User Manual

LED Strobe Controller Family

IPSC1
IPSC2
IPSC4
HPSC1

For customers in the U.S.A.

The equipment provided in an enclosure / housing has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help**.**

Modifications not expressly approved in this manual could void the user's authority to operate the equipment under FCC rules.

For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in the Radio Interference Regulations.

Pour utilisateurs au Canada

Cet appareil est conforme aux normes classe A pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

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1. Overview

1.1. Precautions

To maintain optimal working temperature mount the device on a metal surface. Thermal generation depends on the output parameters used by the controller.

Do not attempt to disassemble this device, there are sensitive parts inside. Tampering with it could lead to permanent damage. Further, the devices can develop high voltages and loads, which can be a serious risk to health.

Do not expose this device to rain or moisture. This device is not intended to work under wet conditions.

Handle this device with the maximum care. Do not throw it, there are fragile parts inside.

Operate this cameras only with the type of power source that meets the specifications indicated on the camera and within the documentation. Operating the camera outside of the specifications can cause to permanent damage. Further electrical specifications can be found in the individual *Mechanical and Electrical specifications* for each model.

LED illumination should never be connected or disconnected to the strobe controller when the power output is enabled. Always turn the device off when changing LED illumination.

1.2. Description

Strobe controllers are used for strobing LED illuminations in machine vision applications. Very high power pulses are aligned to external trigger with high accuracy. Precise current overdrive and very small camera image exposition are used for acquisition of high-speed motion objects. User adjustable output voltage provides high efficiency and low power consumption.

The IPSC strobe controller provides repeatable intensity control of LED lighting, it includes the power supply, intensity control, timing and triggering functions required for machine vision systems. LED lighting needs a constant current supply as small variations in voltage can cause large variations in light output.

1.3. Family models

	IPSC1	IPSC2	IPSC4-r2	HPSC1
Output channels	1	2	4	1
Control interface	Ethernet	Ethernet	Ethernet and RS-232	Ethernet, RS-232 or USB2.0
Output voltage (pulsed)	5V to 200V	5V to 200V	5V to 200V	5V – 50V
Output voltage (Cont.)	5V – 55V	5V – 55V	5V – 55V	5V – 30V
Max current pulse (per channel)	20A @ 200V	10A @ 200V	10A @ 200V	40A @ 50V
Max continuous current (per channel)	2A @ 30V	1A @ 30V	1A @ 30V	5A @ 24V
Power supply	12V – 24V DC	12V – 24V DC	12V – 24V DC	12V – 24V DC
Trigger inputs	1	2	4	1
External dimensions (H / W / L) [mm]	39 x 88 x 103	39 x 88 x 103	56 x 130 x 142	39 x 88 x 103
Weight	approx. 285g	approx. 285g	approx. 715g	Approx. 270g

2. IPSC-Series

2.1. IPSC1

Figure 1: IPSC1 – Front panel view

Specification	IPSC1
Output channels	1
Max. Voltage	200V (pulsed) 55V (continuous)
Max. current pulse (depending on pulse width)	20A @ 200V
Max. continuous current	2A @ 30V
Pulse output range	1µs to 1000ms in 1µs increments
Trigger input	0 – 5V or 0 – 24V level, positive or negative edge
Control interface	Ethernet (10BaseT)
Power requirements	12V – 24V DC (min 11V, max 26V)
Power consumption	Max 3A @ 24V (72W)
	Max 3.5A @ 24V (84W) with cooling fan on output
Housing	Black aluminum case
External dimensions (H / W / L)	39 x 88 x 103 mm
Weight	approx. 285g
Storage temperature (ambient)	from -30°C/-22°F up to +80°C/+176°F
Operating temperature (ambient)	from -5°C/+23°F up to +50°C/+122°F

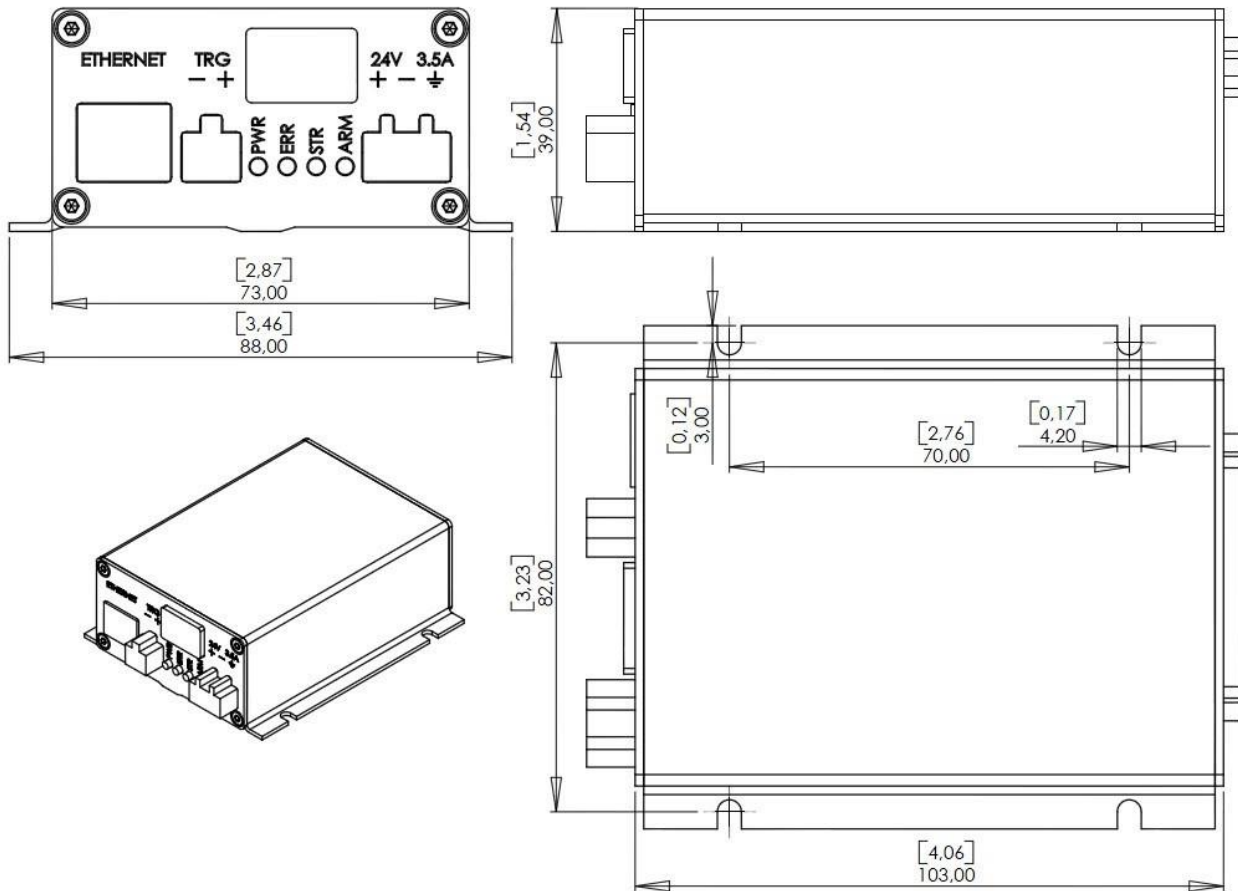*Table 1: IPSC1 - Specification*

2.1.1. Dimensions

Figure 2: Dimensions of IPSC1 in mm and [inch]

2.2. IPSC2

Figure 3: IPSC2 – Front panel view

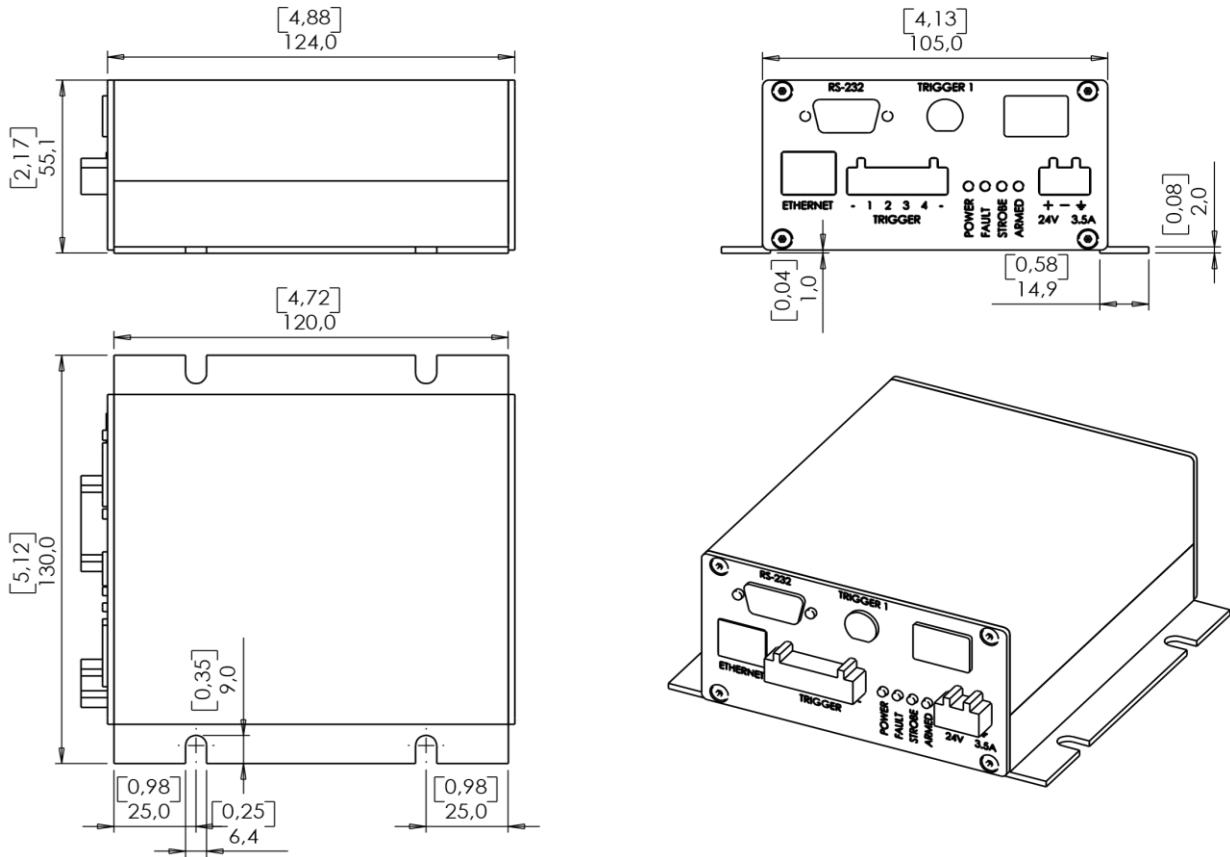| Specification	IPSC2
Output channels	2
Max. Voltage	200V (pulsed) 55V (continuous)
Max. current pulse (depending on pulse width)	10A @ 200V per channel (20A total)
Max. continuous current	1A @ 30V per channel (2A total)
Pulse output range	1µs to 1000ms in 1µs increments
Trigger input	0 – 5V or 0 – 24V level, positive or negative edge
Control interface	Ethernet (10BaseT)
Power requirements	12V – 24V DC (min 11V, max 26V)
Power consumption	Max 3A @ 24V (72W)
	Max 3.5A @ 24V (84W) with cooling fan on output
Housing	Black aluminum case
External dimensions (H / W / L)	39 x 88 x 103 mm
Weight	approx. 285g
Storage temperature (ambient)	from -30°C/-22°F up to +80°C/+176°F
Operating temperature (ambient)	from -5°C/+23°F up to +50°C/+122°F

Table 2: IPSC2 - Specification

2.2.1. Dimensions

Figure 4: Dimensions of IPSC2 in mm and [inch]

2.3. IPSC4

Figure 5: IPSC4 – Front panel view

Specification	IPSC4
Output channels	4
Max. Voltage	200V (pulsed) 55V (continuous)
Max. current pulse (depending on pulse width)	10A @ 200V per channel (40A total)
Max. continuous current	1A @ 30V per channel (4A total)
Pulse output range	1µs to 1000ms in 1µs increments
Trigger input	0 – 5V or 0 – 24V level, positive or negative edge
Control interface	Ethernet (10BaseT), RS232
Power requirements	12V – 24V DC (min 11V, max 26V)
Power consumption	Max 5A @ 24V (120W)
	Max 5.5A @ 24V (132W) with cooling fan on output
Housing:	Black aluminum case
External dimensions (H / W / L)	56 x 130 x 142 mm
Weight	approx. 680g
Storage temperature (ambient)	from -30°C/-22°F up to +80°C/+176°F
Operating temperature (ambient)	from -5°C/+23°F up to +50°C/+122°F

Table 3: IPSC4 - Specification
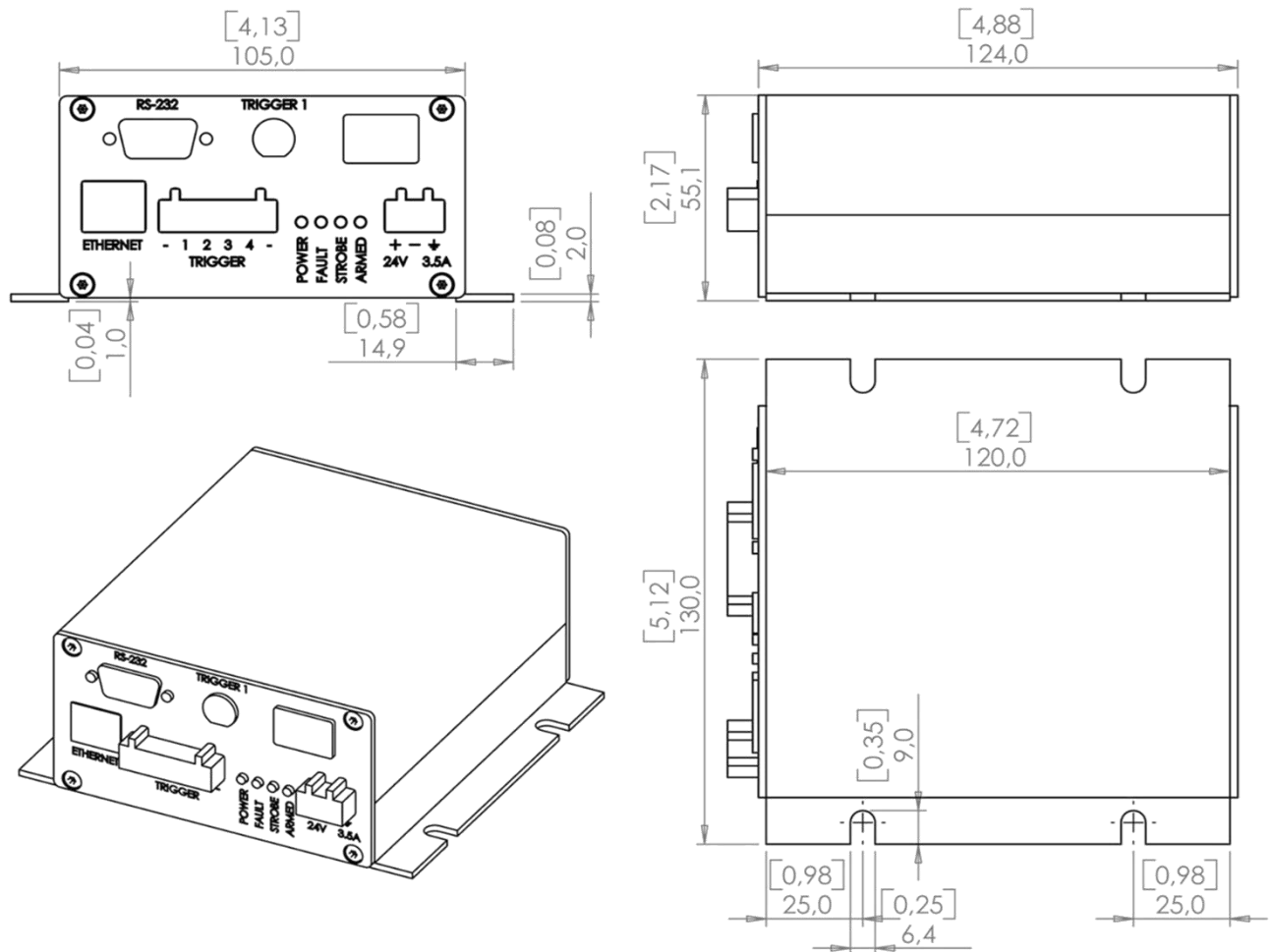
2.3.2. Dimensions

Figure 6: Dimensions of IPSC4 in mm and [inch]

2.4. Physical Interfaces

2.4.1. Power Input

The input power connector is located near the lower right corner of the IPSC front panel. All devices require an external 12V – 24V DC supply for operation, specified in *chapter 2 - IPSC-Series.*
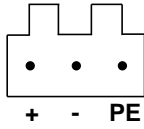
Pin No.	Description
Type	Phoenix Contact MSTB 2,5/ 3-ST-5,08 **+ - PE**
+	Power Supply (+12 to 24V DC)
-	Power GND
PE	Protective Earth

Table 4: Power connector description IPSC-Series

2.4.2. Output

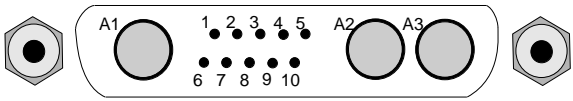*Figure 7: IPSC1/2/4 – Rear panel view with output connector*

Pin#	IPSC1	IPSC2	IPSC4
Type	Deltron DT13W3		
1	CH1-, Channel 1 -	CH1-, Channel 1 -	CH1-, Channel 1 -
2		CH2-, Channel 2 -	CH2-, Channel 2 -
3			CH3-, Channel 3 -
4	*Not assigned*		CH4-, Channel 4 -
5		*Not assigned*	
6			*Not assigned*
7	Analog ID		
8	Signal GND (GND for signals 7,9,10)		
9	Trigger Output Digital Signal, 3.3V LVTTL level		
10	Digital ID (1-Wire EEPROM interface, 3.3V LVTTL level)		
A1	12V – 24V (depends on power supply) DC, max 0.5A (for light head cooling fan)		
A2	Power GND		
A3	V+, Common Output Voltage		

Table 5: Output connector description IPSC-Series
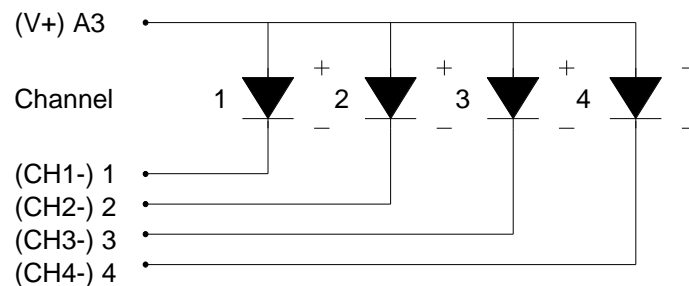
Figure 8: Connecting scheme for output

2.4.3. Trigger Input

Pin#	IPSC1	IPSC2	IPSC4	
Type	Phoenix Contact MSTB 2,5/ 2-ST-5,08 TRG - +	Phoenix Contact MSTB 2,5/ 4-ST-5,08 TRIGGER - 1 2 -	Phoenix Contact MSTB 2,5/ 6-ST-5,08 TRIGGER - 1 2 3 4 -	BNC-Connector TRIGGER 1 - +
+ or 1	Trigger Channel 1 +	Trigger Channel 1 +	Trigger Input 1 +	
2	Not assigned	Trigger Channel 2 +	Trigger Input 2 +	
3		Not assigned	Trigger Input 3 +	
4			Trigger Input 4 +	
-	Common Trigger GND			

Table 6: Trigger input connector description IPSC-Series
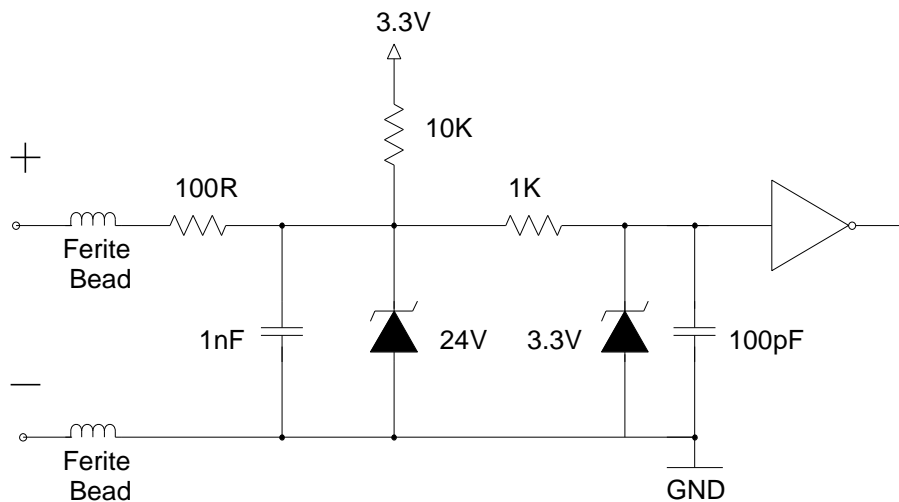
Figure 9: Internal input trigger scheme for IPSC-Series

Logical State	Voltage
HIGH / Logical 1	0 to 0.5V DC
LOW / Logical 0	+3V to 24V DC
Undefined State	+0.5V to 3V DC

Table 7: Electrical Specification - Trigger Input(s)

2.4.3.1. Opto-Isolated Trigger Source

Figure 10 shows how an opto-isolated digital output of e.g. a camera can be connected to trigger an IPSC. The opto-coupler of the trigger source should be able to supply at minimum 20mA current and be rated for minimum 24V voltage.

The shown pull down 1.2kOhm resistor should be rated for at least 0.5W power.
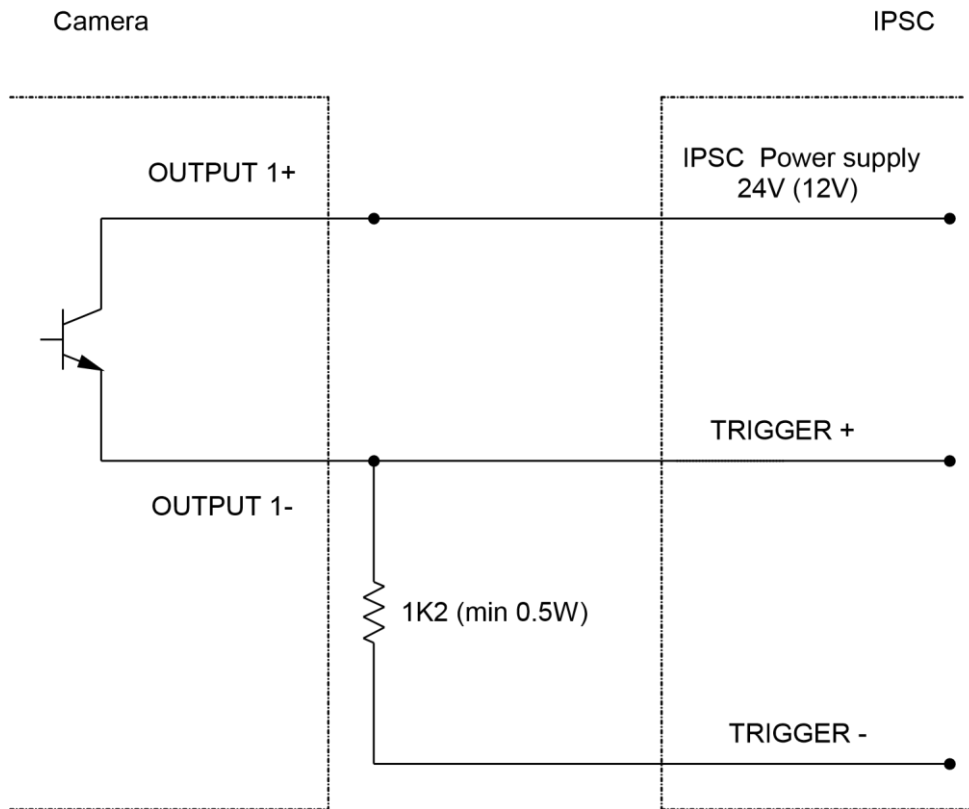

Figure 10: Dimensions of IPSC2 in mm and [inch]

3. HPSC-Series

3.1. Mechanical and Electrical Specifications

Specification	HPSC1
Output channels	1
Max. Voltage	50V (pulsed) 30V (continuous)
Max. current pulse (depends on pulse width)	40A @ 48V
Max. continuous current	4A @ 24V (without heat sink, max. 25°C ambient) 5A @ 24V (with heat sink)
Pulse output range	1µs to 1000ms in 1µs increments
Trigger input	0 – 5V or 0 – 24V positive or negative edge
Trigger output	Open-collector, max. 30V / 50mA
Control	Ethernet (10BaseT), RS-232 or USB1.x/2.0
Power requirements	12V – 24V DC (min 11V, max 26V)
Power consumption	Max. 155W (depending on load)
Housing	Black anodized aluminum case
External dimensions (H / W / L)	39 x 88 x 103 [mm]
Weight (approx.)	270g
Storage temperature (ambient)	From -30°C/-22°F up to +80°C/+176°F
Operating temperature (ambient)	From -5°C/+23°F up to +50°C/+122°F*
Operating relative humidity	From 25% up to 80% (non-condensing)

Table 8: HPSC1 - Mechanical and electrical specifications

3.2. Physical Interfaces

Configuration
Ethernet (shown)
USB2.0
RS-232

Trigger Input
Opto-isolated

Power Input
External power supply,
12 - 24V, max. 155W

Trigger Output
Open-collector,
max. 30V / 50mA
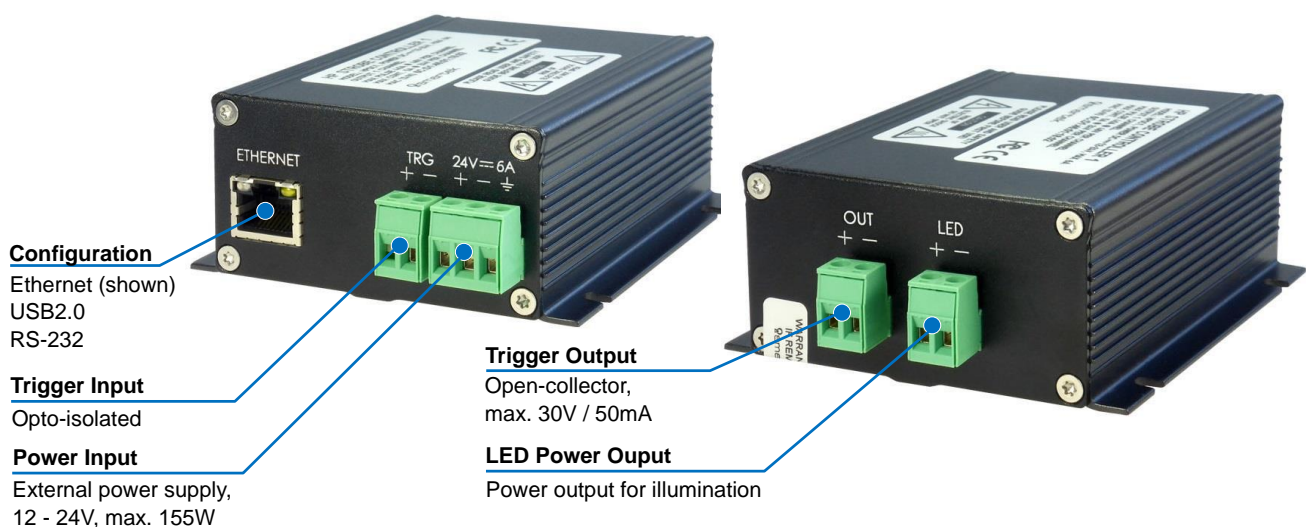
LED Power Ouput
Power output for illumination

Figure 11: HPSC1 - Physical Interfaces

3.2.1. Power Input

The *Power Input* connector, as shown in Figure 11, is located near the lower right corner of the HPSC front panel. All devices require an external 12V – 24V DC supply for operation (specified in *chapter 3.1 - Mechanical and Electrical Specifications*).
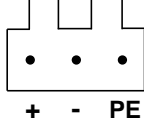
Pin#	Description
Type	Phoenix Contact MSTB 2,5/ 3-ST-5,08 **+ - PE**
+	Power Supply (+12 to 24V DC)
-	Power GND
PE	Protective Earth

Table 9: Power connector description HPSC-Series

3.2.2. Output

The *Output* connectors, as shown in Figure 11 and described in Table 10, provide the power output (*LED*) for the illumination to be driven by the controller, as well as a generic trigger output (*OUT*) for synchronization of further devices.
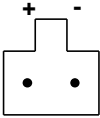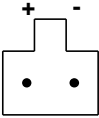
Pin#	HPSC1
Type	Phoenix Contact MSTB 2,5/ 2-ST-5,08 OUT **+ -** LED **+ -**
LED+	LED Power Output +
LED -	LED Power Output -
OUT+	Trigger Output +
OUT -	Trigger Output GND

Table 10: Output connector description HPSC-Series

Interface	OUT
Type	Open-collector
Max. rating	30V / 50mA

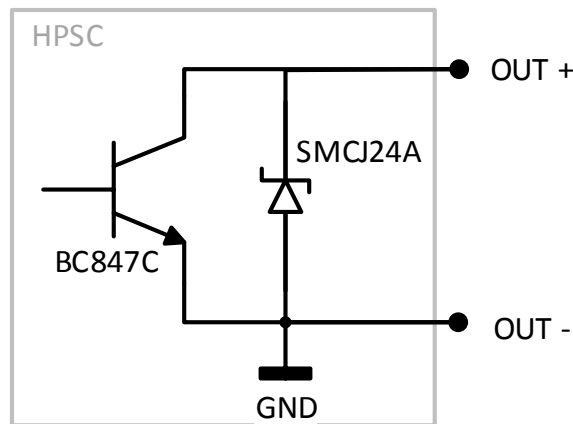*Table 11: HPSC1 – Trigger Output (OUT) maximum ratings*
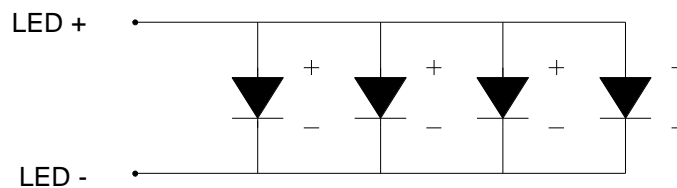

Figure 12: HPSC1 – Trigger Output (OUT) - Schematics

Figure 5: Connecting scheme for output
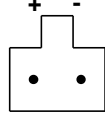
3.2.3. Trigger Input

Pin#	HPSC1
Connector Type	Phoenix Contact MSTB 2,5/ 2-ST-5,08 TRG
+	Trigger Channel 1 +
-	Trigger Channel 1 -

Table 12: Trigger input connector description IPSC-Series

Operating Limits	Voltage
Recommended operation voltage	+0 to +24 VDC
HIGH / Logical 1	> +2.2 VDC
LOW / Logical 0	+0 to +1.4 VDC
Undefined State	> +1.4 to +2.2 VDC
Absolute maximum	+30.0 VDC
The current draw for each input line is 5 to 10 mA.	

Table 13: HPSC1 - Electrical Specification - Trigger Input(s)
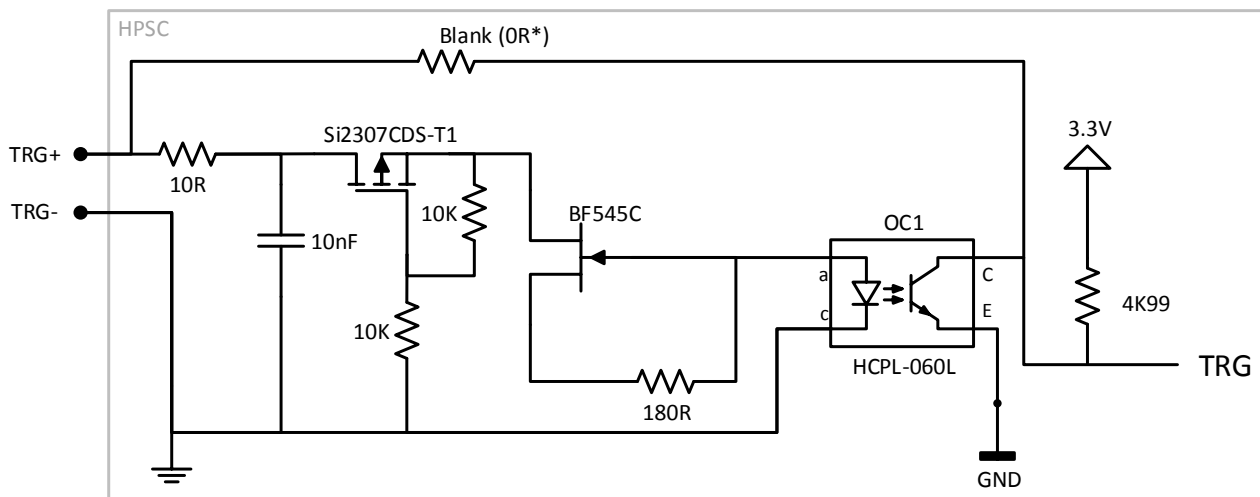
on request, direct path for faster trigger input

Figure 13: Internal input trigger scheme for HPSC-Series

3.3. Mechanical Drawings

3.3.1. Dimensions HPSC1

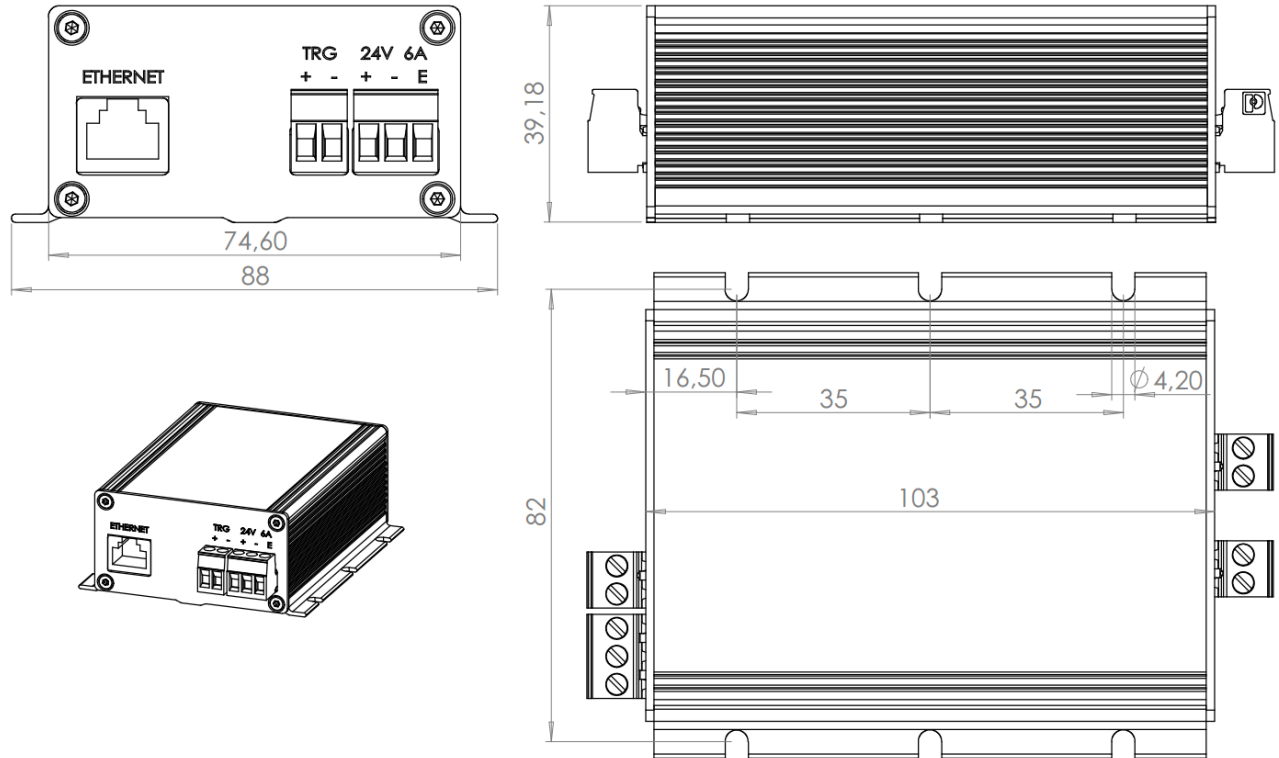*Figure 14: Dimensions of HPSC1 in mm*

4. Interfaces for Configuration

4.1. Ethernet

The strobe controller can be connected directly to the PCs network interface card, or via a switch by using an Ethernet patch cable.

Standard protocols used are HTTP, UDP and TCP via 10Base-T.

Ethernet connector:
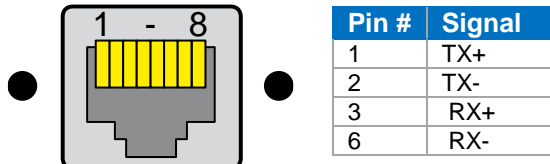- RJ45
- Ethernet 10 Base-T
- 803.2 compliant

Pin #	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Table 14: Ethernet connector PIN assignment

Note: Using a 10/100Mbit network adapter for a direct connection to a strobe controller makes it necessary to use cross-over cabling.

4.2. Serial RS-232

To connect a strobe controller to the PC using its RS-232 interface, a Sub-D / RS-232 cable can be used. The assignment of the connector on the strobe controller can be found below.
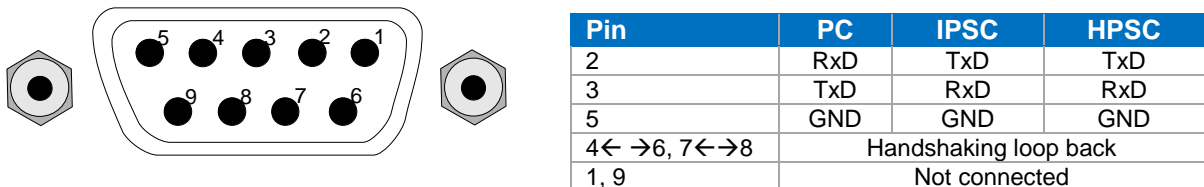
Pin	PC	IPSC	HPSC
2	RxD	TxD	TxD
3	TxD	RxD	RxD
5	GND	GND	GND
4← →6, 7←→8	Handshaking loop back		
1, 9	Not connected		

Table 15: RS-232 connector assignment

Note: The IPSCs and HPSCs series can be connected using a straight wired extension cable.

4.3. Universal Serial Bus (USB)

Strobe controllers providing a USB interface can be connected by an USB1.x/2.0 cable providing Type-A to -B connectors.
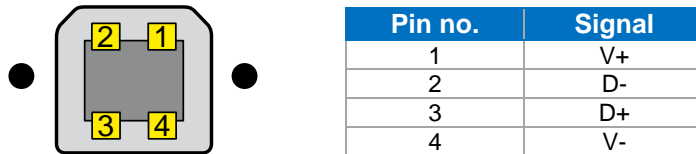

Pin no.	Signal
1	V+
2	D-
3	D+
4	V-

Table 16: USB-B connector assignment

The USB connection is detected by the operating system as an USB-to-Serial converter and provides a serial COM-port. Commands are sent and received similarly to the serial RS-232 interface.

5. Status LEDs

The HPSC and IPSC series have a different concept of Status LEDs. The following chapter describes the LEDs and signaling, as well as the error codes stated by those LEDs.

5.1. HPSC-Series

All versions provide a Green and a Yellow status LED on the front panel of the device. On the Ethernet versions these are part of the Ethernet / RJ45 connector, the USB and RS-232 versions provide separated LEDs.

The signals are coded as shown in the following table.

Status	Green LED	Yellow LED	Description
Error	OFF	OFF	No sign of life
		Flashing	Number of consecutive flashes as described in chapter 5.2.1 - Ethernet Status
Normal Operation	ON	OFF	Running Mode: "OFF" active
		ON	Running Mode: "Continuous" active
		Flashing (fast)	Running Mode: "External Trigger" or "Software Trigger" active
		Flashing (slow)	Running Mode: "External Switch" or "Internal Trigger"
Booting	Flashing	---	Device in bootloader mode
		Flashing	Receiving on data interface

Table 17: HPSC - Status LEDs and description

5.2. IPSC-Series

There are 4 status LEDs on the front panel of the IPSC-series:

Identifier			Color	Type
IPSC1	IPSC2	IPSC4		
PWR	P	POWER	Green	POWER
ERR	E	FAULT	Red	FAULT
STR	S	STROBE	Yellow1	STROBE
ARM	A	ARMED	Yellow2	ARMED

Table 18: IPSC - Identification of status LEDs on different models

When powering the device, POWER (green) and STROBE (yellow) LEDs are solid on, and the FAULT (red) LED is blinking for 5 seconds.
After the startup process is done, only the POWER (green) LED stays solid on.

The different LED statuses are explained in Table 19.

Type	Status
POWER (green) LED	
Solid on	Controller is powered
FAULT (red) LED	
Flashing in specific intervals	System has a failure
Flashing (in combination with STROBE (Yellow) LED)	Controller is starting up, setting controller's IP address, updating firmware. The controller is in reboot mode
STROBE (yellow) LED	
Flashing	Indicates the pulse coming from the IPSC's output. The duration of the LED being turned on depends of the pulse length
Solid on	The controller is either in Continuous or External Switch mode. IPSC is driving outputs with continuous currents
ARMED (yellow) LED	
Solid on	Indicates voltage on output (ready for triggering pulses or in continuous mode)

Table 19: IPSC - Status LEDs and description

5.2.1. Ethernet Status

The Ethernet connector comes with yellow and green LEDs. On the IPSC-series the green LED indicates link, the yellow one activity.

Green LED (left)	Status
OFF	No link
Solid on	Link on / Ethernet link exist

Yellow LED (right)	Status
OFF	No activity
Flashing	Indicates ongoing activity

Table 20: Ethernet status LED

5.3. Error / Fault Codes

If the device detects an error it switches to idle mode and stops driving current on output immediately. There are 9 different error codes stating the source of the error:

Error #	Description
0	No error
1	Error in internal bus communication
2	No light head is detected by AID (IPSC-series only)
3	Wrong parameters are used
4	Temperature of controller is too high
5	Error with temperature measuring device
6	D/A converter failure
7	Input power supply voltage is too low
8	Cannot read DID from light head (IPSC-series only)

Table 21: Error codes

Depending on what error code is detected, the FAULT (IPSC) or Yellow LED (HPSC) is flashing in repeating sequences. Each sequence consists of a number of flashes accordingly to the error code number. E.g. for error code "1" flashing once, for error code "2" twice, etc. The error code, causing the

controller to stop working, is also shown in the status window of the ScLibClient (chapter *7.2 - Strobecontroller Status)* or can be accesseb by the API / RAW commands.

When errors are detected, the following steps are recommended:
1. Turn off controller
2. Disconnect light head
3. Check that input power supply is connected properly
4. Restart controller
5. Check parameters on controller so they are not overloading controller and light head
6. Check that light head is connected properly
7. Send new parameters to controller

Please contact your local SMARTEK Vision distribution partner if the error code persists.

6. Getting Started

6.1. System Requirements

(1) **SMARTEK Vision Strobe Controller of IPSC- or HPSC-Series**
(2) **Power Supply** with flying leads and ferrules
   - IPSC1 / 2:   12V to 24V DC with at least 84W
   - IPSC4 / HPSC1:   12V to 24V DC with at least 135W / 155W
   -
(3) **Cable for communication**:
   - Ethernet: Patch cable with RJ45 plugs
     Note: Direct connections to 10/100Mbit network cards require a crossover cable
   - USB: USB-B cable
   - Serial: RS-232 cable with male to female 9-pole D-Sub plugs, Rx/Tx not crossed
(4) **Cable for powering the illumination**
   - IPSC-Series: Power-out cable for IPSC series providing an appropriate number of lines. Assembled cables are available as accessory from our sales partners.
   - HPSC-Series: Flying leads can be directly attached to the devices screw terminal.
(5) **LED illumination** matching the power output performance of the strobe controller device
   - Note: The illumination must not be equipped with any additional internal / external control electronics!
(6) **Trigger source** (optional)
   - 0 – 24V (voltage level for logical "1" from 3V).
   - IPSC-Series: 1.2kΩ / 0.5W resistor per trigger channel
     (optional for Hi/Hi-Z trigger sources)
(7) **PC** with Microsoft Windows® or Linux 32-/64Bit operating system for configuration of the device
   - 10Mbit Ethernet network card (or faster), RS232 interface or USB1.x/2.0 interface
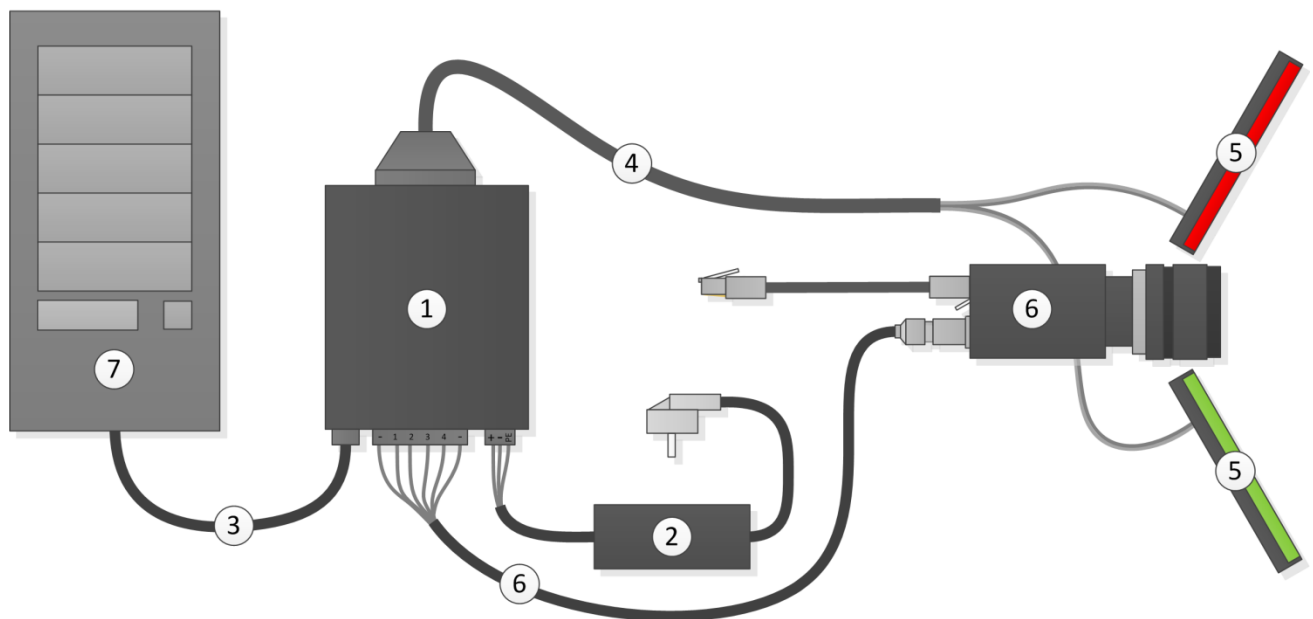   - SMARTEK Vision *ScLibSDK* PC configuration software, optional web browser software.

Figure 15: Basic setup with an IP Strobe Controller

6.2. Software Installation – SMARTEK Vision ScLibSDK

Step 1: Download the latest SMARTEK Vision ScLibSDK from:
http://www.SMARTEK.vision/downloads.php

Step 2: To start the installation **Unzip** and **Run** the ScLibSDK software installation. Please follow the installation instructions to complete the installation process.

6.3. Starting up the Strobe Controller

Step 1: Connect the strobe controller with an appropriate cable to target PC or switch. Connect the positive and negative leads of the power supply to the power terminal of the strobe *controller*, as well as the protective earth conductor (if available).

Step 2: Switch on the power supply as well as the power switch on the front side of the strobe *controller*. Run the configuration tool *ScLibClient* from *Start Menu → (All) Programs → SMARTEK Vision→ ScLibSDK*. Press the button *Find Controllers* 🔍 to search for SMARTEK Vision controllers over Ethernet, RS232 and USB, all found devices are shown in the list below.

Note: There is one of three available flags in front of the strobe controller connection displayed in the list of found devices:
- ❌ Device available and waiting for connection
- ✅ Connection to device established
- ⚠️ Unable to connect to device; usually caused by bad IP-configuration (Ethernet only)

In case that the sign ⚠️ *Unable to connect to device* is shown in front of the *Connection* of the strobe controller, the current IP configuration is invalid. IP address and subnet mask of a selected strobe controller can be changed by pressing the button *Set Device Ip Address* 🖥️. For a quick start it is recommended to use the IP configuration as shown in the table below:

	NIC*	Other NICs	Strobe Controller #1	Strobe Controller #2	Strobe Controller #n
IP	169.254.0.1	not 169.254.x.x	169.254.1.1	169.254.1.2	169.254.1.n
Subnet mask	255.255.0.0	255.255.0.0	255.255.0.0	255.255.0.0	255.255.0.0

*Physically connected to the Strobe Controller(s)

Step 3: In the list of strobe controller, choose the device you want to connect to and press the button *Connect Device* 🖥️ Alternatively, Ethernet strobe controller can now be reached with its web-interface by typing the shown IP address into the address field of your web browser (e.g. http://169.254.1.1).

Step 4: As soon as the connection is established successfully, the strobe controller can be configured for the first start. Please make sure that the *Running Mode* is set to OFF and the output voltage as well as the current of the specific channels, shown in the sub-region *Physical Output,* do not exceed the limits of the illumination to connect. After finishing the configuration, the changes have to be stored on the strobe controller by pressing the button 🔴 *Send*. Subsequent press the button *Disconnect* 🖥️

Step 5: Switch OFF the strobe controller and unplug the power supply.

Step 6: As soon as the device has been disconnected from its power supply, illumination(s) can be connected to the strobe controller. Illuminations are connected to the output panel connector on the backside of the housing, according to the output description shown in 2.4.22.4.2 - Output (IPSC-Series) and 3.2.2 - Output (HPSC-Series).

Step 7 – Connecting an external trigger (optional): Depending on the strobe controller series and trigger source, one of the following input wirings can be applied for getting started:
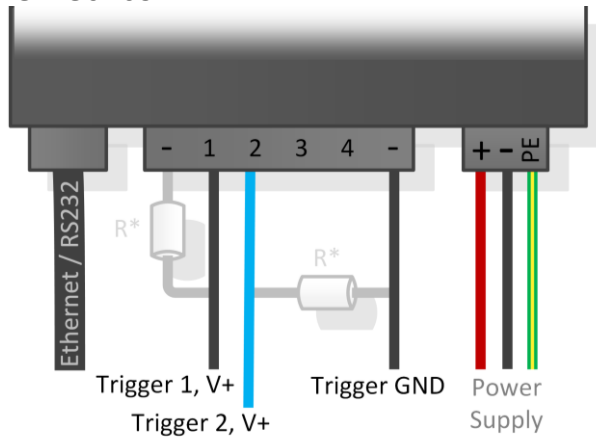
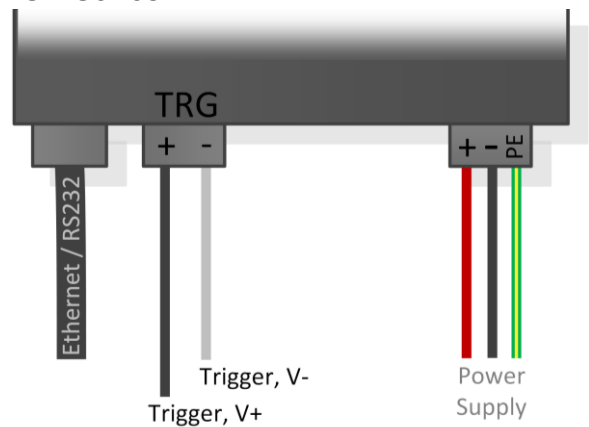**IPSC-Series:**   **HPSC-Series:**

Figure 16: Connecting input trigger of IPSC (left) and HPSC (right) - max. 24V

*IPSC-Series: As shown in Figure 12 left, for trigger source that switch between Hi and Hi-Z state only, it is necessary to apply a pull down resistor (R = 1.2kΩ / 0.5W) between trigger source and GND.

Step 8: When all illuminations have been applied correctly, power the *strobe controller* and establish a connection via the *ScLibClient* or web-interface. Configure the *Trigger Inputs* as well as the *Physical Outputs* according to your application and the limits of your illumination. Finally choose an appropriate *Running Mode* for your application and store the settings by pressing the button 🔴 *Send* which applies the settings to the *strobe controller*.

7. Device Configuration with the ScLibClient

The ScLibClient is a graphical user interface application for strobe controller discovery, configuration and status. It is part of the ScLibSDK which is a collection of software tools, programming samples and documentation to configure, run and integrate devices into user applications. All SMARTEK Vision Strobe Controllers, specified in this document, are supported.

	Specification
Firmware update	Over Ethernet, RS-232 and USB
ScLibSDK PC Client software	Windows XP, Vista, Windows 7, 8, 10, 32 and 64bit Linux 32 and 64bit

Table 22: Software specifications

With the installation of the ScLibSDK the ScLibClient can be ran from the Windows Start Menu or the binary folder of the installation.

7.1. Connecting with a Strobe Controller

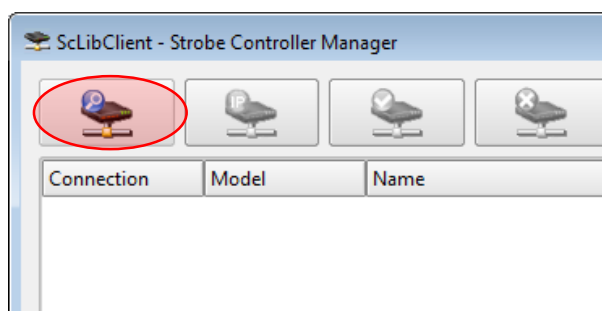Run the ScLibClient and click *Find* icon to start searching for devices.

Figure 17: ScLibClient – Discovery Button

To search for all devices check all boxes, or make search more specific.
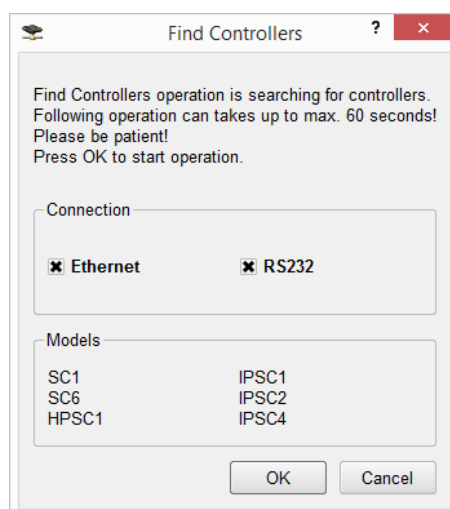

Figure 18: ScLibClient – Discovery Window

Depending on what type of connection is used toward strobe controller, result of search will be different. If no controller has been found check your hardware and software settings. Make sure

everything is plugged properly and your firewall settings are not blocking. If you still experience problem please contact Smartek support.

If controller is connected with serial cable, or is connected peer to peer with Ethernet cable or via Ethernet router that has DHCP server installed and everything is OK, search results can be something like in pictures below.
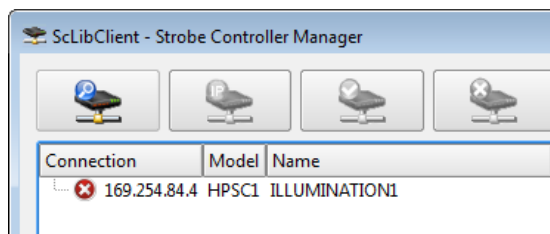

Figure 19: ScLibClient – Device List

If controller is connected peer to peer with Ethernet cable or via Ethernet router and no DHCP server is installed, search result can look something like in picture below. IPSC are shipped in DHCP mode and in case DHCP server does not exist, IP address of device is set to invalid IP address "0.0.0.0". Change IP address of the device to be on the same subnet as the IP address in Local Area Connection settings. To change the IP address of the IPSC click on the Set Address icon.
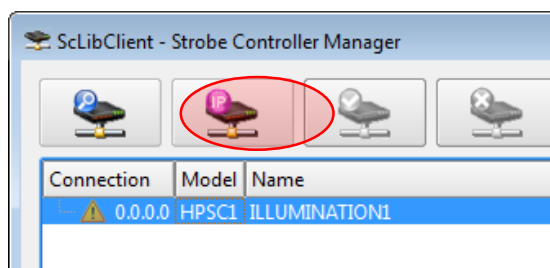

Figure 20: ScLibClient – Set IP Button

New window will open. Here you can set the new IP address, subnet mask and name of the controller. Make sure you don't provide the same IP address to controller as in Local Area Connection.
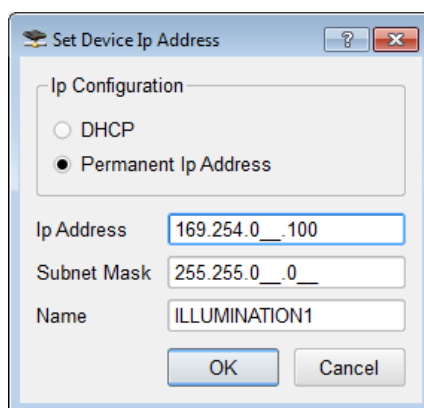

Figure 21: ScLibClient – Set IP Window

Select the IPSC device that is found and click on the Connect icon to connect to controller.
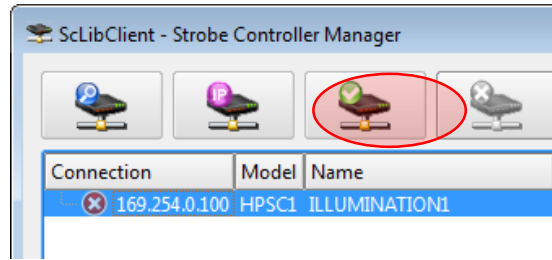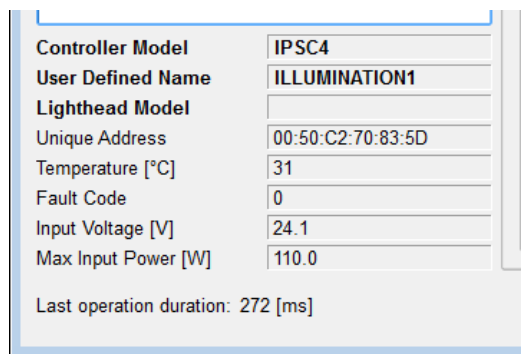
Figure 22: ScLibClient – Connect to Device

7.2. Strobecontroller Status

When connection between ScLibClient and controller is established, all fields are read out in controller status. Controller status is defined in the lower left corner of the ScLibClient software:

- Controller Model – shows the model of the strobe controller.
- User defined name – shows the name of the strobe controller, it can be changed by the user.
- Light head Model – shows the model of the light head connected to the controller. If the light head does not have a digital ID, or it is not connected to the controller, the field will be empty
- Unique Address – shows the mac address of the strobe controller.
- Temperature [°C] – shows the internal temperature of the strobe controller. At the beginning this field is zero. Controller temperature sensor needs a few seconds to read the exact temperature. Normal internal temperature is from -5°C to +50°C (+23°F to +122°F).
- Fault Code – internal error code, described in chapter 5.2.1 - Ethernet Status
- Input Voltage [V] – shows the controller input power supply voltage.
- Max Input Power [W] – shows the maximal power of input power supply.

Figure 23: ScLibClient – Strobecontroller Status Output

7.3. Applying a Configuration

The ScLibClient has read and send functions. Read button is used for reading the current parameters on the controller, and Send button is used for sending the desired parameters to the controller. After changing the desired parameters, click on the Send button to send new parameters to controller.

7.4. Running modes

The controller work in different modes, providing pulsed and continuous DC current output.
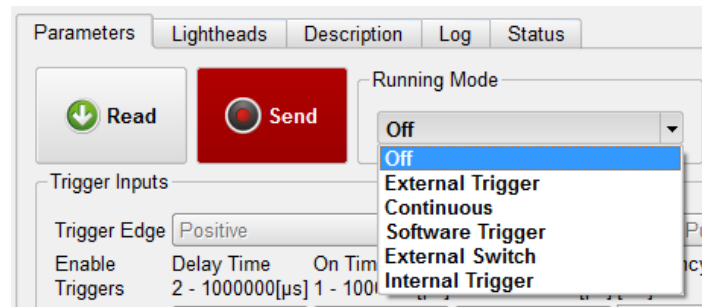

Figure 24: ScLibClient – Running Modes

In pulse controlled output modes, controller generates electrical impulses on the output. The output pulses in this mode can be triggered by external trigger or software trigger. These modes are intended for over-driving LED light heads. When the device reacts to one of the trigger signals, all other incoming triggers are ignored. The trigger signals are processed sequentially. These modes are External Trigger and Software Trigger mode.

In DC controlled output modes controller operates as a DC current source. Those modes are intended for continuous currents on the output. These modes are Continuous and External Switch mode.

Note: Asynchronous Triggering

The SMARTEK Vision strobe controller family is designed for high-power and reliable performance, which can only be guaranteed in a synchronized application. It is highly recommended that each device is only used in one physical application to ensure the best performance and a reliable repeatability of output signals due to the limited energy. In case that it needs to be used in two processes in parallel, make sure that no input and output signals can cross each other in time. The second signal will be ignored until the prior one has been completed, due to the sequential signal processing of the strobe controller architecture.

7.4.1. Off

Controller is in idle mode and does not respond to input triggers. There is no voltage on output, output is off and controller is not waiting for trigger input. When strobe controller is in the Off mode only POWER (green) LED is solid on.

7.4.2. External Trigger

In this mode, device is ready to accept external trigger input and generate an output pulse. External Trigger mode is the most precise mode of the IPSC. This is because there is very low (min. ~2 microseconds) latency between the arriving trigger input and the output pulse coming form IPSC. When strobe controller is in the External Trigger mode, POWER (green) LED and ARMED (yellow) LED are turned solid on. In this process, the STROBE (yellow) LED blinks when the device sends a pulse on the output.

7.4.3. Software Trigger

In this mode the device is ready to accept software trigger input and generate an output pulse. Controller does not respond to external trigger inputs but does to the software trigger via RS-232 cable or Ethernet cable. Software Trigger mode is not precise as the External Trigger or External Switch mode. This is because of the delay between the device and the PC. When strobe controller is in the Software Trigger mode, POWER (green) LED and ARMED (yellow) LED are turned solid on. In this process, the STROBE (yellow) LED blinks when the device sends a pulse on the output. Also, in Software Trigger mode a test can be performed to generate a output pulse (see 7.6.1.1. Preforming a test pulse).

7.4.4. Continuous

In the Continuous mode the output is a continuous current. Controller operates as a DC current source. After the parameters are configured and sent to the IPSC, voltage is applied to the output. The timing parameters are not used in this mode. When strobe controller is in the Continuous mode, POWER (green) LED, STROBE (yellow) LED and ARMED (yellow) LED are solid on.

7.4.5. External Switch

In this mode the device acts like a switch. IPSC is armed and ready for generating output pulses. If a trigger has arrived, the device will send continuous current on the output as long as the trigger is active. In the External Switch mode the output is a continuous current. The timing parameters are not used in this mode. When strobe controller is in the External Switch mode, POWER (green) LED, and ARMED (yellow) LED are solid on. STROBE (yellow) LED is on as long as trigger signal is active.
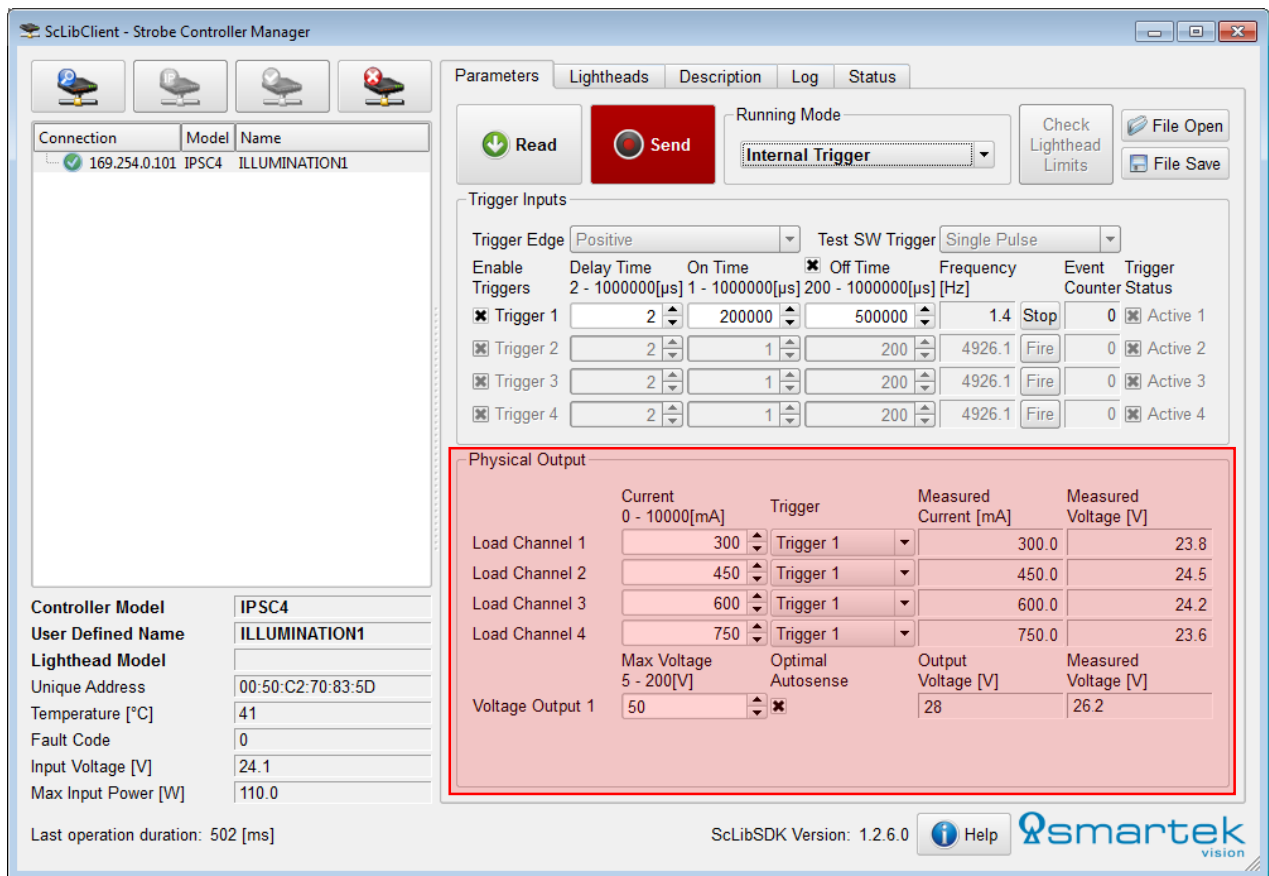
7.4.6. Internal Trigger

The Internal Trigger mode allows to generate one constant trigger signal by the strobecontroller itself, which can be used to drive one or more outputs synchronously. The signal is defined by the configured On- and Off-Time. With the minimum supported *Off Time* of 1ms and minimum *On Time* of 1µs, the resulting maximum frequency is 997Hz. The *Off Time* must be at least the twice of the *On Time*.

When the strobe controller is in the Internal Trigger mode, POWER (green) LED and ARMED (yellow) LED are turned solid on. In this process, the STROBE (yellow) LED blinks when the device sends a pulse on the output.

7.5. Output Parameters

By setting output parameters, current and voltage power can be configured. These parameters should only be applied carefully meeting the specifications of the LED illumination. Too high output parameters can lead to permanent damage to the illumination.

Figure 25: ScLibClient – Running Modes

Parameters:

- *Load Channel n* – Available output channel(s) which can be configured independently
- *Current* – Current for the individual output line
- *Trigger* – Trigger which will be used to drive the individual output line
- *Measured Current / Voltage* – Actual measured voltage and current at the output lines
- *Voltage Output 1* – Maximum voltage the internal switching power supply will be able to provide. The actual (measured) voltage of each line will be depending of the illumination characteristics and the configured current.
- *Optimal Autosense* – Enables / Disables *Optimal Autosense* for the internal power supply
- *Output Voltage* – Voltage of the internal power supply, set by *Optimal Autosense*
- *Measured Voltage* – Measured voltage at the internal power supply

7.5.1. Optimal Autosense

Optimal Autosense is used to determine the optimal output voltage for the current set-up. As soon as the *Optimal Autosense* check box is enabled, the device corrects the desired voltage to the lowest voltage that is needed to reach the desired current on all channels.

Having the optimal voltage for illumination operation set, can reduce the heat generation at the MOSFETs significantly, which will dissipate all superfluous energy into heat.
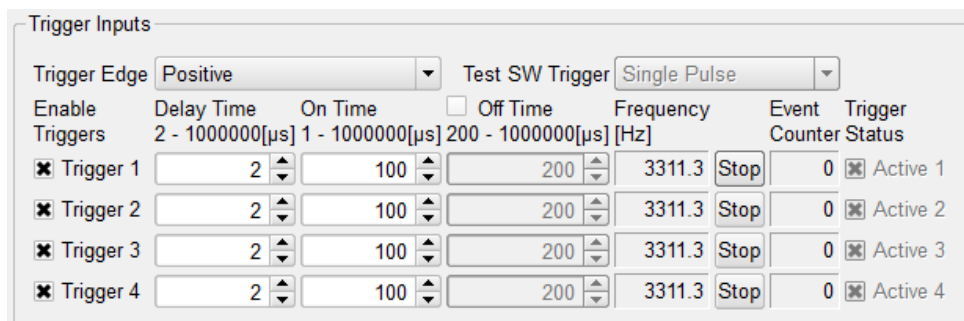
To make *Optimal Autosense* work properly, the value set on *Voltage Output* should be significantly higher than needed. The determined values can then also be applied manually after disabling *Optimal Autosense.*

Caution: Changing the illumination (even with the same type) can show differences in brightness due to tolerances in manufacturing, needing slightly higher voltages to reach a specified current.

7.6. Trigger Input

7.6.1. Setting Trigger Input Parameters

With the trigger parameters, timing and triggering options of LED illuminations are configured.

Figure 26: ScLibClient - Trigger Input Parameters

All parameters have resolution of 1µs:

- *Trigger Edge* – configuration of controller's input trigger edge. If the trigger edge is not the same between camera and strobe controller, asynchronization may occur between them.
- *Delay Time* – time interval between the receipt of a trigger signal and the initiation of an output pulse. Minimal delay time is 2µs and cannot be shorter because there is a minimal response time of the hardware which is a fixed value (hardware latency). Input trigger response jitter is ±0.1µs.
- *On Time* – definition of the impulse length of the input. This is the most important parameter, light head illuminates over this time. Please be careful with On Time parameter. Too high value of On Time can damage the light heads.
- *Off Time* – the time when no trigger is accepted, internal strobing capacitors are recharged.
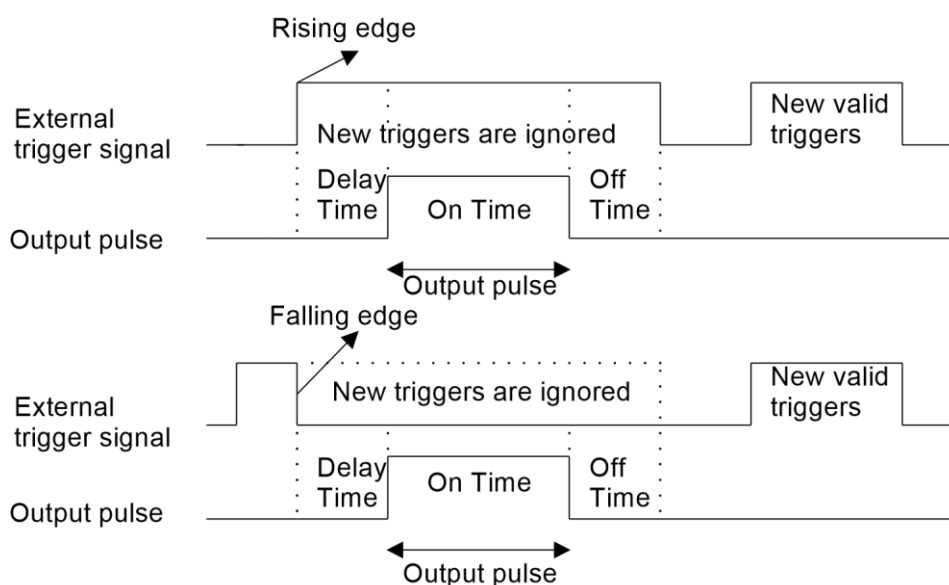- *Trigger 1, 2, 3, 4* – enable or disable trigger.

Figure 27: Process of generating pulses

Trigger Inputs parameters are not used if controller is in Continuous, External Switch or Off mode.

7.7. Lightheads (IPSC-series only)

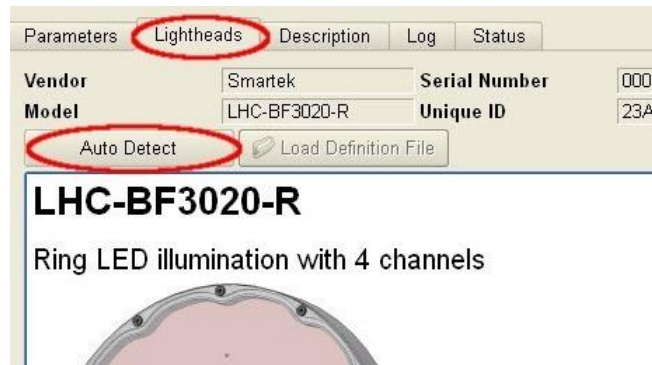To access the light heads options click on the Light heads tab.

Figure 28: ScLibClient - Configure Light head

By using the Auto Detect button additional information is provided about the currently connected light heads. Only the light heads with digital light head signature can provide additional information. Digital light head signature is an optional feature. If digital light head signature exists, Vendor, Model, Serial Number and Unique ID are read out. While connecting custom illumination, be careful with limitations of LEDs. Bad settings can permanently damage the illumination.

7.7.1. Digital EEPROM Light head Signature

Digital EEPROM light head signature or Digital ID (DID) is a feature which is used for protecting the light heads from damaging and provides additional information about the light heads. Currents driven through LEDs exceeding the specifications can damage LEDs. Digital light head signature is stored on the EEPROM of the light head and is accessed through IPSC controller over 1-Wire protocol.
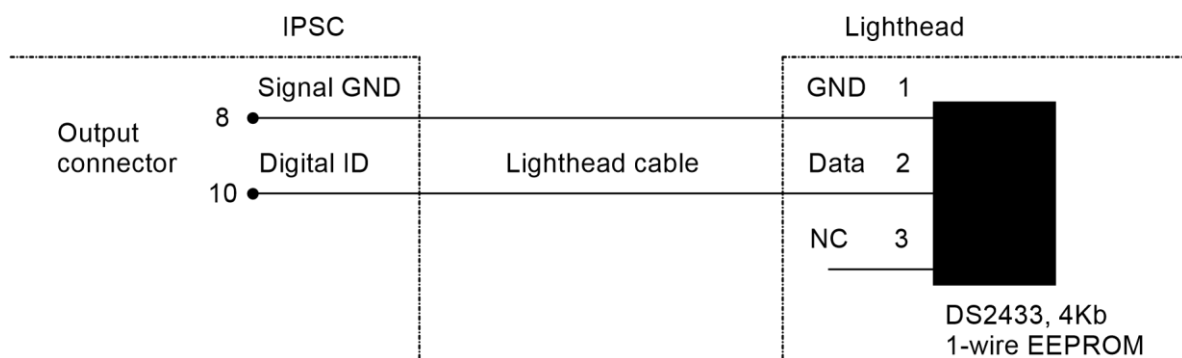

Figure 29: Digital ID Interface for Light head Coding

EEPROM that is supported by the IPSCx series is Dallas, Maxim DS2433 4Kb 1-Wire EEPROM. The light head can be with or without digital light head signature/EEPROM.

Digital light head signature of the lighting device is accessed by pressing the F4 key on keyboard. In the Digital Light head Signature window, additional information is provided about strobe controller and light head.
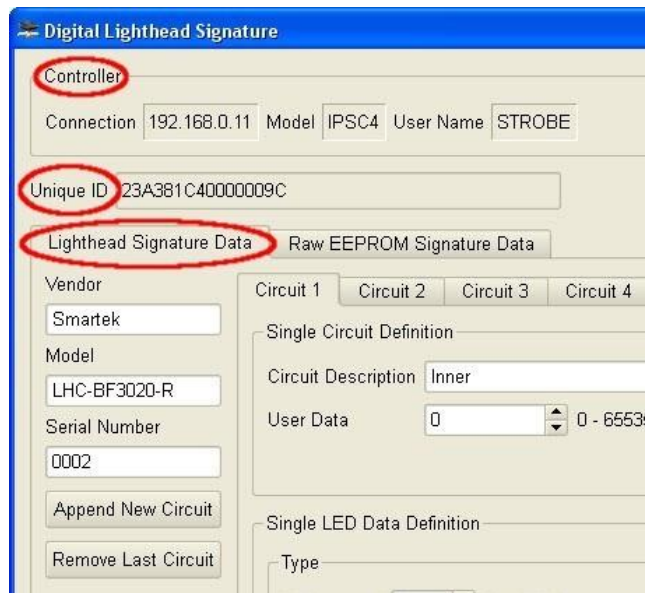
Figure 30: ScLibClient - Light head Information

Controller – these parameters are changed when changing IP address of the strobe controller. These parameters are also read out in the controller status field:
- *Connection* – IP address of the strobe controller
- *Model* – model of the strobe controller
- *User Name* – name that's given when changing IP address of the strobe controller or a default name
- *Unique ID* – unique ID of the light head

Unique ID – unique ID of the light head

Light head Signature Data – these parameters are changed when writing new digital signature. These parameters are also read out in the *Light heads* tab:
- *Vendor* – vendor of the light head
- *Model* – model of the light head
- *Serial Number* – serial number of the light head

7.7.1.1. Circuits

A new circuit is added by selecting the Append New Circuit (1) button. Parameters for circuits are defined under Circuit tab. To save current parameters click Save File (2) button. To update signature in EEPROM with current parameters click on Write EEPROM (3) button. To see current parameters in raw hex format go to Raw EEPROM Signature Data (4) tab.
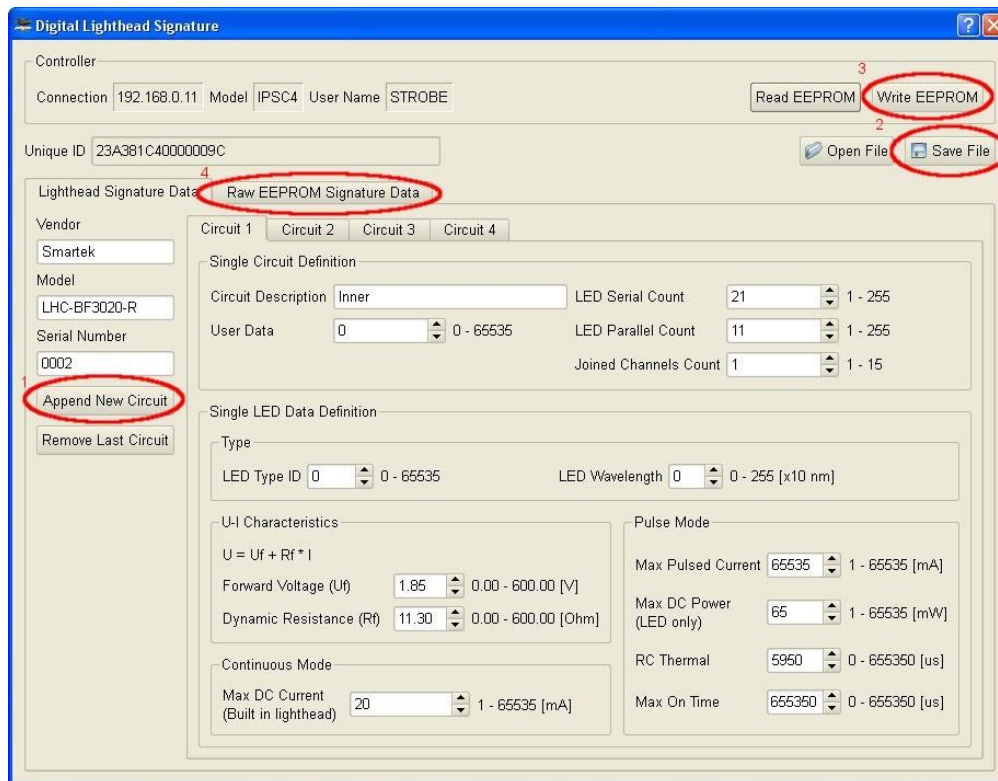
Single Circuit Definition defines parameter for single circuit:
   • *Circuit Description* – defines the name of circuit.
   • *User Data* – circuit user data.
   • *LED Serial Count* – number of LEDs connected in series.
   • *LED Parallel Count* – number of LEDs connected in parallel.
   • *Joined Channels Count* – number of connected channels in custom illumination.

Single LED Data Definition section defines parameters for the single LED:
   • *LED Type ID* – user configurable, with a value between 0 – 66535
   • *LED Wavelength* – wavelength of the LED determines the color of the LED, with a value between 0 – 255[x10nm]
   • *Forward Voltage (Uf)* – maximum forwarded voltage on a LED, with a value between 0.00 – 600.00[V]. This value should be read out from the specifications of the LED
   • *Dynamic Resistance (Rf)* – LEDs electrical resistance when it is in operation, with a value between 0.00 – 600.00[Ohm]. This value should be read out from the specifications of the LED
   • *Max DC Current (Built in light head)* – maximal allowable current trough LED when built in light head with a value between 1 – 65535[mA]
   • *Max Pulsed Current* – maximal allowable current trough LED when the device is in pulse mode, with a value between 1 – 65535 [mA]
   • *Max DC Power (LED only)* – maximal DC power which can run through single LED, with a value between 0 – 65535[mW]. This value should be read out from the specifications of the LED
   • *RC Thermal* – time constant obtained by multiplication of thermal capacity and thermal resistance, with a value between 0 – 655350[us]. This value is obtained from the LED datasheet
   • *Max On Time* – maximum value for On Time when in the pulse controlled mode, with a value between 0 – 655350[us]

7.7.1.2. User custom LED light head connection diagram

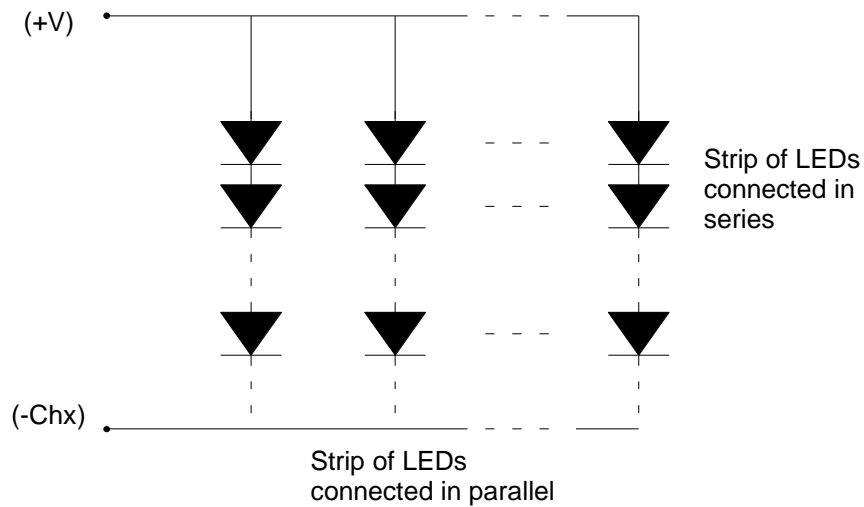The figure below is an example how the LEDs can be connected on one channel.

Figure 31: Parallel and serial LED connections

7.7.1.3. ID Check Mode and Analog ID

IPSC1, IPSC2 and IPSC4 with firmware version 1.2 and up provide optional features. ID Check Mode is used to preform checking of Digital ID and Analog ID. To change setting for ID Check Mode, please contact our sales partner or Smartek support.
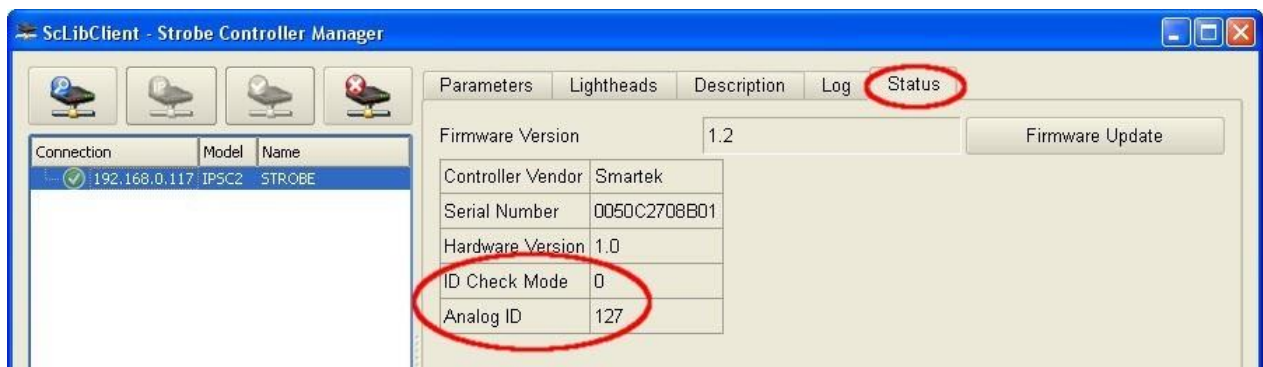
ID Check Mode – gives information for ID Check Mode setting:
- *0* – IPSC does not perform any checking
- *1* – IPSC checks for AID at startup
- *2 and 3* – IPSC checks for AID continuously all the time
- *4* – IPSC checks for DID at startup
- *5* – IPSC checks for DID and AID at startup
- *6 and 7* – IPSC checks for DID at startup and AID continuously all the time

Analog ID is optional feature to check if light head is connected to IPSC. Pins 7 and 8 on IPSC output are connected with 1K resistor.
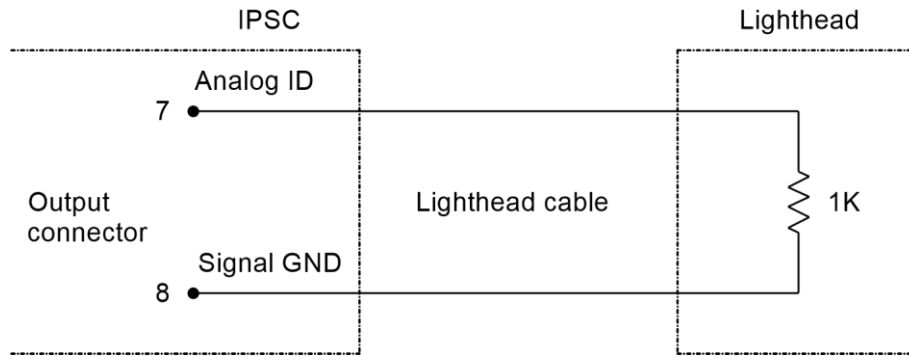
Figure 32: Analog ID interface

Analog ID – reads status of AID for light head:
- *128 ± 8* – Light head is not connected
- *97 ± 8* – Light head is connected
- *68 ± 8* – AID output is connected to GND

7.8. Firmware update

Firmware update is done via Ethernet, in order to update the firmware, the IP address of controller has to be permanent not in DHCP mode (see 6.2.2 Connecting ScLibClient with the strobe controller how to set permanent IP address on controller), and controller needs to be in Off mode (see 7.3.1. Off mode).To update the firmware follow these steps:
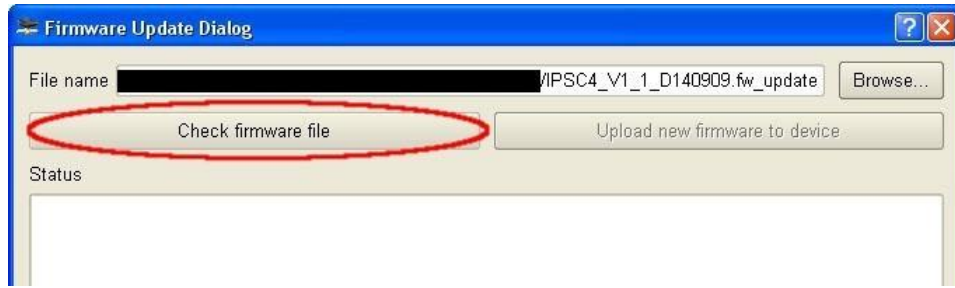
Go to *Status* tab and press *Firmware Update* button.

Click on the *Browse* button to select a firmware to install.

Find and open a firmware to install. After opening a firmware, click on the *Check firmware file* button to run a compatibility test between the device and firmware.

If the selected firmware is compatible, "PASSED" is indicated in text window and *Upload new firmware* to device button will become available. Click on *Upload new firmware to device* button to start updating the firmware.
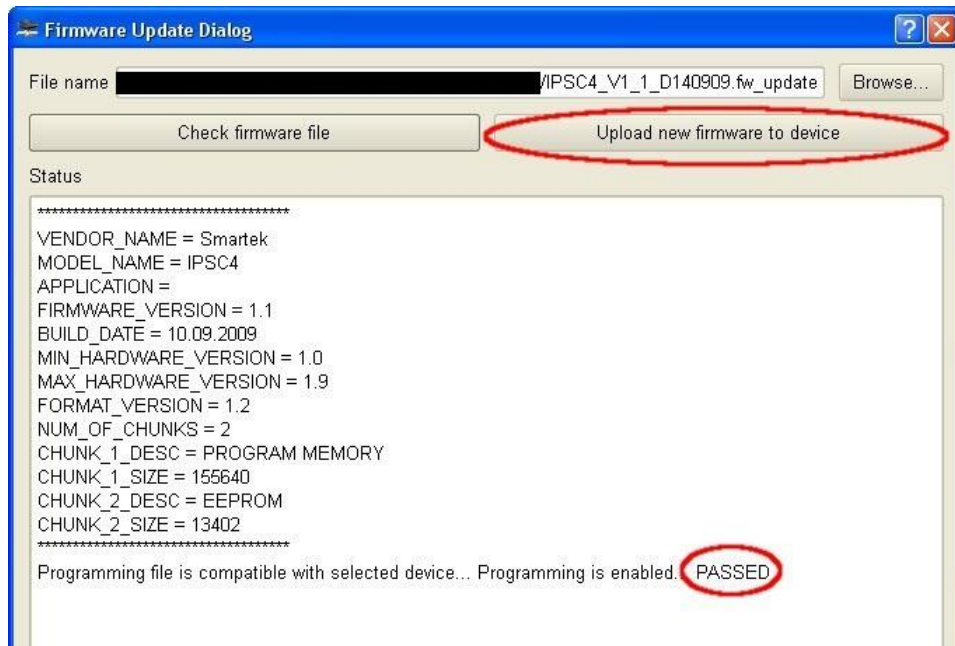
During this process, POWER (green) LED and STROBE (yellow) LED are solid on, while the FAULT (red) LED is blinking. After programming is done, "PASSED" is indicated in text window. This process can take a couple of minutes. When updating of new firmware finishes, simply close the dialog box.
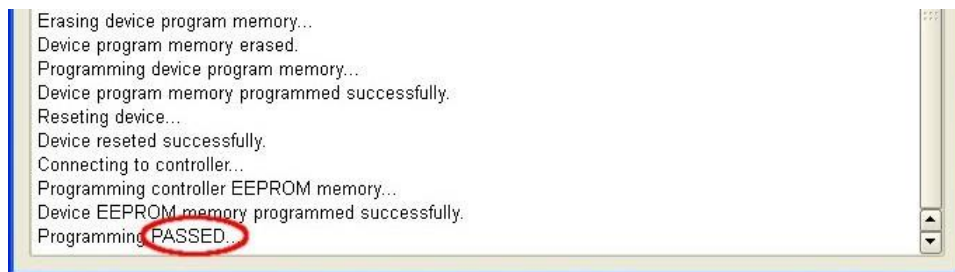
7.9. Other features

7.9.1. Description Tab

Go to Description tab to see major features, specifications and maximum ratings of controller that is connected to *ScLibClient*.

7.9.2. Log Tab

To see actual logging information go to *Log* tab. To save actual log, just click *Save to File* button and save it on disk.
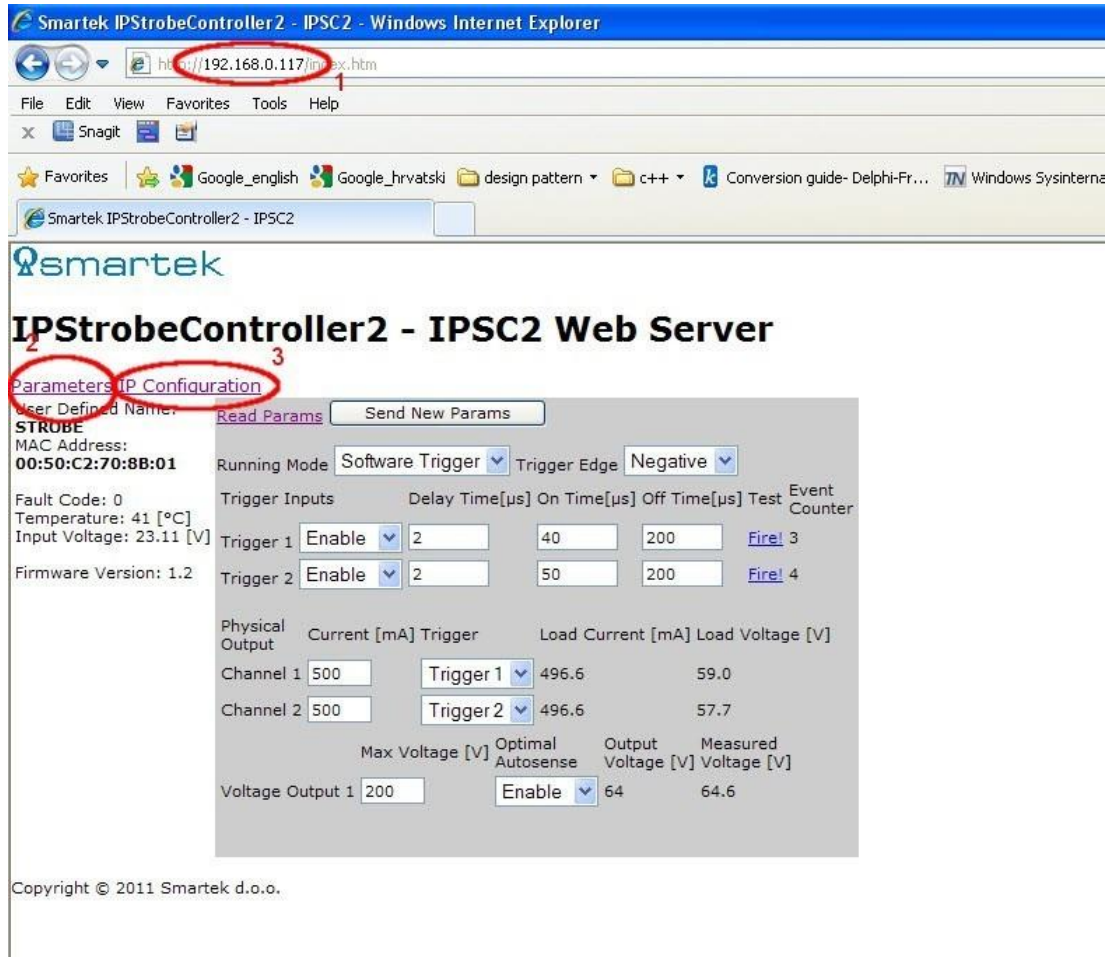

7.9.3. Status Tab

To see actual status information about controller go to *Status* tab.

8. Web Server

IPSC strobe controllers are accessible through web interface. To gain access just enter IP address (1) of IPSC in web browser. Use Web Server to read and send parameters to device (2), or use it to change IP address of controller (3).

9. Declarations of Conformity

9.1. CE

Manufacturer: Smartek d.o.o.
Dobrise Cesarica 5
HR-40000 Cakovec
Croatia

$C\!\!E$

Product: LED Strobe Controller
Type Family: Internet Protocol Strobe Controller (IPSC),
High Power Strobe Controller (HPSC)

Type of Equipment: IPSC1, IPSC2, IPSC4, IPSC4r2, HPSC1

This equipment is in compliance with the essential requirements and other relevant provisions of the following EC directives:

Reference No.   Title:

89/336/EEC, 92/31/EEC   Electromagnetic Compatibility (EMC directive)

Following standards or normative documents:

EN 55022:1994 Class A + A1:1995 + A2:1997,

EN 61326:1997 Class A + A1:1998 + A2:2001 + A3:2003,

EN 55024:1998 + A1:2001 + A2:2003

The equipment specified above was tested conforming to the applicable Rules under the most accurate measurement standards possible, and that all the necessary steps have been taken and are in force to assure that production units of the same product will continue comply with the requirements.

Damir Dolar
Technical Director
Smartek d.o.o.

9.2. FCC

Manufacturer: Smartek d.o.o.
Dobrise Cesarica 5
HR-40000 Cakovec
Croatia

Product: LED Strobe Controller

Type Family: Internet Protocol Strobe Controller (IPSC),
High Power Strobe Controller (HPSC)

Type of Equipment: IPSC1, IPSC2, IPSC4, IPSC4r2, HPSC1

Directive: **FCC Part 15, Class A**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules

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Damir Dolar
Technical Director
Smartek d.o.o.

9.3. RoHS

Manufacturer: Smartek d.o.o.
         Dobrise Cesarica 5
         HR-40000 Cakovec
         Croatia

Product: LED Strobe Controller

Type Family: Internet Protocol Strobe Controller (IPSC),
         High Power Strobe Controller (HPSC)

Type of Equipment: IPSC1, IPSC2, IPSC4, IPSC4r2, HPSC1

This equipment is in compliance with the essential requirements and other relevant provisions of the following RoHS Directive 2002/95/CE.

This equipment is in compliance with the essential requirements and other relevant provisions of the following RoHS Directive 2002/95/CE.

Damir Dolar
Technical Director
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10.   Contact Information

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