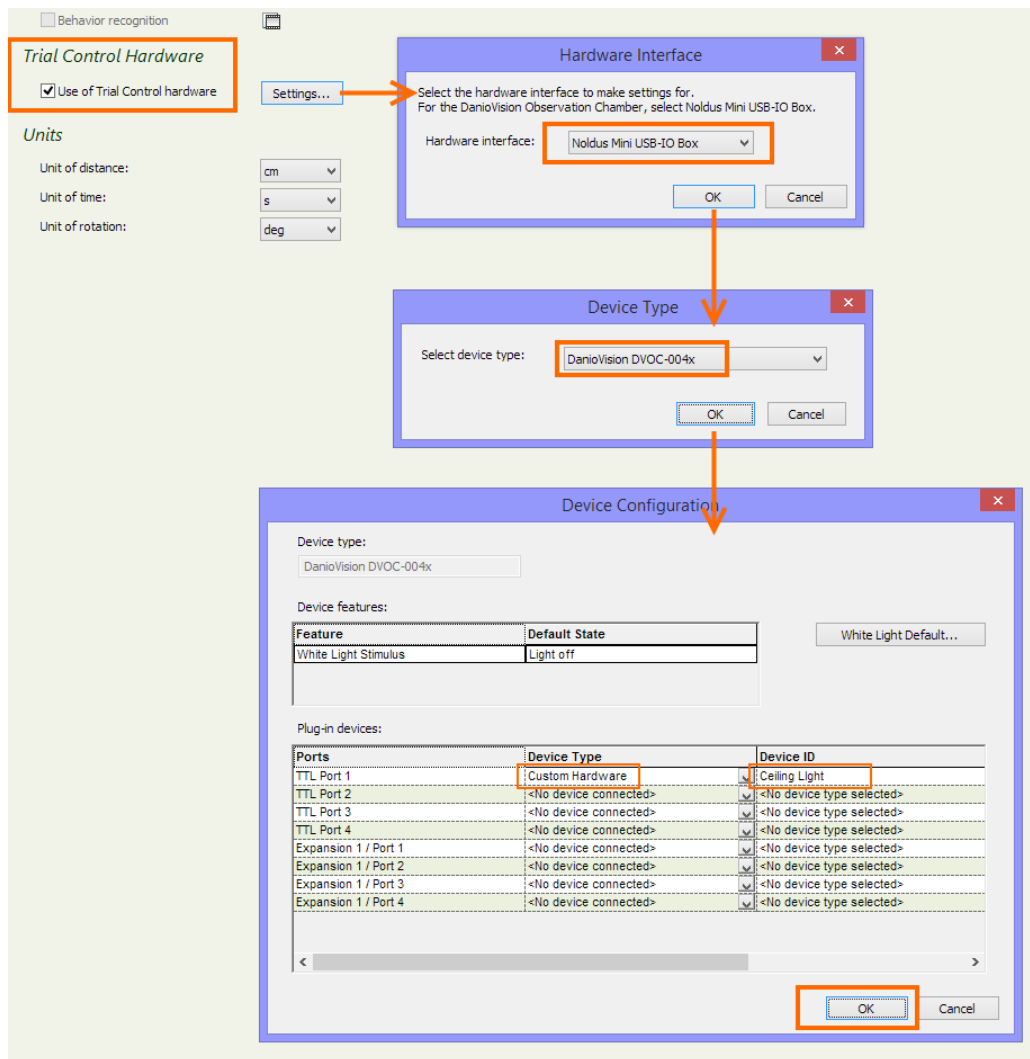
Figure 5: Experiment settings: setting up the custom hardware

Choose **Setup** > Arena Settings.

After calibrating and drawing the arenas, click **Arena Hardware Mapping**. Click Add device and follow the picture below. You can rename the text under **Device name** to something like "Ceiling Light". Under **A1** select the device (*Figure 6*). Then Click OK.
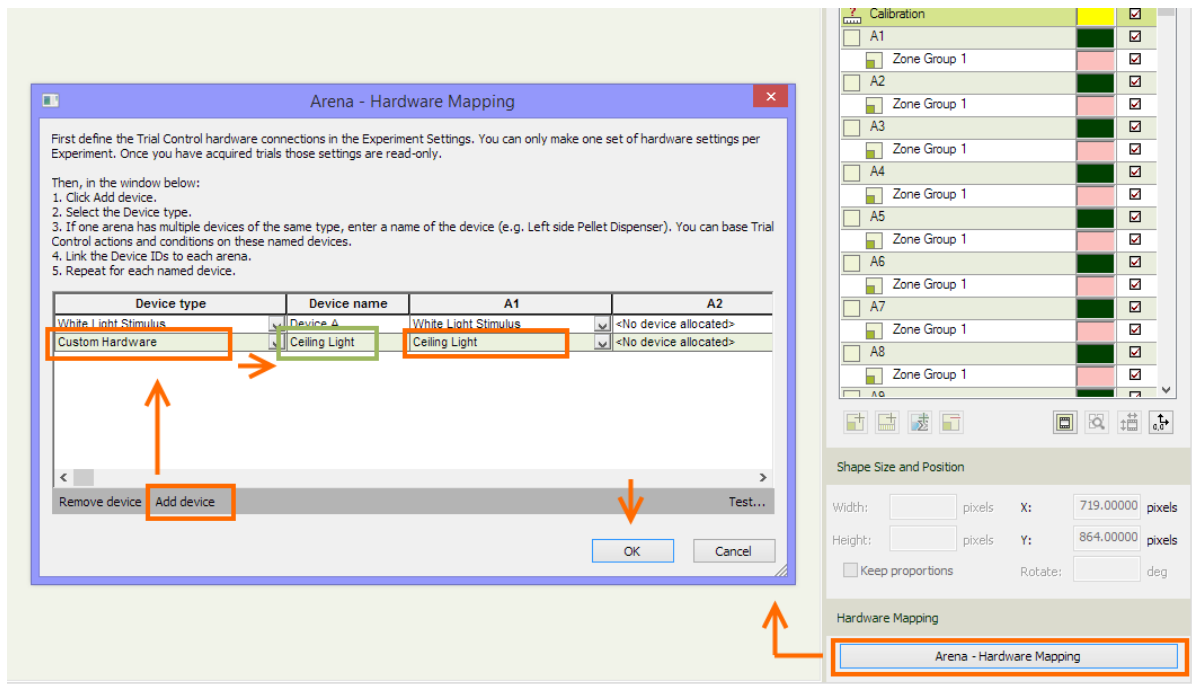

Figure 6: Arena Hardware Mapping: adding the ceiling light well A1.

To test the light, select 'Output 1 High' or 'Output 2 High' from the dropdown menu and click the **Test** button (*Figure 7*). To turn them off, select 'Output 1 Low' or 'Output 2 Low'.
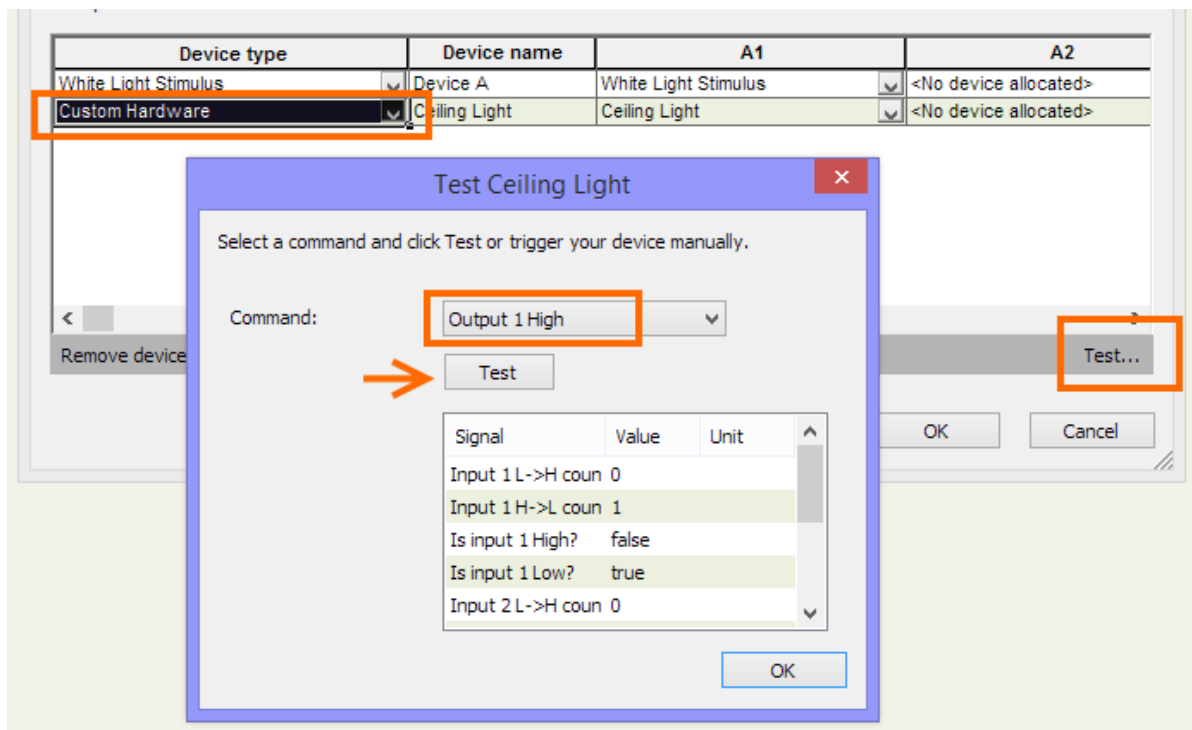

Figure 7: Arena Hardware Mapping: testing the Ceiling light

6. Programming the Light during the trials in EthoVision XT

Choose **Setup** > **Trial Control Settings**.

Example:
After 1 minute during the trial, switch the light on, then after 10 seconds switch it off.

Use **Conditions** - **Time** to create a time condition (Wait 1 minute, Wait 10 seconds).
Use **Actions** – **Custom Hardware** to define commands (Switch on/off). This can be done for both output 1 and output 2.
Remember to connect all boxes with the start-stop procedure (*Figure 8*).
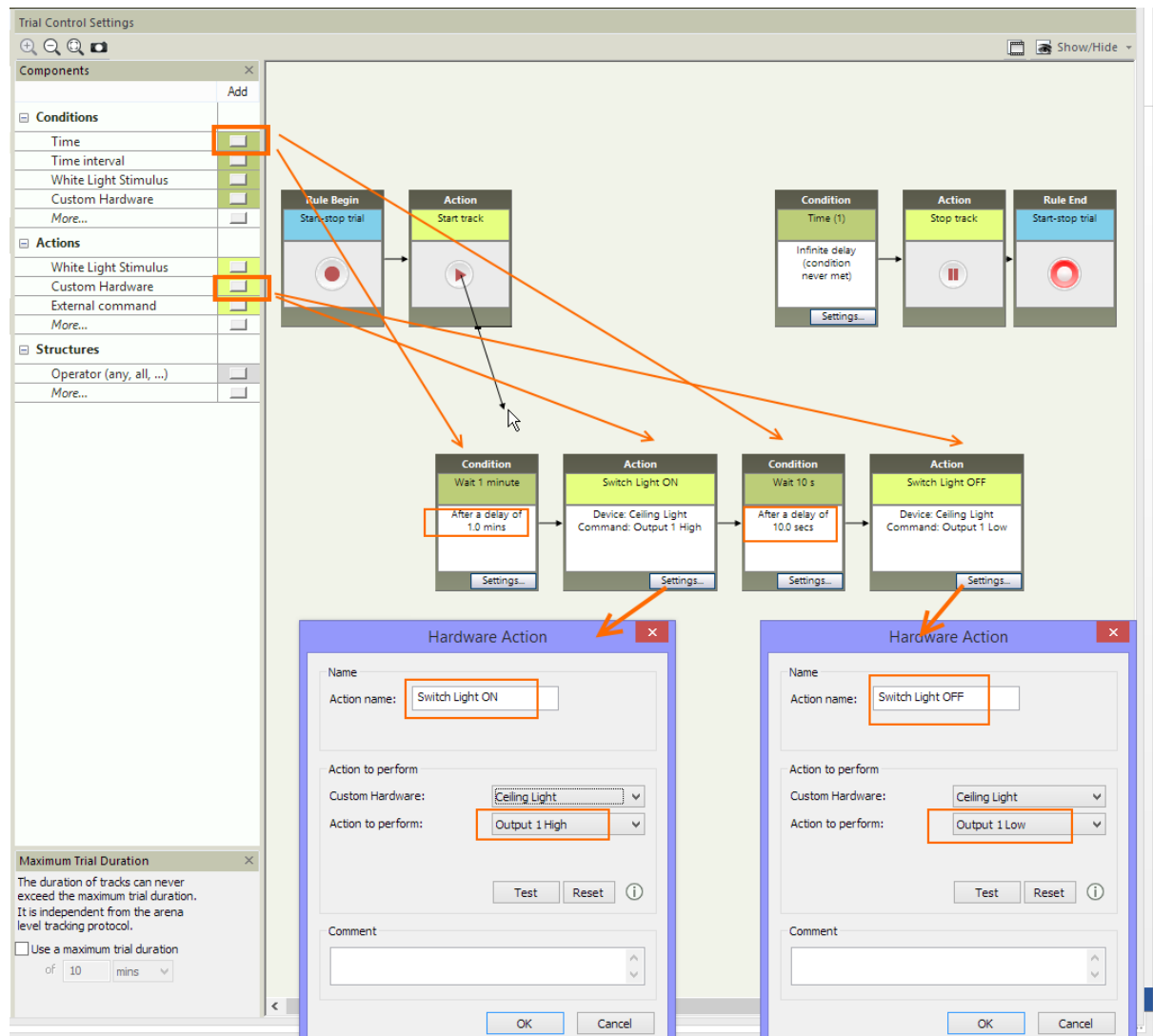

Figure 8: Trial Control Settings: creating an experimental protocol

With the **Subrule** function you can create routines (switch on-off-on etc.)
For more information (on the EthoVision DVD or Noldus web site):
- The **DanioVision DVOC-0040 User Manual**.
- The **Trial and Hardware Control – EthoVision XT11.5 Reference Manual**
  - Chapter 5 **Subrules**
  - Chapter 7 **Controlling hardware devices**.

Also adjust the Detection Settings (**Setup** > **Detection Settings**) before running the trials (**Acquisition**).

7. Tips

- The LEDs get hot during operation. Please let the ceiling light cool down before touching it
- Do not exceed the maximum specified voltage for each color as doing so may damage the LEDs

8. Specifications

White light :   > 30.000 lux at 25cm distance (well plate), 1584 lm
Color temperature 4000K
Array of 408 LED's
Max. voltage 18 Volt

Red light :   192 lm, wavelength 623 nm
Array of 252 RGB LED's
Max. voltage 24 Volt

Green light :   384 lm, wavelength 525 nm
Array of 252 RGB LED's
Max. voltage 24 Volt

Blue light :   240 lm, wavelength 470 nm
Array of 252 RGB LED's
Max. voltage 24 Volt

Unit Dimensions :   270 x 220 x 30mm