

IES 4414 Onboard LED Controller



SYSTEM DESCRIPTION



Mobile ruggedized supply and control unit for 12 or optional 16 LED illumination heads (2 LED arrays per connector). The housing of this member of our controller family is extra strong and allows on top mounting of extra equipment.

Revision UA20

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1 General

1.1 Intended usage



This lighting equipment is designed for high speed video filming and is not intended for general illumination. The controller and LED heads are made for indoor use in industrial environments, like test stands for component testing, sled testing facilities, or full scale crash testing, where maximum light output is needed.

1.2 Cautions, Do's and Dont's



Artificial optical radiation, risk group 2. Never stare into the LED as it may be harmful to the eyes. Do not suppress the lid closing reflex. Turn away from lamp, if eyes are hit from the light.



Caution HOT. High power LED heads will generate heat. The lamp case may be hot.



Caution fire. High intensity light from the LED heads will be absorbed from materials and cause heating of those materials. Keep a reasonable distance between LED lamps and objects.



Caution powerful batteries inside. Restricted access to the inside - only electricians or trained personnel may open the housing.



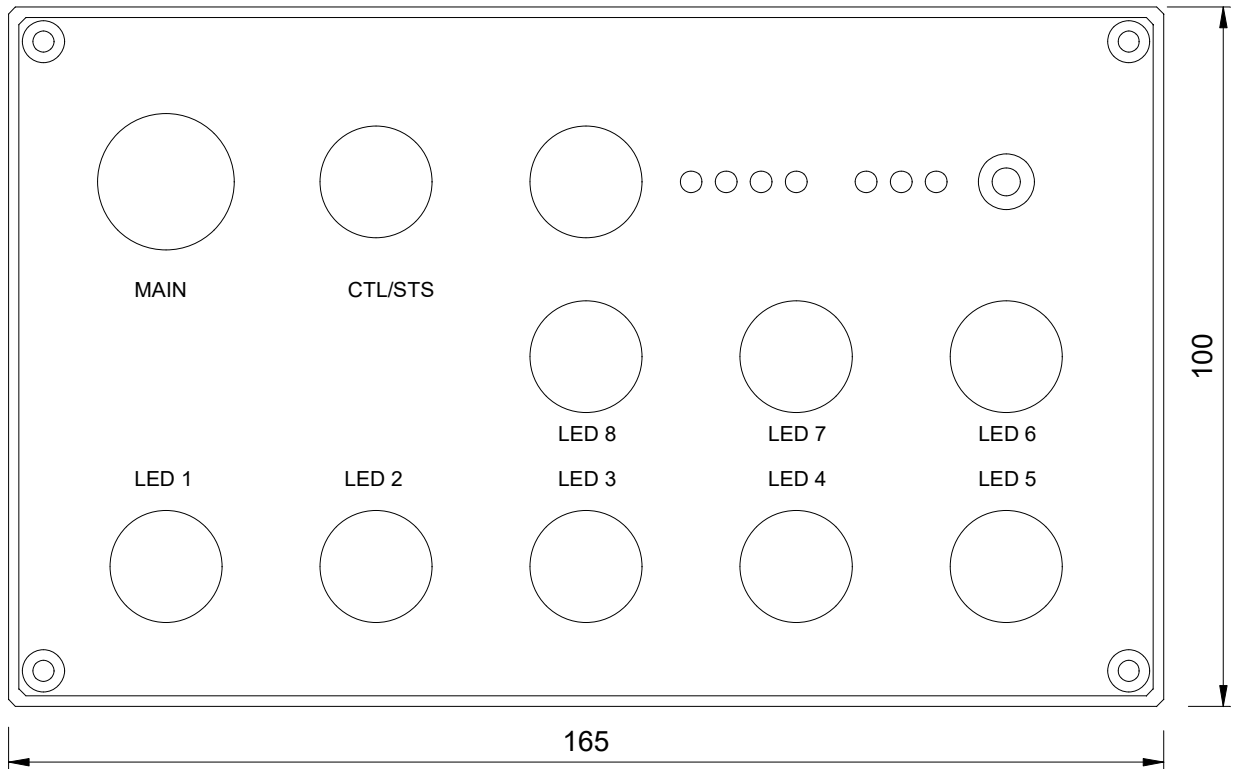
Keep batteries charged. Do not connect the device to power for few hours at least after 4 weeks of storage time, even when it was not used. Device can stay connected to charging power for unlimited time.

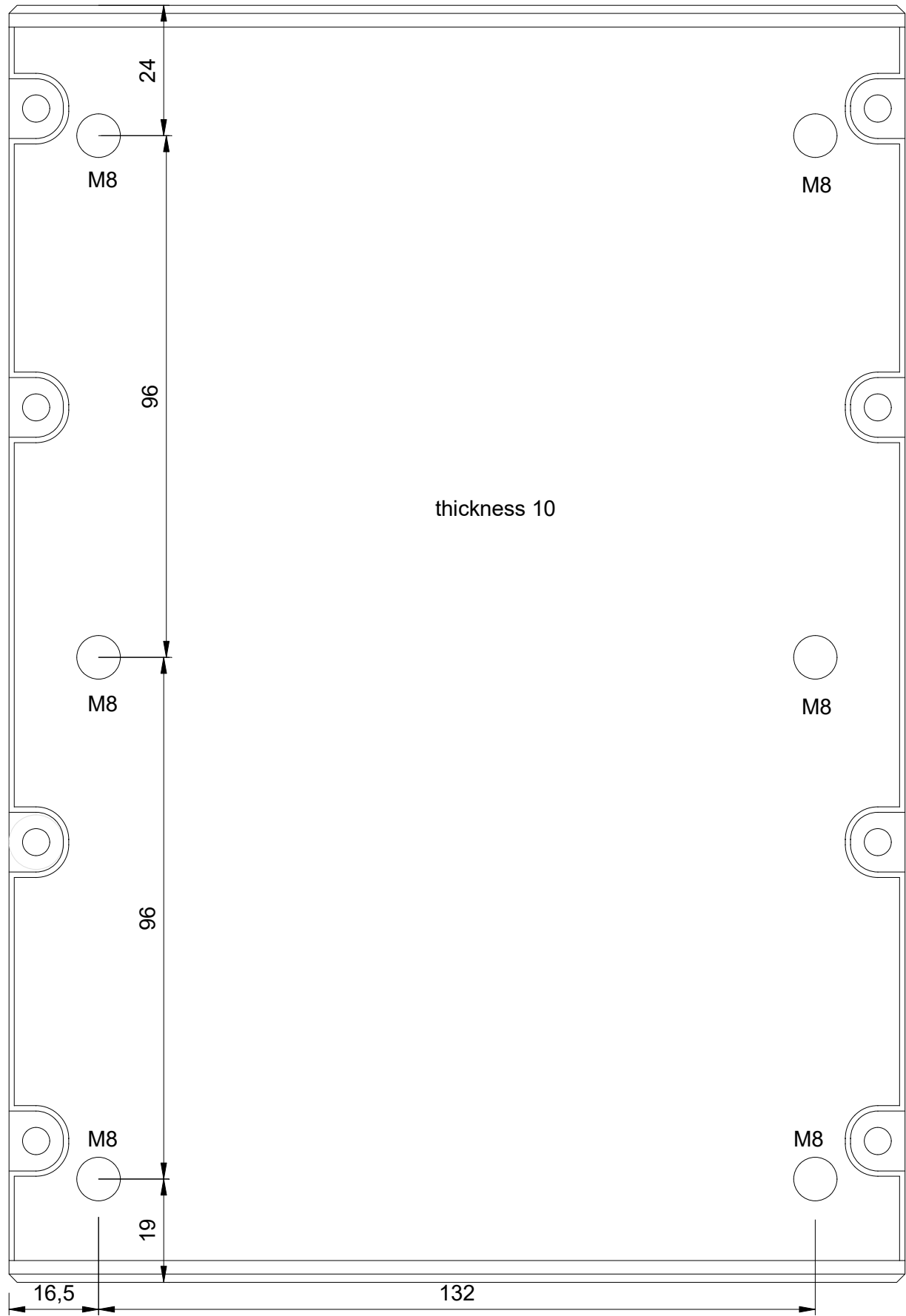
1.3 Mounting information

The drawings below shows the main measures. Dimensions are in millimeters.

Use 6x M8 for mounting the device on a user's plate. The housing thickness is 10 mm. Do not use longer screws as these would intrude and cause damages.

We recommend the good practice of having a stopping edge on the users mounting plate, which can take the acceleration force.





2 Connectors and Front Panel elements

All connectors are located at the front of the device.

2.1 MAIN connector

The MAIN connector is used to connect this device to the user's existing infrastructure. Connections are:

- Power supply to internal charger
- Ethernet for communication
- Trigger input (unused in this device)
- Sync input

The pinout is given in the table below.

Connector type in front panel: Lemo EGA.2B.318
Connector type for user cable: Lemo FGA.2B.318

Pin	Signal	Remark
1	Ethernet A-	
2	Ethernet D-	
3	Ethernet B-	
4	Ethernet B+	
5	Ethernet C+	
6		
7	+CHGSUP	Charger-Input 40-48 V, 1 A
8	+CHGSUP	as above
9	SYNC+	
10	SYNC-	
11	-CHGSUP	Device-GND and Charger-GND
12	-CHGSUP	as above
13	Ethernet A+	
14	Ethernet D+	
15	Ethernet C-	
16		
17	+T0	(unused)
18	-T0	(unused)
Case		

The input signals SYNC and T0 are of **type RS-485**. They are pulled to their respective quiet

voltage levels by internal pullup resistors and therefore may be left open, if unused.

These inputs **also accept TTL input signals**. These must be referenced to GND. This table shows, how to connect a TTL sync signal to the MAIN connector:

TTL sync out from user's equipment	MAIN Pin 9
TTL GND from user's equipment	MAIN Pin 11

2.2 CTL/STS connector

The CTL/STS connector has control and status signals for exchange with external equipment. The signals are optoisolated and the couplers have internal current limiting circuitry (at approx. 10 mA) so they can be driven from sources between 5 V and 24 V without additional resistors. Functions provided:

- START signal input to start the light
- READY output to signal ready status
- Remote front panel button control input

There is also an isolated 5 V voltage source provided on this connector. It makes it easy to use the optoisolated inputs from closing contacts.

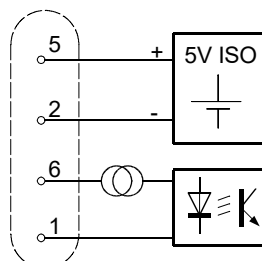
The pinout is given in the table below.

Connector type in front panel: Lemo EGG.1B.308

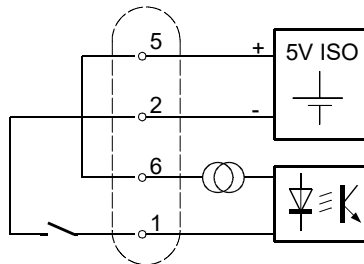
Connector type for user cable: Lemo FGG.1B.308

Pin	Signal
1	Opto-Start -
2	ISO 0V
3	Opto RDY +
4	Opto RDY -
5	ISO +5 V
6	Opto Start +
7	Opto Setup light +
8	Opto Setup light -

To control the light with an **external voltage** between 5 V and 24 V just connect this voltage between pins 6 and 1 (picture).



To control the light with an **external closing contact** make connections as shown below. The external switch is then used to apply the internal 5 V isolated voltage to the optocoupler.



2.3 AUX connector

The AUX connector is used for user specific extensions. There is no general description available or possible.

2.4 LED head connector

The LED illumination heads are connected to the LED 1, LED 2 , ... output connectors. Each output connector can supply two LED heads, or one double LED head. Each output connector has one temperature supervising input channel.

If (downgraded) devices are not fully equipped with LED ports, then the lower connector numbers are functional (starting at LED1) and the higher numbers are not functional.

The pinout is given in the table below.

Connector type in front panel: Lemo EGG.1B.306
 Connector type for user cable: Lemo FGG.1B.306

Pin	Signal
1	LED A1
2	LED K1
3	LED A2
4	LED K2
5	NTC a
6	NTC b
Case	Screen

2.5 LED status markers and button

The status markers indicate

- Charge level of internal batteries
- Ethernet communication activity
- Sync input signal present
- Controller ready status

During charge (when external power supply is attached to MAIN connector) the highest charge level LED blinks. This indicates that charging takes place. The charging is complete, if all charge indication LED's are ON.

Ethernet indicator is normally ON, and is blanked for a moment, if a command is received and processed.

Sync LED is ON, if a valid external sync signal is recognized.

Controller ready status is signalled, if battery is in good condition and no temperature is higher than the "ready level". See operating instructions for more on ready signalling.

2.6 Front panel button

The front panel button provides these functions:

- Switch ON the device (press short)
- Switch ON or OFF the light (press 1/2 second)
- Toggle light intensity (press again)
- Switch OFF the device (press long until LED is OFF)

Switching ON is simple, just press shortly.

Switching the light is done by pressing the button a bit longer, then release. Light is switched on at the lowest level on the first press (called setup light), then switched to full level on the second press, then switched off on the third press.

Switching OFF the device is done by pressing the button long, approx 8 seconds (or more). The power LED's give feedback: All turned off.

3 Functional Description

3.1 Full light and Setup light

High speed filming typically goes in parallel with a short term lighting demand. But for the set up of cameras and lenses more time is required. To prevent excessive heating up of LED heads, drawing energy out of batteries and heating up test objects it is wise to use a lower light level, called setup light. This can be switched ON by command or by pressing the front panel button, and the percent level of light can be set using Diag4400 software.

A better concept for setting up cameras and lenses is to use the full light level, but a reduced frame rate like 100 fps. It means only a tenth of energy and heating, and also very convenient light level for the human eye. And, as the pictures are illuminated with the final parameters (shutter time, light level) you see what you get during the set up. No post-adjustment of lenses is to be done then.

The low frequency setup can be done by feeding in an external sync signal (e.g. from a camera), or by setting the internal frequency generator to 100 fps (for devices with built in generator).

3.2 Starting the light

The light can be started by

- pressing the front panel button (once or twice)
- software command
- electrical signal or closing contact at CTL/STS connector (Opto Start function)
- electrical signal or closing contact at same connector (RMT function)

The OPTO start function switches ON full light immediately. The RMT (remote) function is internally wired in parallel with the front panel button and thus all functions of this button can be done with an external signal. For example it would be possible to use a small user built operator panel with 6 meters cable as a remote control.

The duration of light ON can be selected between two possibilities. If "Start is signal controlled" is checked in Diag4400 software, then the light is ON as long as the external signal is active. The external signal directly controls on/off of the light. If this is unchecked, then the external signal acts as a start timer trigger and light is switched ON for a duration set by the timer value.

3.3 SYNC and CONT modes

The LED controllers may operate in SYNC mode or in CONT mode. The actual mode can be read with the command GMOD ("get mode"), which is answered with a string like "0000". These are two hex numbers 00 and 00 which reflect the settings für mode and sync edge.

To change the operating mode via command line use command "SMODxxxx" (set mode"), where xxxx is the number from this table:

Mode	xxxx
Sync, rising edge	0000
Sync, falling edge	0001

For example send SMOD0000 to set sync mode.

Most users will use the ControlTool4414 software for changing the setup (see section software).

3.4 Device shutdown timer

The LED controllers have an internal shutdown timer with a user settable value (see Diag4400). Devices will be ON as long as external power is applied. If no external power is present, timer counts down and finally switches off the device. This prevents (forgotten) devices from drawing the battery empty. A **special value 255** can be used for the timer: In this case the **shutdown is disabled** and it is in users responsibility to switch off device before the battery is empty!

Remember to **keep the device charged** all time and recharge at least all four weeks, **even when not in use**.

4 Control Software

IES provides multiple software solutions to control these devices. One software is named "Diag4400", and it is primary intended for lower level diagnostic purposes related to LED controllers and lamps, allowing to send commands to the devices.

Another software is "SyncLampControl", which is indended for complete illumination systems with stationary lamps and onboard components. Test setups can be stored and loaded, and devices have a graphical representation in the control window on a PC. SyncLampControl is described in detail in its own documentation.

For simple control of single LED controllers or a small group of controllers IES provides the free "ControlTool4414". It is a lightweight front end for controlling the light function (switch on/off). To obtain the latest revision, or report bugs and wishes, please contact office(at)ies-elektronikentwicklung.de. This tool is described below.

The description is based on LED controller model IES 4414 with firmware QI03 or later and ControlTool4414 revision UA20 or later.

The software has one EXE file (ControlTool4414.exe) and one INI file (ControlTool4414.ini). These both should be placed in a free to choose directory on a Windows PC. Microsofts DotNet 4.5 framework must be installed on that PC.

4.1 Finding and connecting LED-Controllers

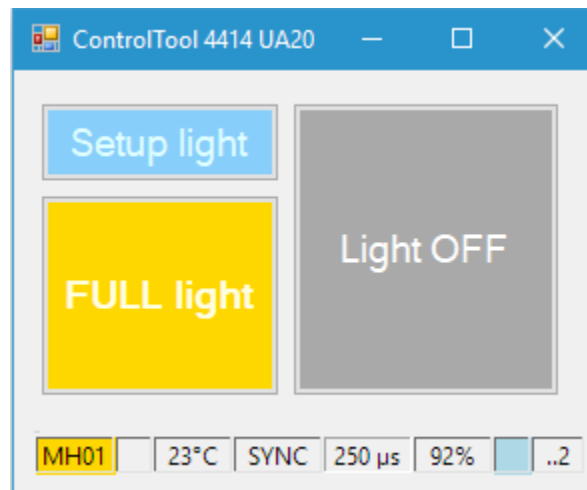
At first, a proper INI file should be prepared (text editor). See an example below.

```
[LAMPGROUP1]
NAME=Onboard
LAYOUT=T(20,10)
GRIDSIZE=25
INTERFACE=UDP:192.168.1.40
BROADCASTLIGHTCMD=OFF
NUMDEV=1
DEV01=N:VO1 M:4414 S:MH01 L:(1,1) C:Ies4414Default
```

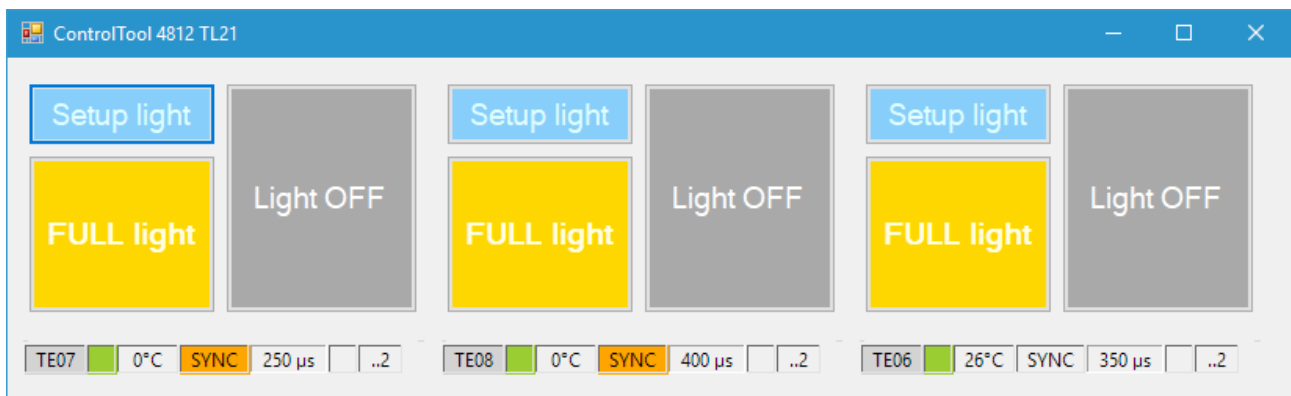
If using a single LED controller, the INI starts with a section named "[LAMPGROUP1]" (mandatory). NAME is the descriptive name of the lamps group, freely chosen by the user. LAYOUT and GRIDSIZE are used for the graphical display of this device in SyncLampControl, and meaningless in other software. INTERFACE needs to be set to the IP of the device, so it can be found. BROADCASTLIGHTCMD is used from SyncLampControl and meaningless in other software. NUMDEV is the number of devices, and is 1 for onboard controllers. DEV01 holds the N (name), M (model), S (serial), L (layout), and C (config) information, of which M and S MUST be set properly.

4.2 Control Light Panel

After the ControlTool4414 was started, it processes the INI file, tries to connect to the LED controller and comes up like shown below. This is the "control light" panel. It has three big buttons to switch ON a small light level, the full light, or switch lights OFF.



The "ControlTool4414" can also be used to setup and control a small group of controllers. In this case it elongates itself to the right, as shown below.



Below the light control buttons a status line is displayed.

At left side, the serial number of device is shown. This field is also color coded, red meaning an error condition (message shown when mouse hovers over it), light yellow and full yellow meaning the illumination status (setup light, respective full light). It is gray, when light is off.

Next, a green activity marker is displayed on each communication event.

Next, LED head maximum temperature is displayed, it also has color coding, being orange, when warn level is reached.

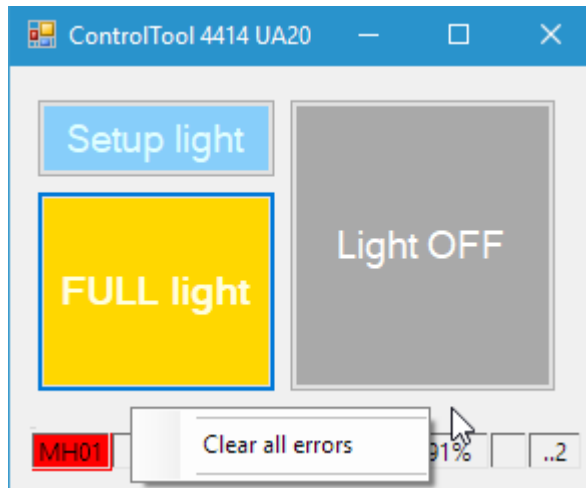
Next, SYNC or CONT mode is indicated, as per config of the device.

Next, for sync mode the configured pulse width is shown.

Next, the battery capacity is shown. It is a conservative estimate.

The seventh indicator field changes to light blue, when the hardware signal "opto start" is detected. This signal would switch on the lights.

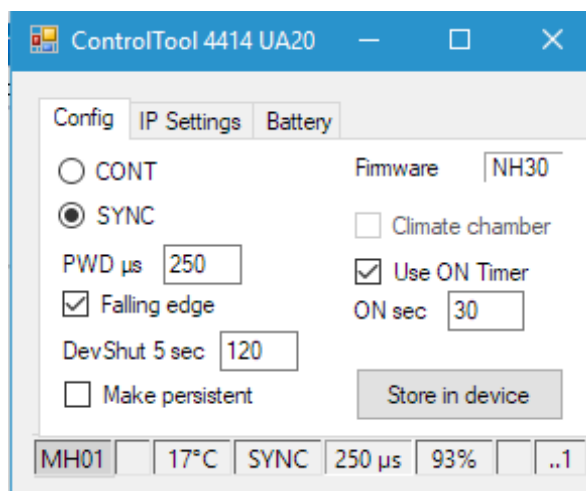
In case of a (communication) error, the status bar backlights the serial number in red, as shown below. By clicking right the mouse (context menu) the "clear all errors" option is offered. Communication is re-started then.



"Behind" this control panel there is another panel for status and config. Click the "..2" field in the status line to bring this panel into view.

4.3 Config-Tab

This tab enables some settings to be made.



DevShut controls device shut down (switch itself off) after some time of inactivity and when disconnected from external power supply. It prevents a forgotten device to draw the battery empty. The value means increments of 5 seconds, i.e. a value of 60 represents $5 \times 60 = 300$ seconds, or 5 minutes. A special value 255 can be used, if the device should never switch off. It is then an urgent responsibility of the user, to switch it off manually, after work is done.

PWD pulse width is a setting for the output pulse width of sync signal, that is given to the LED light. Preferably use a pulse width lower than 50% of the frame period to have maximum power output from LED heads. If using more than 50% duty cycle, power is automatically reduced.

Falling edge allows to select the controlling edge for SYNC mode. If checked, light pulses will be aligned with falling edge instead of rising edge (rising edge is default and recommended).

Use ON timer is a selection between timer control of LED light or direct control from a hardware signal. If checked, the external START signal starts the internal timer, which controls the light ON duration. If not checked, the external START signal controls the light output directly, so the duration of the signal is used for switching on the light (as opposed to the timer duration).

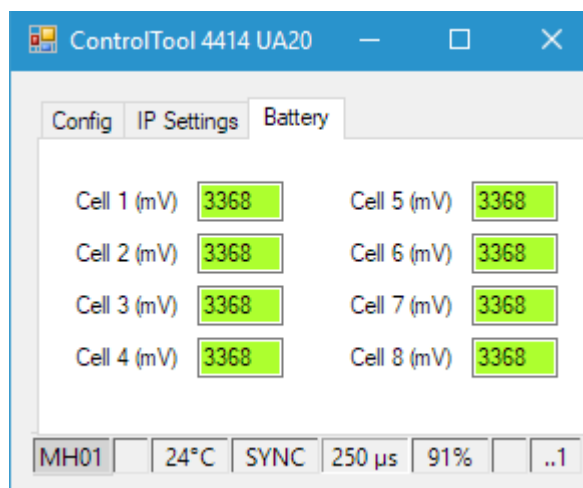
ON sec sets the duration of an internal timer. Light will be switched off after this duration. START light can be done from an ethernet command or from a contact signal.

Make persistent, if checked, makes the settings nonvolatile after the **Store in Device** button is clicked. If not checked, the **Store in Device** button sends the new settings to the device, and device uses them, but will forget the changes at power off. This volatility is good for experimenting, for temporary setups or when a controlling software sets up the LED controllers prior to each test. The non volatile storage option is good for stand alone applications.

4.4 Battery-Tab

The battery tab displays all battery cell voltages. A background in green color means "normal", whereas an orange color means not normal, too low or too high. The internal charger and balancer will bring the cells back to the normal range, if possible. This may take time from minutes to hours. Note that while illumination is on, cell voltages may be low and even orange, but voltages recover after illumination is off. This is a normal behaviour.

Note this tab is only updated on every tab enter (change between tabs to update information).



4.5 IP-Settings -Tab

The IP settings tab allows to change IP of the device. To avoid changes done by accident, a password must be entered:

Password to change IP config	IP-Admin
------------------------------	----------

After a change and write into the device, the device keeps using its old IP until a fresh power up is done.

ControlTool 4414 UA20

Config IP Settings Battery

IP-Adr 192.168.1.40

Subnet 255.255.255.0

MAC 0050C2772023

Change...

MH01 23°C SY

Change configuration

Enter password to change the configuration:

OK

Abbrech

5 CE Conformity

We,

IES Ingenieurbüro für Elektronikentwicklung und Spezialgerätebau Dr.-Ing. U. Bahr
In den Waashainen 2
38108 Braunschweig
Germany

hereby declare in sole responsibility, that our product

IES 4414 LED Controller

complies in conception and production with the following EU standards

2014/30/EC (EMC)

2011/65/EU (RoHS)

Applied standards:

EN 61000-6-2

EN 61000-6-4

If any modifications are applied from the end user, this declaration is invalid.

2016-06-01
(Date)



(Dr.-Ing. U. Bahr, company owner)