MCC DIN8 – MULTI CHANNEL CONTROLLER
PLD DIN 1 – POWER LED DRIVER

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DESCRIPTION

MCC DIN8 - Multi Channel Controller and PLD DIN 1 - Power LED Driver are DIN 35mm rail-mounted devices designed to power LED illuminators. Thanks to the possibility of attaching PLD (slave) modules to the MCC (master) unit, it is possible to build a system with up to eight DC outputs controlled via: the keypad on the MCC unit, a website or an attached API for building your own control application.

MCC DIN 8 - is the control master unit and contains:

- Control module with keypad, mains module and isolated input and output to trigger the entire power supply system.
- DC power supply module with isolated input and output to trigger the power supply module only.

PLD DIN 1 - is a DC power supply slave unit with an isolated input and output to trigger the power supply unit. Each channel of the power supply can be controlled independently, with an adjustable current range of 0.02-5A. The output voltage range is 3V-20V.

MOUNTING ON DIN 35MM RAIL

MCC DIN8 and PLD DIN 1 modules are designed for DIN rail mounting. To mount a device on a DIN rail, the connectors intended for mounting on a rail must be fitted first - communication between the MCC module and the PLD modules takes place through them.

Mounting of connectors::
- Connect the correct number of connectors together (from 0 to 8 - depending on the number of modules) (A)
- Press the connected connectors onto the DIN rail, taking care to orient the connectors correctly (B)
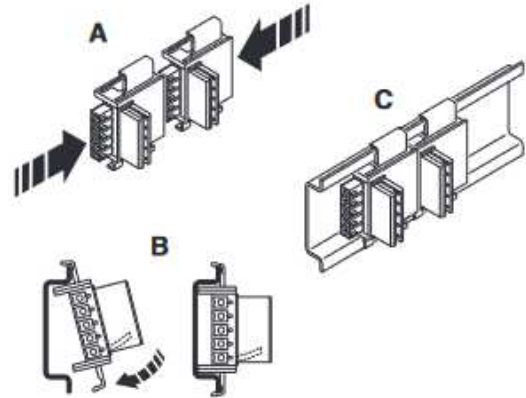
Pic. 1.   DIN rail mounting of connectors

Mounting of device:
- Mount the devices one by one
- Place the device on the DIN rail so that the top groove of the housing catches on the top edge of the DIN rail and the DIN rail-mounted connector is in the correct position (A)
- Holding the device by the front of the housing, carefully push it towards the mounting surface (B)
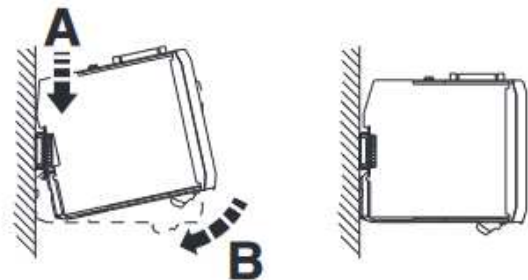
Pic. 2.   Mounting of device
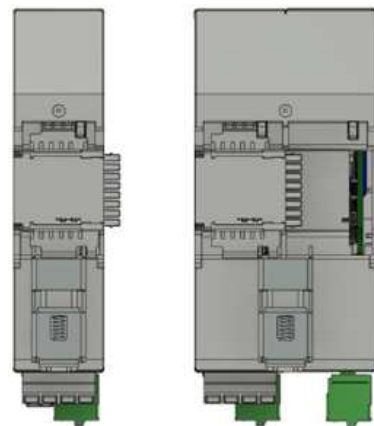
Pic. 3.   Place for correct installation of connectors in PLD DIN 1 and MCC DIN 8 modules

Dismantling the device:

- Disconnect the devices from the power supply. Wait for the capacitors to discharge
- Use a screwdriver to release the locking mechanism of the latch foot (A, B)
- Leaving the screwdriver inserted, pull the bottom of the housing upwards to disconnect the unit and the DIN rail connector (C)
- Carefully remove the device from the DIN rail (D)

Pic. 4. Dismantling the device

ADDRESS SETTING ON PLD DIN 1 MODULES

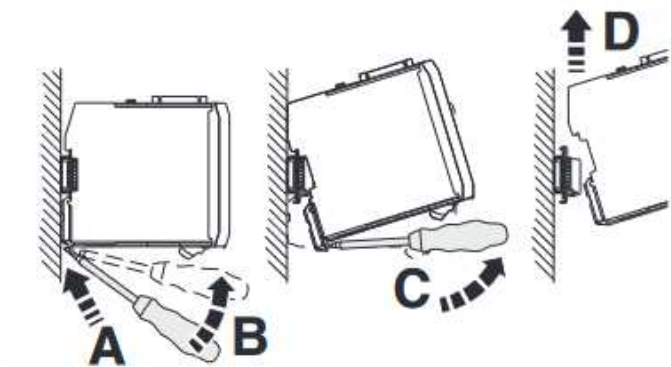After mounting the modules on the DIN rail, the addresses of the PLD DIN 1 modules must be set on the PLD DIN 1 modules using the DIP SWITCH on the front of the housing. On delivery, each PLD DIN 1 module is set to address 0.

Address 0x0 is reserved for the MCC DIN 8 module. After mounting on the rail, the next address must be set on each PLD DIN 1 module starting from 0x1. Addresses must be set before power up - setting after power up will be ineffective. Changing addresses while the unit is running requires a restart of the unit.

Pic. 5. DIP SWITCH settings for individual addresses

CONNECTION OF MCC DIN 8 AND PLD DIN1 MODULES

The pictures below show the layout of the connectors on the MCC DIN 8 and PLD DIN 1 modules.
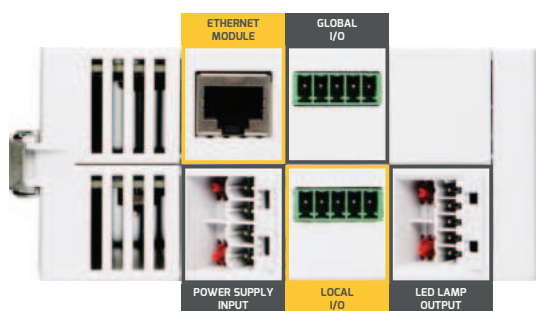
Pic. 6. MCC DIN 8 connector layout
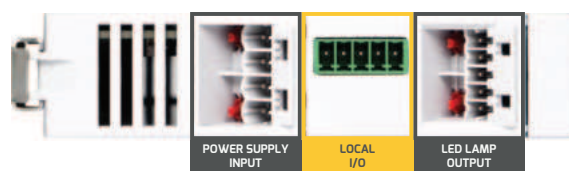
Pic. 7. PLD DIN 1 connector layout

Modules' power supply:

- Use an external 24V +/-10% power supply for the modules.

- Maximum power per channel 100W

- For the connection, a 4-pin connector with a 5 mm pitch should be used ICC25-PPC2.5/4-5.0-AA-7035 (supplied with the module)

- Pins 1, 2 - GND of the PSU, pins 3, 4 - plus of the PSU (+24V), maximum current rating 16A, cable cross-section $2.5mm^2$(14AWG), stripping length 10mm.

- The connector enables subsequent modules to be chained to the main power supply. It is important not to exceed the rated current of the connector - 16A.

- Before the connector is inserted for the first time, it can be coded so that it can only be connected to one module if the plug is connected again. The coding is done with a screwdriver - see Pic. 9
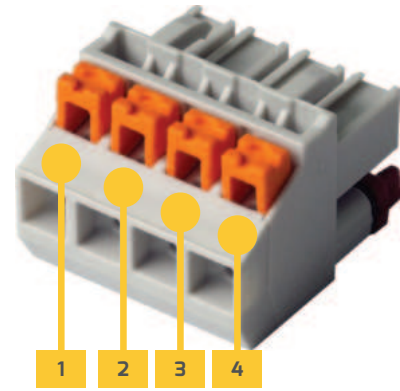
Pic. 8. Power connector
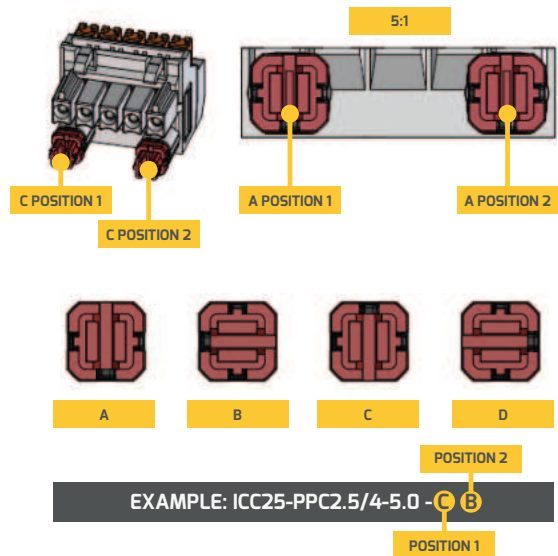
Pic. 9. Connector coding
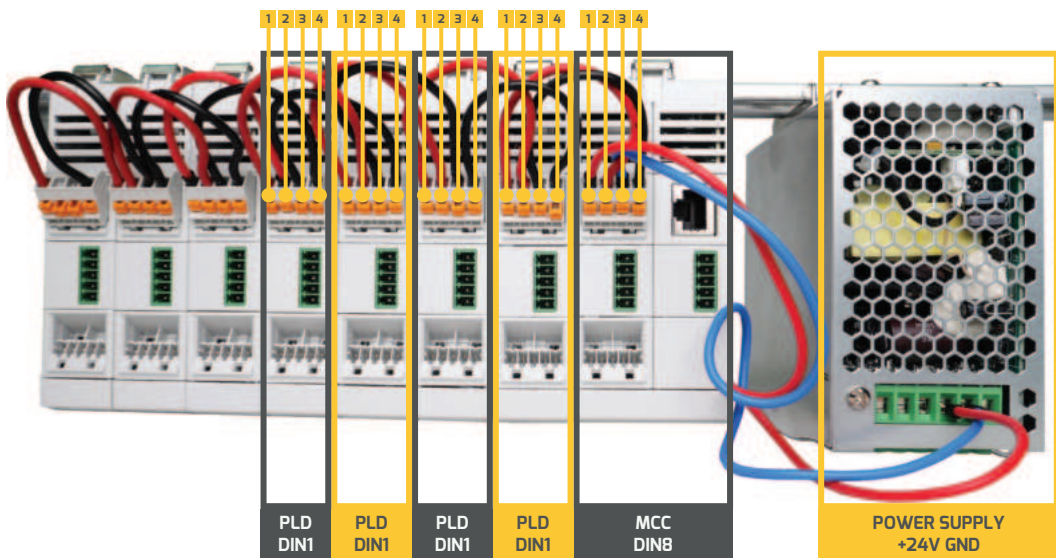
Pic. 10. Power supply chain diagram

6

MCC DIN 8 | 1 2 3 4
PLD DIN 1 | 1 2 3 4
PLD DIN 1 | 1 2 3 4 ...

power module

+24V GND
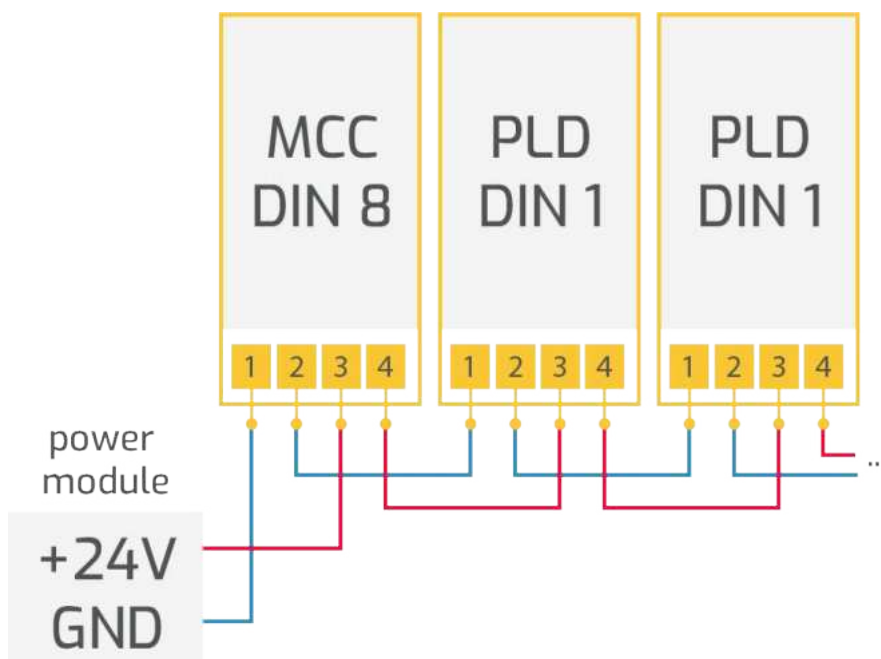
LED lamp output:

■ For connection, use connector ICC25-PPC1.5/5-3.5-AA-7035, 5 poles with a 3.5 mm pitch (supplied with the module)

■ The module supports also LED lights with DS18B20 temperature sensor

■ Pin 1 - GND_TEMP, pin 2 - EX_TEMP_Sensor - light lamp temperature sensor data pin, pin 3 - +3.3V_Temp - temperature sensor supply, pin 4 - LED_OUT+ - LED+ light lamp supply, pin 5 - LED- light lamp supply.

■ LED light current in the range 0.02A-5A, lamp voltage in the range 3-20V, cable cross-section rating 1.5mm^2(16AWG), stripping length 10mm, maximum cable length 5m.

■ Before the connector is inserted for the first time, it can be coded so that it can only be connected to one module in the event of the next plug connection. Coding is done with a screwdriver - see Pic. 12

1 2 3 4 5

Pic. 11. LED light power connector

5:1

C POSITION 1
C POSITION 2
A POSITION 1
A POSITION 2

A   B   C   D

POSITION 2

EXAMPLE: ICC25-PPC2.5/4-5.0 - C B

POSITION 1
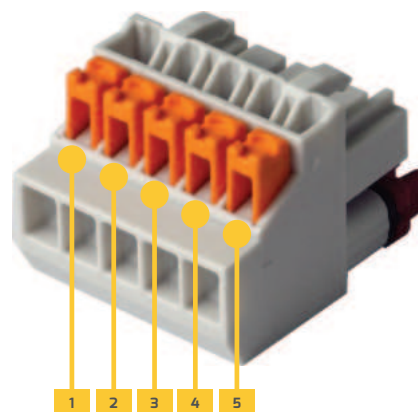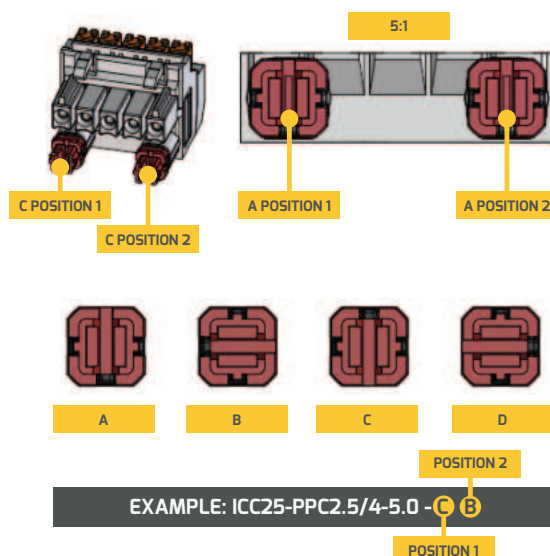
Pic. 12. Connector coding

I/O CONNECTION

The MCC DIN8 module is equipped with two sets of I/O - global and local. All inputs and outputs operate in the 5-24V range and are opto-isolated.

The global input on the MCC DIN8 module allows triggering of the entire MCC DIN8 and PLD DIN1 system connected on the DIN rail.

The local input allows control of the module it belongs to.

Local output allows setting:
- Change of status when a command is sent over the ethernet (the time after which the change of status occurs is not guaranteed due to the time it takes for the command to reach the device over the ethernet).
- An alarm when the set temperature level of the module or lamp is exceeded.

To connect, use connector FK-MCP 1.5/5-ST-3.5 , 5 poles with a 3.5 mm pitch (supplied with the module)
- cable cross section 1,5mm^2(16AWG), stripping length 10mm
- Pin 1 - GPO output ground, pin 2 - GPO output, pin 3 - GPO power supply, 4 - GPI input, 5 - GPI input ground
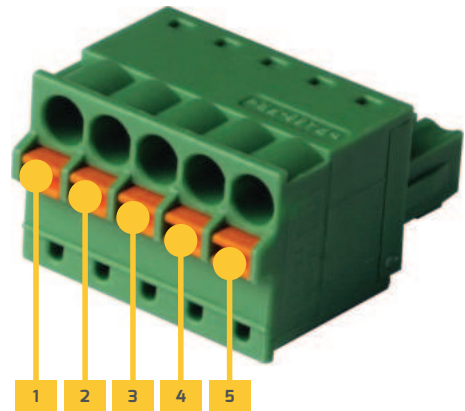
Pic. 13. I/O connector

ETHERNET CONNECTION

You can connect an Ethernet to the MCC DIN 8 module - using an RJ45 cable. This allows to control a set of devices using the TCP/IP protocol. The device can be controlled via a WWW web page hosted on the device or using the API, which allows you to create your own control application.

OPERATION AND CONFIGURATION OF MCC DIN 8 AND PLD DIN 1 MODULES

The MCC DIN 8 device and the PLD DIN 1 modules connected to it can be controlled via the keypad and display, located on the front panel of the MCC DIN8 module, and via Ethernet. The keypad can be used to set the initial configuration - Ethernet network parameters (IP address, net masks, etc.) as well as other operating parameters - set current, set operating modes, current limits, etc. From the display it is possible to read the current voltage, current and temperatures of the lamp and each module, the current time, the set current and the network status for each channel.

NOTE: It is recommended to use only one control channel (i.e. Web, Menu in MCC, API) at a time.

BACK

UP/LEFT

DOWN/RIGHT

ENTER

GREEN LED - WHEN LIT GREEN, INDICATES THAT THE ETHERNET CABLE IS CONNECTED

ORANGE BLINKING LED - INDICATES ETHERNET TRANSMISSION

ADDRESS SELECTOR FOR PLD DIN1 MODULE

RED LED - WHEN LIT, THE LED LAMP IS ENABLED

GREEN LED - WHEN LIT, INDICATES THE MODULE IS POWERED AND RUNNING
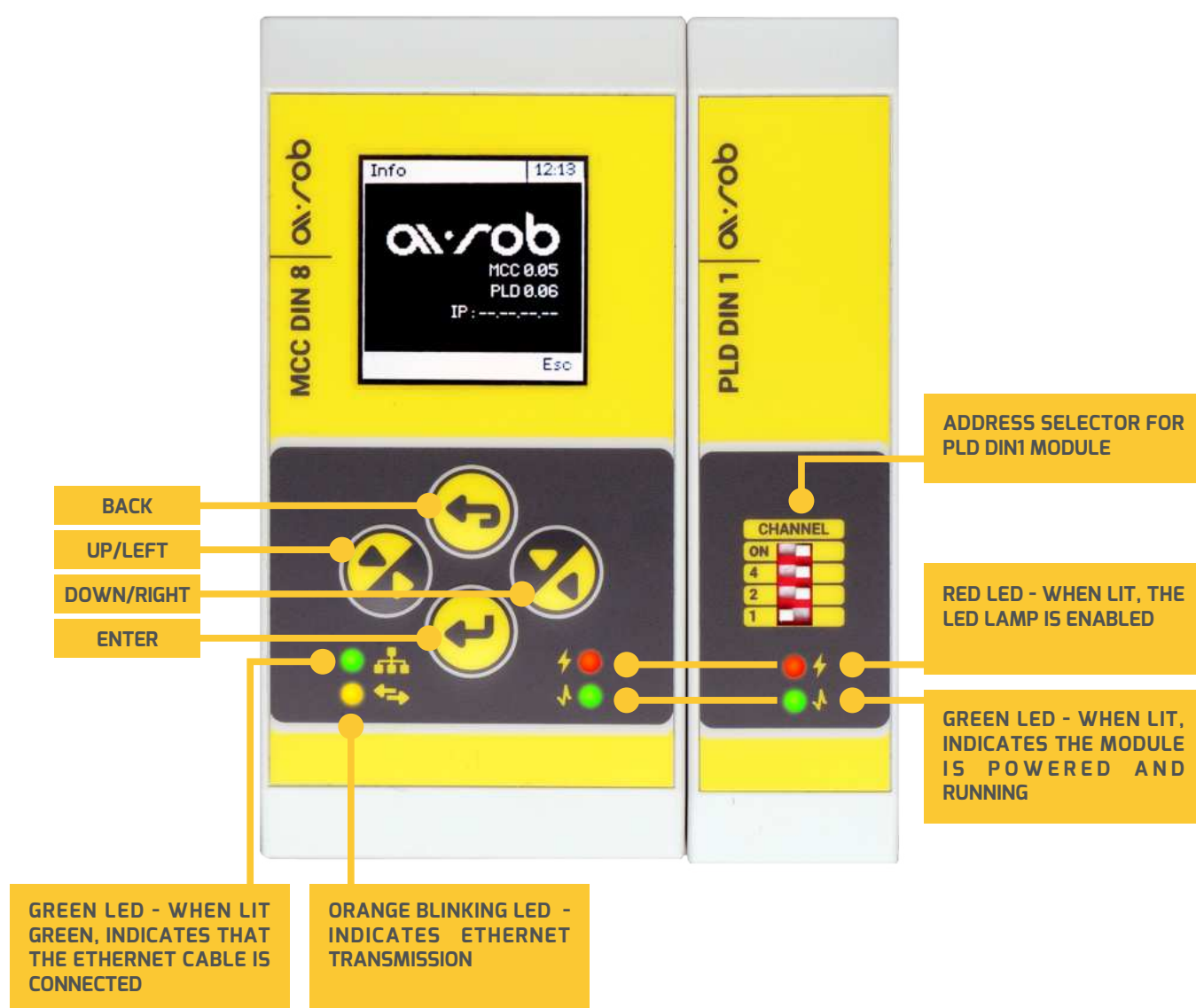
Pic. 14. Front panel view

LCD DISPLAY DESCRIPTION FOR AN EXAMPLE LIGHT

SELECTED SYSTEM CHANNEL FROM 0 TO 7 - DEPENDING ON THE NUMBER OF CONNECTED MODULES

NETWORK CONNECTED

CHANNEL 0 IS SET TO DC MODE, LAMP CURRENT 912mA

TIME

MEASURED LAMP CURRENT

MEASURED LAMP VOLTAGE

MODULE OPERATING TEMPERATURE

THE TEMPERATURE OF THE MODULE OR LAMP HAS REACHED THE WARNING LEVEL SET FOR THE CHANNEL IN QUESTION

THE TEMPERATURE OF THE MODULE OR LAMP HAS REACHED THE ALARM LEVEL SET FOR THE CHANNEL IN QUESTION

LAMP OPERATING TEMPERATURE

```
Channel 0        08:14
DC 912 mA
       I=177,4mA
       U=12,1V
      t=39,1°C
     t_L=30°C
```

NETWORK DISCONNECTED

CHANNEL 1 IS SET TO STROBE MODE, CURRENT 1000MA, PULSE TIME 10µS

TIME

NO LAMP OR LAMP OFF

NO LAMP OR LAMP OFF

NO LAMP CONNECTED TO THE CURRENT CHANNEL

LAMP TEMPERATURE SENSOR DISCONNECTED

```
Channel 1        08:14
Strobe 1000mA 10µs
       I=---
       U=---
      t=29,9°C
     t_L=---
```

Pic. 15. LCD display

GLOBAL PARAMETERS MENU

By pressing the **Enter** and **Escape** keys together, you enter the device menu. From this level, you can use the keypad to set all the global parameters for the device.

- **Settings** - contains screen and time settings
- **Network** - network settings
- **Trigger Global** - global trigger input settings
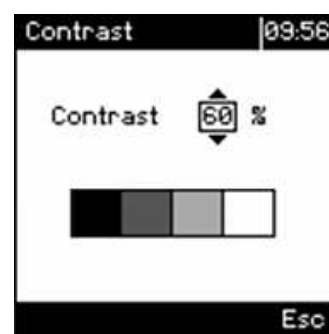- **Info** - system information

Pic. 16. Global menu

SETTINGS – SCREEN AND TIME SETTINGS

Settings - contains screen and time settings

Pic. 17. Menu Settings

Contrast - use the up/down arrows to set the contrast of the LCD display. When the setting is complete, confirm by pressing **Enter**.

Pic. 18. Menu Contrast

Display - allows you to set the display's blanking time - when it is not needed.

- Always – always on,
- 30s - fades out after 30 seconds,
- 60s - fades in after 60 seconds.
- Screen image returns when keypad button is pressed

Pic. 19. Menu Display

Date/Time - to set the current date and time - use the up/down keys to set the desired day. Confirm by pressing **Enter** to move on to the month setting, etc.

Pic. 20. Menu Date/Time

NETWORK – NETWORK SETTINGS

Pic. 21. Menu Network-DHCP

Pic. 22. Menu Network-Static

Net info – displays information about the set/acquired network parameters


Pic. 23. Menu Net info - Static

Pic. 24. Menu Net info - DHCP

DHCP - Enables/disables **DHCP** (Dynamic Host Configuration Protocol) - when set to **DHCP**, the device acquires the IP address and network parameters automatically from the router. When set to **Static** - you must set the network parameters manually.

Pic. 25. Menu DHCP

IP address – When **Static** is selected in the **DHCP** submenu, all network parameters can be set manually. Use the up/down arrows to set the desired value, **Enter** to confirm and move to the next section.
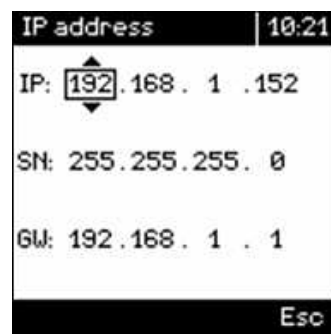
Pic. 26. Menu - IP address

Port - enables the setting of the port for the UDP and TCP protocols. Use the up/down arrows to set the desired value, Enter to confirm.
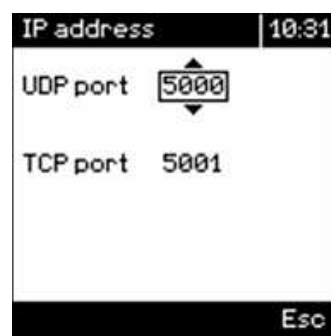
Pic. 27. Menu - IP address Port

TRIGGER GLOBAL – GLOBAL TRIGGER INPUT SETTINGS

When the trigger is activated, you can set whether it reacts to a rising or falling edge
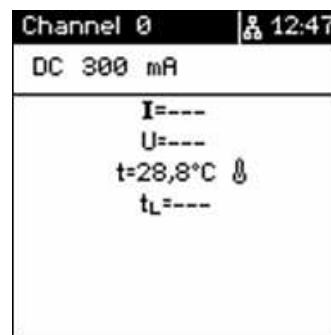
Pic. 28. Menu Tigger

INFO – SYSTEM INFORMATION

System information – the firmware number of the MCC DIN 8 and PLD DIN 1 units and the IP number of the module.

Pic. 29. Menu Info

QUICK LAMP SWITCH-ON

- On the main screen, use the right/left arrows to select the channel for which you want to turn on the light
- Then press **Enter**.

Pic. 30. Main screen

- Then use the up and down buttons to set the appropriate current value, and confirm with the **Enter** button.
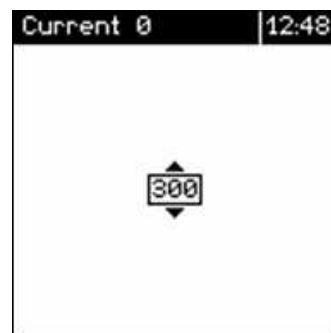
Pic. 31. Set current value

- Use the right/left buttons to switch on the LED light. Then confirm with the **Enter** button - the screen will return to displaying the measured current, voltage and temperature values.
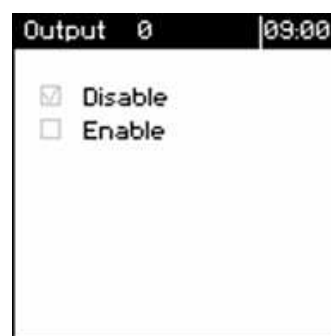
Pic. 32. Enable/disable LED lamp

- Use the arrows to select the next channel and switch other lights on or off.

Pic. 33. Main screen

SETTING LOCAL PARAMETERS PER CHANNEL

On the main screen, use the arrow keys to select the desired channel. Then hold down the **Enter** button for approximately 3 seconds. This will switch to the local settings of the module. Depending on the **DC** or **Strobe** mode selected, the menu will

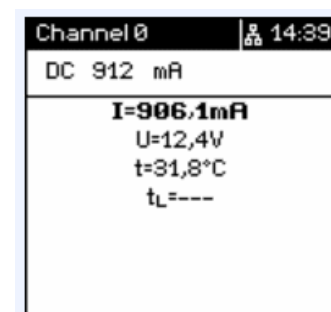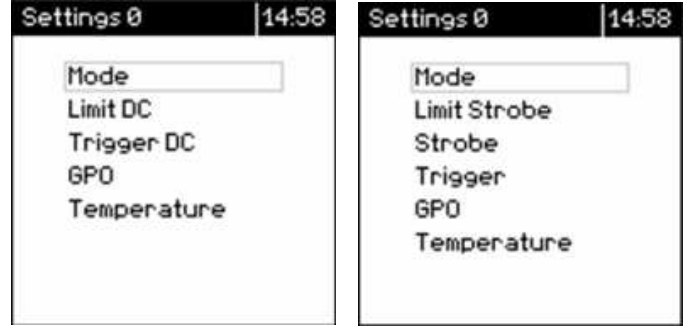- ■ **Mode** - selection of DC or Strobe mode
- ■ **Limit DC** - current and current limit setting for DC mode accordingly
- ■ **Limit Strobe** - setting the current and current limit for Strobe mode accordingly
- ■ **Strobe** - setting of time parameters for Strobe mode
- ■ **Trigger DC** - setting the trigger input parameters for the DC mode
- ■ **Trigger** - setting of the trigger input parameters for the Strobe mode
- ■ **GPO** - local output settings
- ■ **Temperature** - settings of warning and alarm temperature levels

look different. Note that the local parameters must be set for each channel of the power supply - each channel has its own individual settings. Each channel can operate in a different mode, with a different current, trigger from a different input and with different timing parameters.different input and with different timing parameters.

Pic. 34. Setting local parameters per channel

MODE – MODE SETTING

- ■ After entering the **Menu** category, use the arrow keys to select **DC** or **Strobe** mode.
- ■ Confirm by pressing **Enter**.
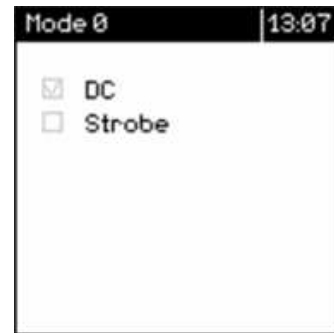
Pic. 35. Mode – mode setting

LIMIT DC – CURRENT AND LIMIT SETTINGS FOR DC MODE

- ■ After entering, the arrows can be used to set the lamp current limit for DC mode - it will not be possible to set a higher lamp current.
- ■ The set parameters are confirmed by pressing **Enter**.
- ■ The LED current and limit can be set in the range 20-5000mA.
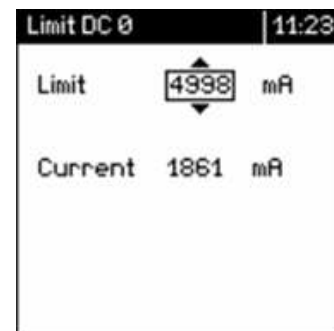
Pic. 36. Limit DC – current and limit settings for DC mode

LIMIT STROBE – CURRENT AND LIMIT SETTINGS FOR STROBE MODE

- After entering, the arrows can be used to set the lamp current limit for Strobe mode - it will not be possible to set a higher lamp current.
- The set parameters are confirmed by pressing **Enter**.
- The current and limit can be set in the range 20-5000mA.
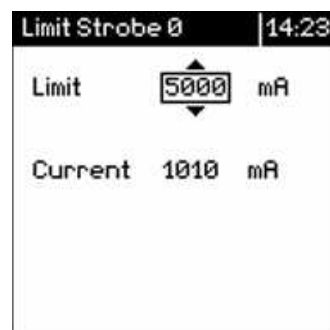

Pic. 37. Limit Strobe – current and limit settings for Strobe mode

STROBE – TIME PARAMETERS FOR STROBE MODE

In the **Strobe** tab, you can set, using the up/down arrows, the time parameters for the Strobe mode. Confirm by pressing **Enter** and move to the next parameter.

- **Pulse** – duration of the light pulse after detection of the trigger pulse - range 1-4000000µs (4000ms)
- **Period** – time limit between individual trigger pulses. When trigger pulses come more frequently than the **Period** parameter, the unit will not respond to some of them - e.g. trigger pulses every 20µs, **Period** set to 40µs - the lampwill be triggered on second trigger pulse. When **Period** is less than the sum of **Delay** and **Pulse**, the lamp will be triggered on every pulse
- **Delay** - delay between trigger pulse and light switching - range 0-4000000µs (4000ms)
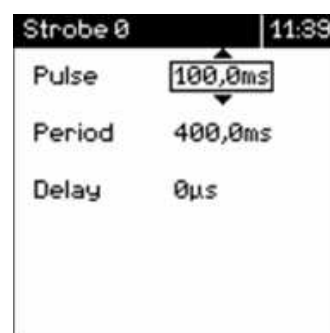
Pic. 38. Strobe – time parameters for Strobe mode
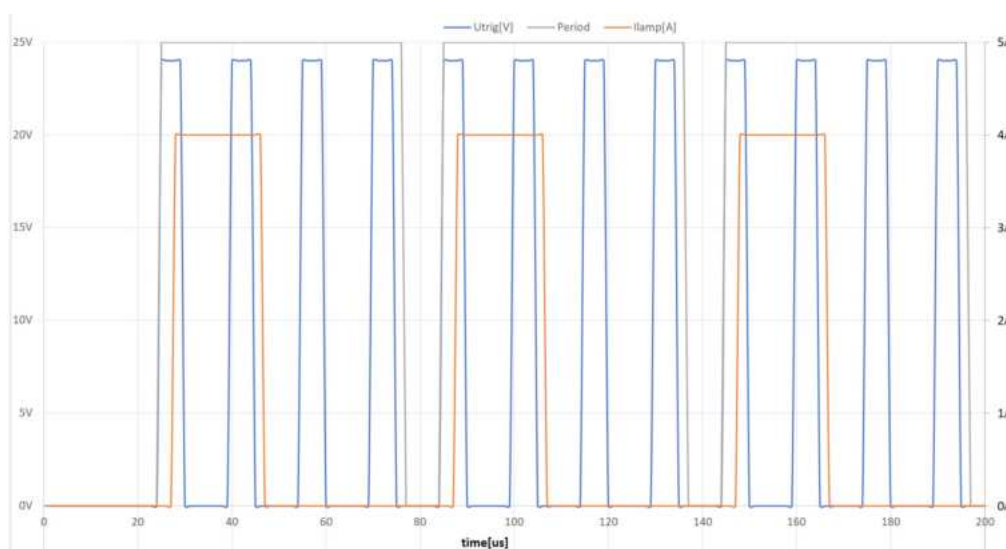
Pic. 39. Example of parameter settings Strobe – Period > Delay+Pulse
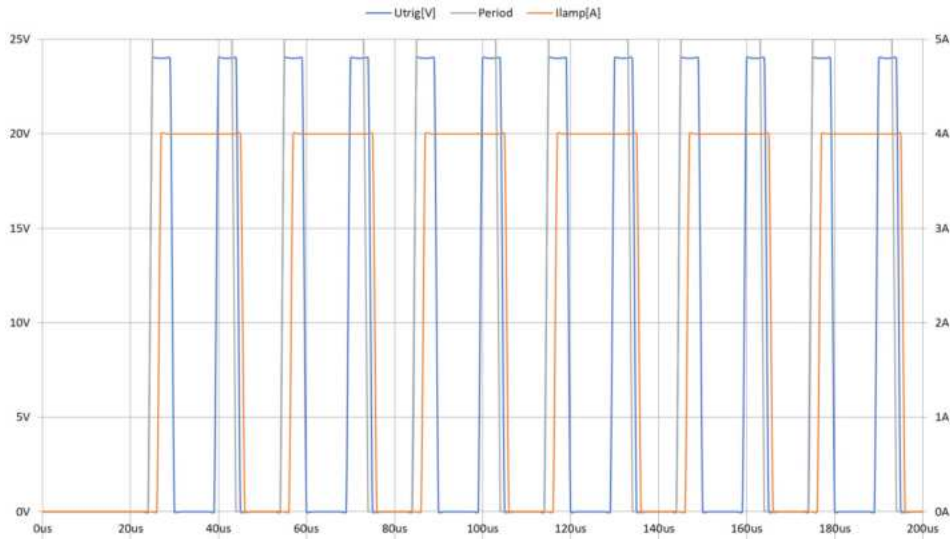
Pic. 40. Example of parameter settings Strobe – Period < Delay+Pulse

TRIGGER DC – TRIGGER INPUT SETTINGS FOR THE MODE: FOLLOW INPUT

The MCC controller allows operation in trigger input follow mode. When operating in this mode, the light will switch on and off when the state of the trigger input changes.

- After entering the **Trigger DC** tab, we can use the arrow to select whether the device should follow the local input.
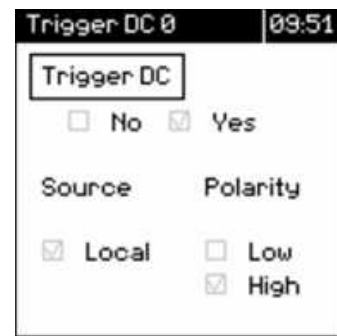- We confirm the selection by pressing **Enter**.
- We then select whether the light will be enabled at **Low** or **High** level.

Pic. 41. Trigger input settings for the mode: Follow input

TRIGGER – TRIGGER INPUT SETTINGS FOR STROBE MODE

The **Trigger** tab allows you to select the trigger input for **Strobe** mode - you can choose a **Local** or **Global** input.

- When the **Local** input is selected, you have the option to select whether the light will be triggered from a rising or falling edge.
- Once the **Global** input is selected, the trigger edge selection is made in the **Global Menu**.
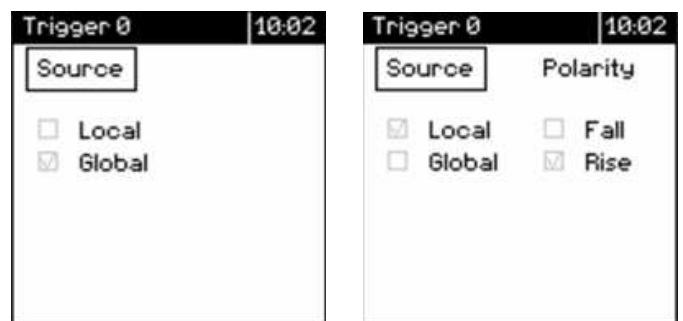
Pic. 42. Trigger input settings for Strobe mode

GPO - LOCAL OUTPUT SETTINGS

In the **Menu** you can set what will be set at the local output of the module. Navigate through the **Menu** using the up/down arrows and confirm by pressing Enter. You can then choose whether the active state will be **High** or **Low**.

- ■ **None** - output not active
- ■ **Command** – changing the state of a local output using a command
- ■ **Alarm** - light or module temperature alarm can be set

Pic. 43. GPO - Local output settings

TEMPERATURE – DEVICE AND LAMP TEMPERATURE SETTINGS

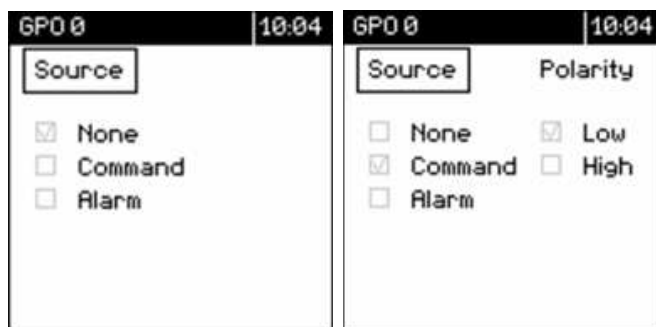In the tab, we set the Warning level and Alarm level for the module and light temperature. When the level is exceeded, warnings will appear on the MCC module screen and on the WWW web page.
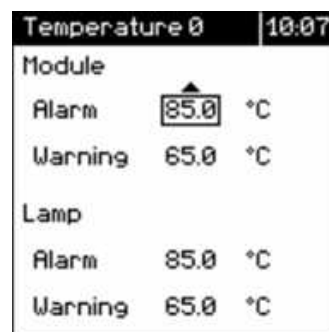
Pic. 44. Temperature – device and light temperature settings

HELP – WIRING DIAGRAM OF THE LIGHT, GPI AND GPO TO THE MODULE

- ■ After pressing the **Escape** button once, the screen will display a diagram of how to connect the light and temperature sensor to the LED light power connector.
- ■ Pressing the right/left button takes you to the I/O connector connection diagram.
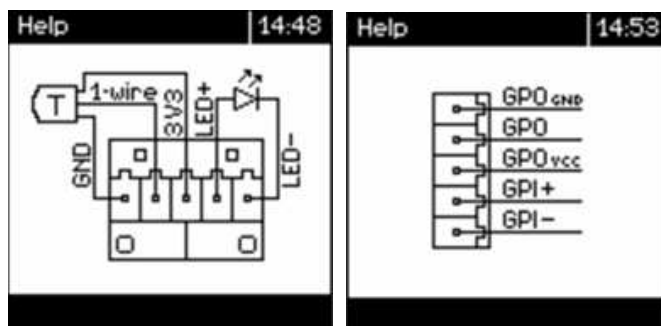
Pic. 45. Help – wiring diagram of the light, GPI and GPO to the module

WWW WEBSITE

The web page makes it possible to control the device, e.g. switch on, switch off individual lights, set currents, etc. To access the device's web page, check the IP address of the device displayed in the menu - Info - system information. Enter the displayed address in the address bar of your web browser. To access the web page, the device must be connected to the Ethernet and have a pre-configured network.

In the sidebar we have information on the number of connected channels - in this case two channels are active. Inactive channels are greyed out.
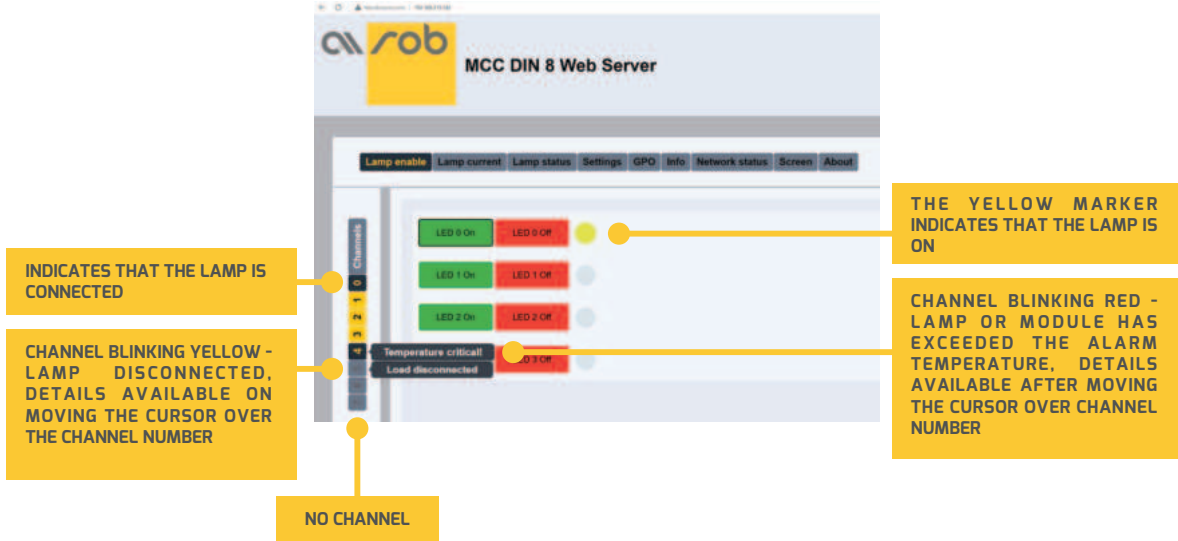
In the **Lamp enable** tab, we can switch a particular light on or off.

INDICATES THAT THE LAMP IS CONNECTED

CHANNEL BLINKING YELLOW - LAMP DISCONNECTED, DETAILS AVAILABLE ON MOVING THE CURSOR OVER THE CHANNEL NUMBER

NO CHANNEL

THE YELLOW MARKER INDICATES THAT THE LAMP IS ON

CHANNEL BLINKING RED - LAMP OR MODULE HAS EXCEEDED THE ALARM TEMPERATURE, DETAILS AVAILABLE AFTER MOVING THE CURSOR OVER CHANNEL NUMBER

Pic. 46.WWW Website

The **Lamp current** tab allows you to set the current for the following channels. Select the channel you are interested in and enter the current value.

Pic. 47. Lamp current

In the **Lamp status** tab, we can check the status of the switched-on lamps: lamp current, lamp voltage, module and lamp temperature.

Pic. 48. Lamp status

In the **Settings** tab, we can select the operating mode - **DC** and **Strobe**, set the time parameters for the Strobe mode, select the trigger source and the edge that triggers the flash. Once the parameters have been set, finally press the **Apply** button - only then will the parameters be saved to the device. Parameters set in this tab work in the same manner as parameters set via MCC DIN 8 display.

Pic. 49. Settings - DC

Pic. 50.Settings, - Strobe

In the **GPO** tab, set the parameters for the local output - analogous to the parameters set from the keypad. When the setting is complete, press the **Apply** button.

The **Active** and **Inactive** buttons allow you to send a command to the device and set the local output to active or inactive state.

Pic. 51. GPO - Command

Pic. 52.GPO - Alarm

In the **Info** tab, we can read out the hardware and firmware version of each module, its serial number, etc. This information is important for futher diagnostics.


Pic. 53. Info

In the **Network status** tab, you can view the current status of the network - DHCP/Static, its IP number, etc. This tab also allows editing network parameters. After editing the data, press **Apply** to save the data to the device. Please note that if the IP number is changed you will lose connection to the website. After changing the IP address, enter the updated IP address into your browser and connect to the website again.

Pic. 54. Network status

In the **Screen** tab you have a preview of the MCC device's display - using the buttons below you can navigate the device as you would using a keypad. The only differences are:

- **Menu button** - enter the global menu
- **Set button** – enter the local menu.
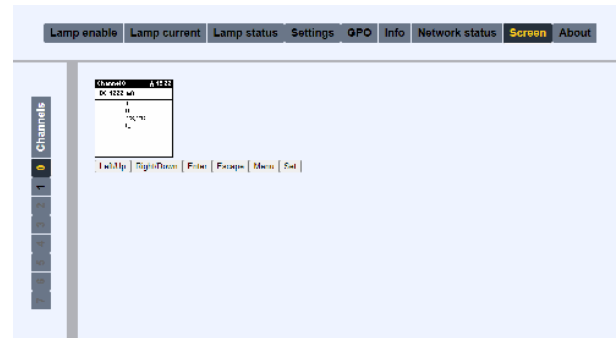
Pic. 55. Screen

CONTROL VIA API

Using the API commands, you can build your own application to control the MCC controller, or integrate the control of the MCC controller into your own application controlling a robot or vision system. The exact command structure and description of the commands can be found in the document "MCC Instruction DIN 8 - API command description" downloadable from **www.airob.com**

Communication with the controller takes place over an Ethernet network using the TCP/IP protocol.

SYSTEM UPDATE

Important - the modules must not be switched off during the upgrade process - disconnecting the power supply during the update process will require devices to be sent back for service.

To update the controller:

- ■ - Download the current firmware for the MCC DIN8 and PLD DIN1 module together with the updater (VLCCProgramer. exe) from **www.airob.com**
- ■ Extract the firmware to a directory of your choice on your PC
- ■ Start the Command Prompt on your computer
- ■ In the Command Prompt, go to the directory containing the updater
- ■ After starting VLCCProgrammer.exe, a list of available parameters and commands for the updater will be displayed

Pic. 56.   System update

LIST OF COMMANDS

Command	Description
VLCCProgrammer.exe --list	displays a list of IP addresses of all MCC modules available in the local network
VLCCProgrammer.exe --ip=192.168.215.131(example IP address) --ports	displays the actual port settings for the selected device
--ip=addres	the IP address of the device to be updated
--port=5000	the port of the device to be updated. If port=5000 (default) is set on the device, this command can be omitted
--pld=file_name	name of the update file for the PLD DIN 1 module, if the file is in a different directory than the updater the full path with the file name must be given
--mcc=file_name	name of the update file for the MCC DIN 8 module, if the file is in a different directory than the updater the full path with the file name must be given
--force	forces the module update if the firmware versions of the file and the device are the same or there is a need to downgrade the device firmware, no command will skip the update if the versions are the same
--info=file_name	calling the command checks the update version of the file
--chanel, --com, --diagnostic, --require	commands used during tests, not recommended for use during normal operation.

An example of a correct update command should look like this:

VLCCProgrammer.exe --ip=192.168.215.142 --port=5000 –mcc=V-LCC.bin -pld=V-PSL_Buck.bin

ELECTRICAL PARAMETERS OF THE MODULES

Electrical parameters	
Channels	Up to 8 channels
Supply voltage	24V ±10%
Max. supply current	5A per channel
Module output current	20mA-5A ±5%
Current setting resolution	1mA
Module output voltage	3-20V ±5%
Lamp current measurement	20mA-5A + ±5%
Lamp voltage measurement	3-20V ±5%
Temperature range	0-40°C
Maximum module temperature	90°C - above this, the module is switched off
Humidity range	0%-90%
Supported temperature sensor	DS18B20
Default IP address	192.168.1.1
Default UDP port	5000
Default TCP port	5001
Mounting	DIN TH35
Dimensions of MCC DIN 8 module	50mm×100mm×110mm
Weight of MCC DIN 8 module	235 grams

Local/global input	
Optical insulation	Yes
Input voltage	5-24V

Local/global output	
Optical insulation	Yes
Supply voltage	4.5-24V

DC Trigger mode	
Triggering method	Local input status - low or high

Strobe mode	
Triggering method	Local or global input edge - rising or falling
Switch-on delay of the lamp in relation to the trigger	2µs
Lamp switch-off delay	10µs
Minimum interval between trigger pulses	20µs
Duration of lamp switching on	2µs – 4s
Delay between trigger and lamp switch-on	0-4s
Interval between trigger pulses	20µs – 4s

ELECTRICAL DIAGRAM OF ISOLATED INPUT/OUTPUT
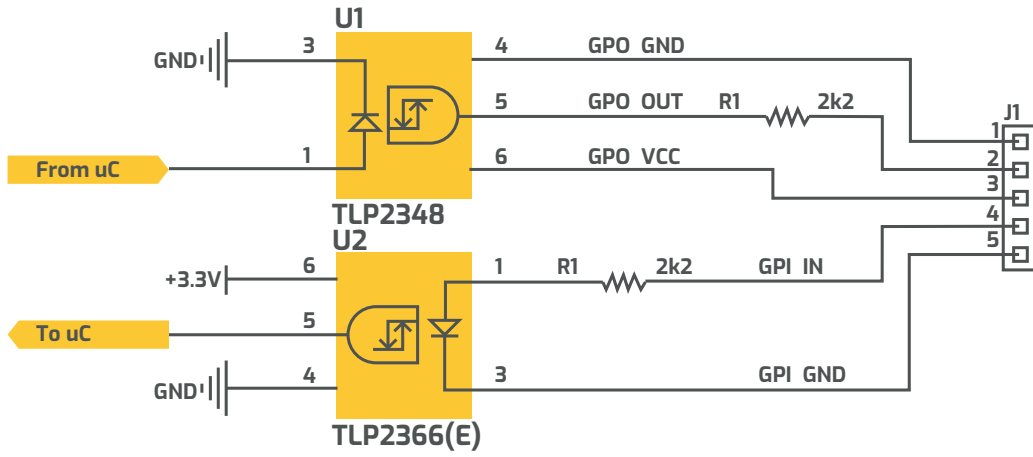
Pic. 57. Electrical diagram of isolated input/output

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