smartek
vision

User Manual

LED Strobe Controller Family

IPSC1
IPSC2
IPSC4
HPSC1
HPSC2
HPSC4

Version 2.2.1

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Table of Contents

1. Overview

1.1. 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 short exposure time on camera are used for acquiring clear images of fast moving objects. User adjustable output voltage provides high efficiency and low power consumption.

The IPSC and HPSC strobe controllers provide repeatable intensity control of LED lighting, they include the power supply, intensity control, timing and triggering functions required for machine vision systems. LED lighting needs a constant current supply, as small variation in voltage can cause large variations in light output.

1.2. 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 these devices only with the type of power source that meets the specifications indicated on the Strobe Controller and within the documentation. Operating it outside of the specifications can cause 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.

1.3. Cabling Recommendation

All our strobe controllers are designed to operate with a large variety of LED illuminations and light heads. Even if one of our focuses is the maximum performance at every setup, the laws of physics limit the performance when operating a wide range of illuminations with inadequate cabling quality. The result can be bad signal shape, long signal rise times and oscillation.

Therefore, it is recommended to follow some general rules for cable selection:
- Select cables as short as possible, no longer than 3m
- Use high cable grades
- Respect appropriate wire cross sections depending on the current
- Shielded twisted pair cables can further improve the signal

For longer cable lengths, it is further recommended to raise the voltage of the illumination. This can be realized by using series LED arrays requiring higher voltage together with a device from our IPSC series, providing up to 200V on output.

1.4. Family models

	IPSC1	IPSC2	IPSC4	HPSC1	HPSC1 v2	HPSC2	HPSC4
Output channels	1	2	4	1	1	2	4
Asynchronous Operation	-	No		-	Yes		
Control interface	Ethernet		Ethernet and RS-232	Ethernet, RS-232* or USB2.0*			
Output voltage (pulsed)	5V – 200V			5V – 48V			
Output voltage (Cont.)	5V – 55V		5V – 55V	5V – 30V	5V – 48V		
Max current pulse (per channel)	20A @ 200V	10A @ 200V		40A @ 48V			
Max continuous current (per channel)	2A @ 30V	1A @ 30V		5A @ 24V	4A @ 24V		
Power supply	12V – 24V DC			12V – 24V DC			
Trigger inputs	1	2	4	1	1	2	4
External dimensions (H / W / L) [mm]	39 x 88 x 103		55 x 130 x 124	39 x 88 x 103			45 x 130 x 124
Weight (approx.)	285g		715g	270g	285g	297g	635g

Table 1: Family models

*for HPSC1 v2, HPSC2 and HPSC4 on request

2. HPSC-Series

2.1. Mechanical and Electrical Specifications

Specification	HPSC1	HPSC1 v2	HPSC2	HPSC4
Output channels	1	1	2	4
Asynchronous Operation	-	-	Full timing independent channels	
Operating Modes	Continuous, External Trigger, Internal Trigger, Software Trigger, External Switch			
Max. Voltage	48V (pulsed/continuous)			
Max Current	40A @ 48V (per channel) up to 160A @ 48V (in total)			
Current Resolution	down to 1mA			
Max. continuous current	4A @ 24V (without heat sink, max. 25°C ambient) 5A @ 24V (with heat sink)	4A @ 24V (per channel) up to 5A @ 24V (in total)		
Pulse output range	1µs – 1000ms, 1µs resolution	1µs – 60s, 1µs resolution		
Maximum frequency (External Trigger)	4,9kHz	50kHz		
Maximum frequency (Internal Trigger Generator, External Switch Mode)	997Hz	25kHz		
Trigger input	Opto-isolated, HIGH at 3V – 24V; positive or negative edge			
Trigger output	Open-collector, max. 30V / 50mA	Opto-isolated, max. 30V / 50mA		
Control	Ethernet (10Base-T), RS-232 or USB1.x/2.0	Ethernet (10Base-T/100Base-TX) RS-232 or USB1.x/2.0 on request		
Input Power requirements	12V – 24V DC (min 11V, max 26V) at max. 6.5A			
Power consumption	Max. 150W (depending on load)			
Housing	Black anodized aluminum case			
External dimensions (H / W / L)	39 x 88 x 103 [mm]	39 x 88 x 103 [mm]	39 x 88 x 103 [mm]	45 x 130 x 124 [mm]
Weight (approx.)	270g	285g	297g	635g
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			
Relative humidity	From 25% up to 80% (non-condensing)			
Conformity	CE, FCC, RoHS2			

Table 2: HPSC1, HPSC1 v2, HPSC2 and HPSC4 - Mechanical and electrical specifications

2.2. Value Ranges and Precision

To raise the current precision at lower levels, the current control is split into three ranges. The following chapters describe the precision of different attributes over the set output current per channel.

2.2.1.   Accuracy over Current Range (HPSC1 v2, HPSC2, HPSC4)

Based on the applied current level, the resolution is adjusted as shown in Table 3.

Running Mode	Range	Min. [mA]	Max. [mA]	Resolution [mA]	Accuracy*	
					Set	Measure
Continuous / External Switch	Range1	1	500	1	1%	2%
	Range2	501	2500	2	1%	2%
	Range3	2501	4000	11	1%	2%
Trigger Modes (External, Internal, Software)	Range1	10	700	1	2%	4%
	Range2	701	7000	2	2%	4%
	Range3	7001	40000	11	2%	4%

*The accuracy is defined as % of the full range

Table 3: HPSC1 v2, HPSC2 and HPSC4 resolution over current range

2.2.2.   Minimum Delay Time (HPSC1 v2, HPSC2, HPSC4)

The minimum delay time from trigger to output signal depends on the set output current. Minimal delay time rises with number of enabled channels and with decreasing of output current. The specified minimum (*Min.*) delay is reached at the specified maximum current for the appropriate range, while the longest (*Max.*) delay is effective at the lowest current in that range.

Table 4 below shows the corresponding values, the ranges are the same as in chapter 2.2.1. The relation between current and min/max delay time is decreasing exponential function. Minimal delay times are shown for maximum numbers of enabled channels on specific device and for less enabled channels, these times are lower. In *External Trigger*, these times are bigger.

Attribute	Device	Range	Min. [µs]	Max. [µs]	Resolution [µs]
Delay Time	HPSC1 v2	-	2	60000000	1
Minimal Delay Time		Range1 (700mA down to 10mA)	2	12	1

		Range2 (7000mA down to 701mA)	**2**	**4**	1
		Range3 (40A down to 7001mA)	**2**	**3**	1
Delay Time	HPSC2	-	2	60000000	1
Minimal Delay Time		Range1 (700mA down to 10mA)	**3**	**13**	1
		Range2 (7000mA down to 701mA)	**3**	**5**	1
		Range3 (40A down to 7001mA)	**3**	**4**	1
Delay Time	HPSC4	-	3	60000000	1
Minimal Delay Time		Range1 (700mA down to 10mA)	**5**	**15**	1
		Range2 (7000mA down to 701mA)	**5**	**6**	1
		Range3 (40A down to 7001mA)	**5**	**6**	1

Table 4: Minimum delay time for HPSC1 v2, HPSC2 and HPSC4

2.3. Physical Interfaces

Configuration
Ethernet (shown)
USB2.0
RS-232

Trigger Input
Opto-isolated

Power Input
External power supply,
12 - 24V, max. 150W

Trigger Output
Open-collector,
max. 30V / 50mA,
Opto-isolated (except HPSC1)

LED Power Ouput
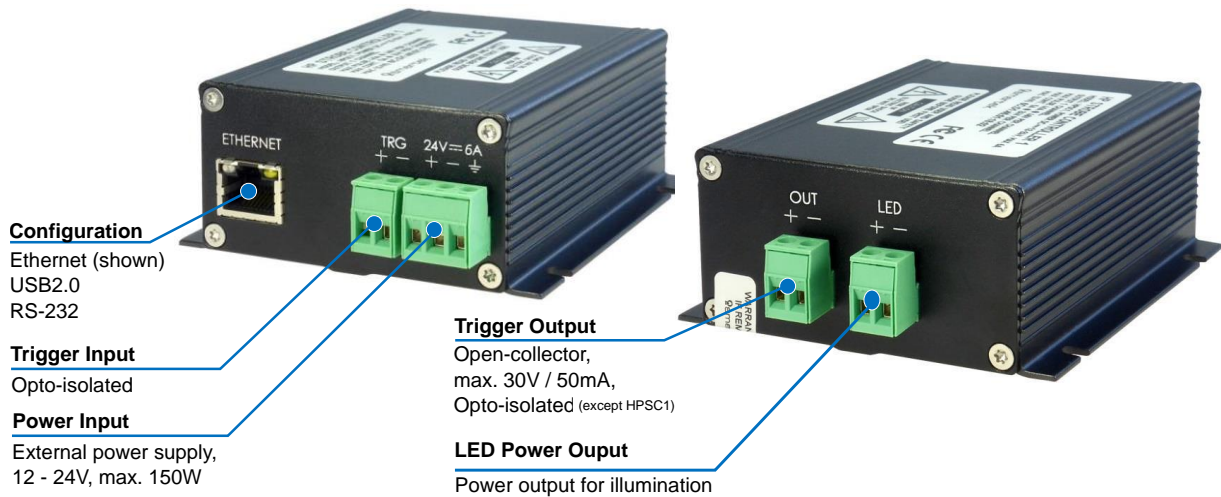Power output for illumination

Figure 1: Physical Interfaces shown for example on HPSC1

2.3.1. Power Input

The *Power Input* connector, as shown in Figure 1, 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 2.1 - Mechanical and Electrical Specifications*).
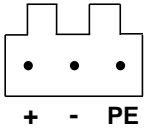
Pin#	Description
Type	Phoenix Contact MSTB 2,5/ 3-ST-5,08 **+ - PE**
+	Power Supply (+12 to 24V DC)
-	Power GND
PE	Protective Earth

Table 5: Power connector description HPSC-Series

2.3.2. Trigger Inputs

To physically trigger the strobe controllers by an external synchronization source, each device provides a count of input trigger lines (TRG), by a connector described in Table 6.
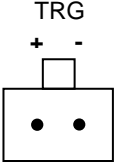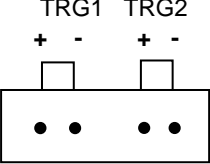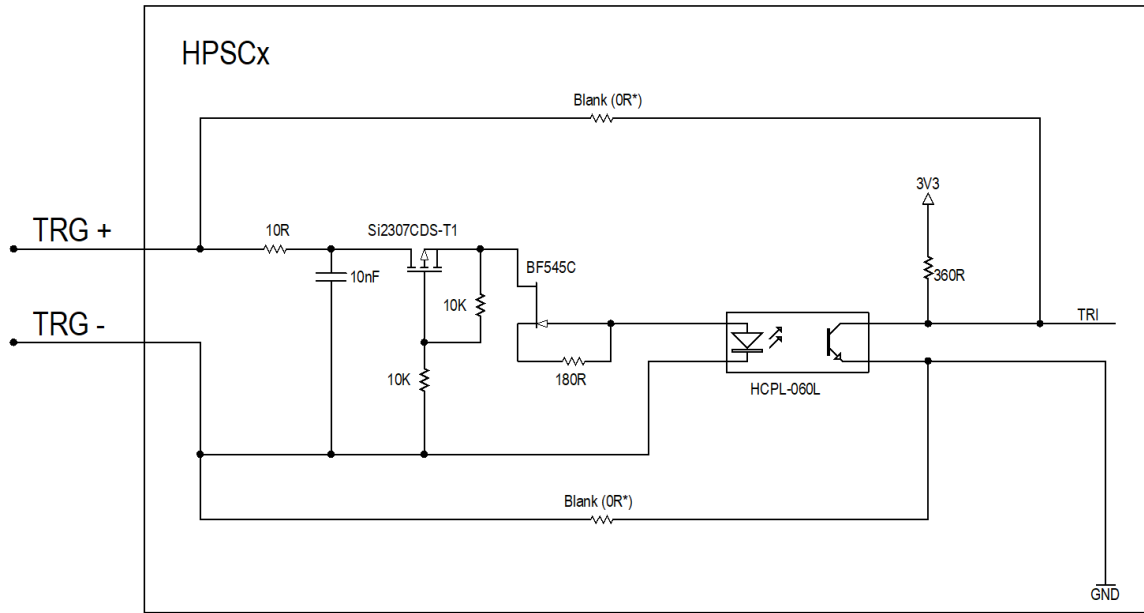
Pin#	HPSC1	HPSC1 v2	HPSC2	HPSC4
Connector Type	Phoenix Contact MSTB 2,5/ 2-ST-5,08 TRG **+ -**		Phoenix Contact MSTB 2,5/ 4-ST-5,08 TRG1 TRG2 **+ - + -**	Phoenix Contact MSTB 2,5/ 8-ST-5,08 TRG1 TRG2 TRG3 TRG4 **+ - + - + - + -**
TRG+	Trigger Channel n +			
TRG -	Trigger Channel n -			

Table 6: Trigger input connector description HPSC-Series

The electrical ratings, operation limits as well as the device internal circuitry are described in Table 7 and Figure 2 below.

Operating Limits	Voltage
Recommended operation voltage	+0 to +24 VDC
HIGH / Logical 1	> +3 VDC
LOW / Logical 0	+0 to +1,4 VDC
Undefined State	> +1,4 to +3 VDC
Absolute maximum	+30 VDC
The current draw for each input line is 6 to 10 mA.	

Table 7: HPSC-Series - Electrical Specification - Trigger Input(s)

Figure 2: Internal input trigger scheme for HPSC-Series

2.3.3. LED Output

The *LED* connectors, as shown in Figure 1 and described in Table 8, provide the power output (*LED*) for the illumination to be driven by the controller. Scheme is shown in Figure 3.

Pin#	HPSC1	HPSC1 v2	HPSC2	HPSC4
Connector Type		Phoenix Contact MSTB 2,5/ 2-ST-5,08 LED + -	Phoenix Contact MSTB 2,5/ 4-ST-5,08 OUT1 OUT2 LED1 LED2 + - + - + - + -	Phoenix Contact MSTB 2,5/ 8-ST-5,08 LED1 LED2 LED3 LED4 + - + - + - + -
LED+	LED Power Output n + (common for all channels)			
LED -	LED Power Output n -			

Table 8: Illumination Output (LED) connector description HPSC-Series
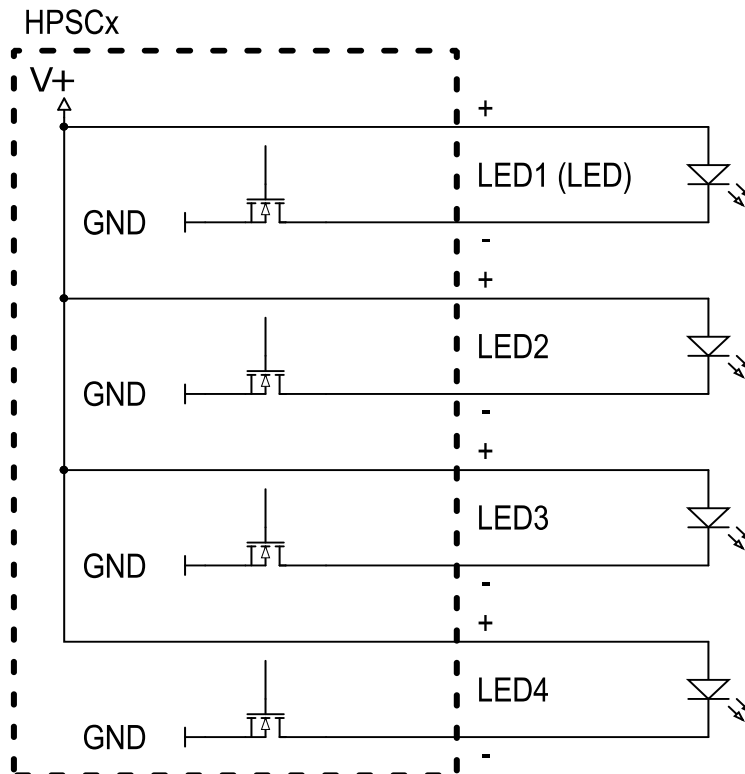

Figure 3: Connecting scheme for LED output

2.3.4. Trigger Output

Every controller provides a generic trigger output (*OUT*) for synchronization of other devices. The connector assignment is described in Table 9.

Pin#	HPSC1	HPSC1 v2	HPSC2	HPSC4
Connector Type	Phoenix Contact MSTB 2,5/ 2-ST-5,08 OUT + -		Phoenix Contact MSTB 2,5/ 4-ST-5,08 OUT1 OUT2 LED1 LED2 + - + - + - + -	Phoenix Contact MSTB 2,5/ 8-ST-5,08 OUT1 OUT2 OUT3 OUT4 + - + - + - + -
OUT+	Trigger Output n +			
OUT-	Trigger Output n -			

Table 9: Tigger Output (OUT) connector description HPSC-Series

The limits of each line are shown in Table 10, the internal circuitry of the HPSC1 in Figure 4 and for HPSC1 v2, HPSC2 and HPSC4 in Figure 5.

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

Table 10: HPSC-Series – Trigger Output (OUT) maximum ratings
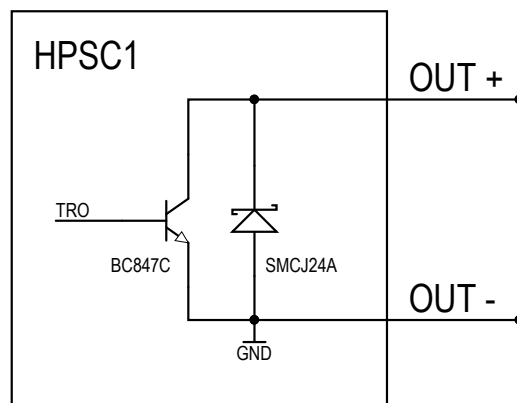
Figure 4: HPSC1 – Trigger Output (OUT) – Schematics

HPSC1v2, HPSC2, HPSC4

Blank (0R*)

TRO   330R

GND   ACPL-217

BC847C

560R

Blank (0R*)

OUT +

OUT -
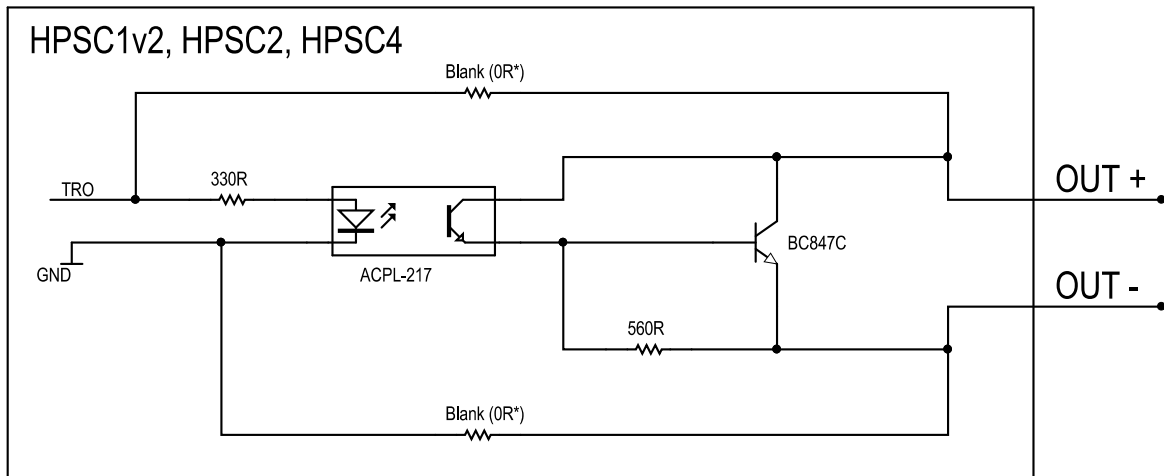
*on request, direct path for faster trigger output

Figure 5: HPSC1 v2, HPSC2, HPSC4 – Trigger Output (OUT) – Schematics
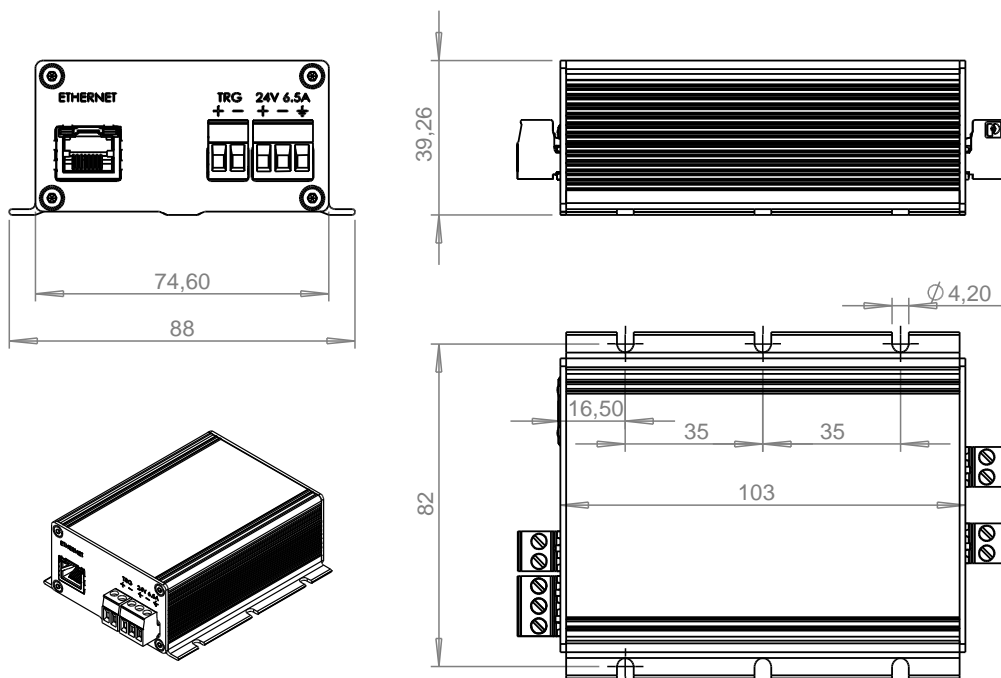
2.4. Mechanical Drawings

2.4.1. Dimensions of HPSC1

Figure 6: Dimensions of HPSC1 in mm
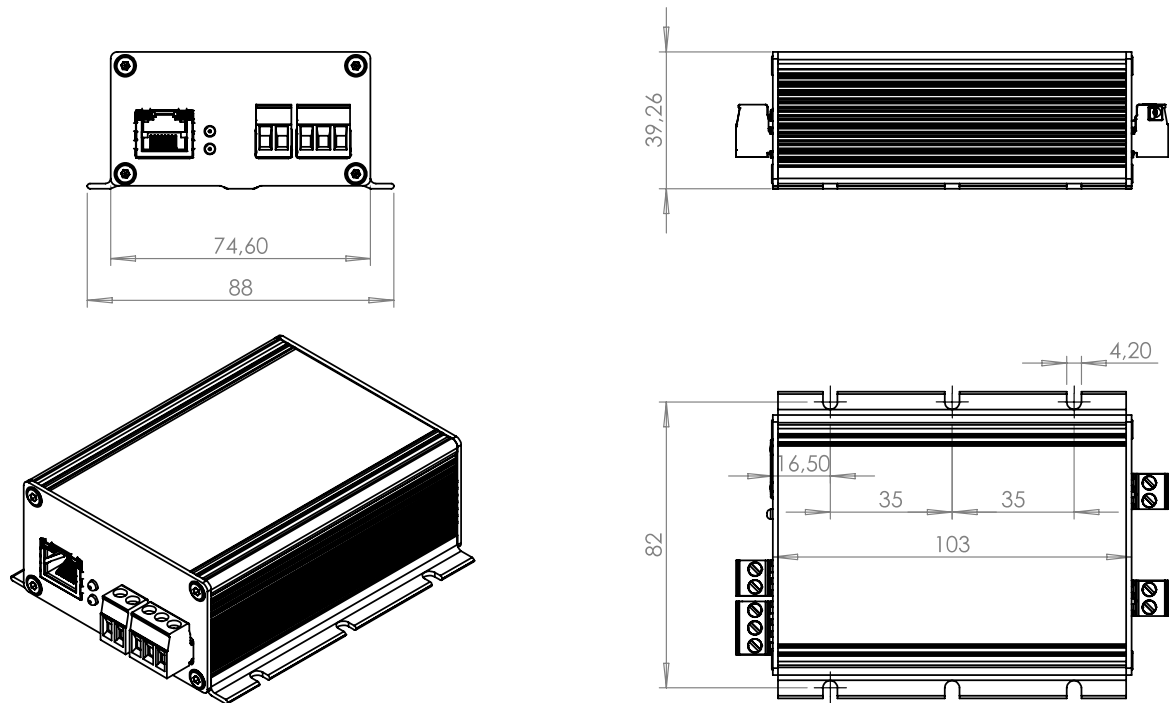
2.4.2.   Dimensions of HPSC1 v2

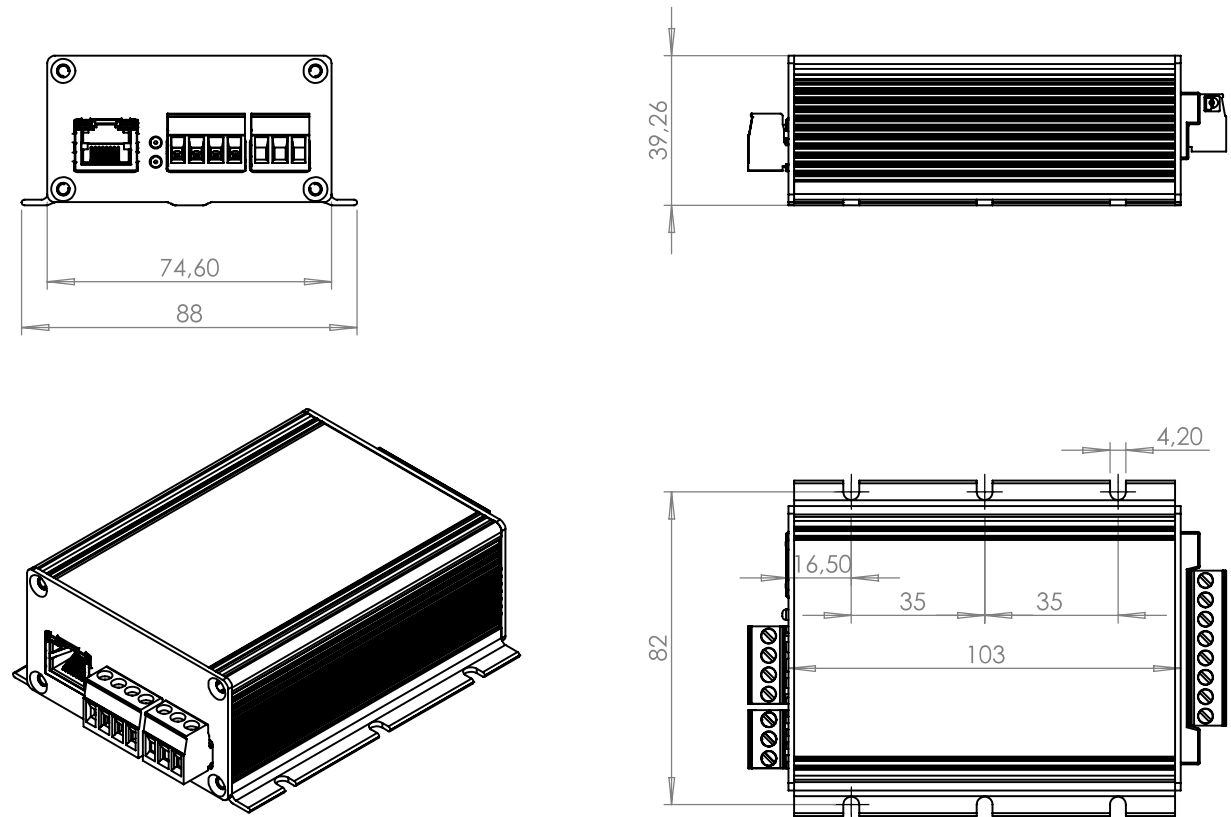*Figure 7: Dimensions of HPSC1 v2 in mm*

2.4.3. Dimensions of HPSC2

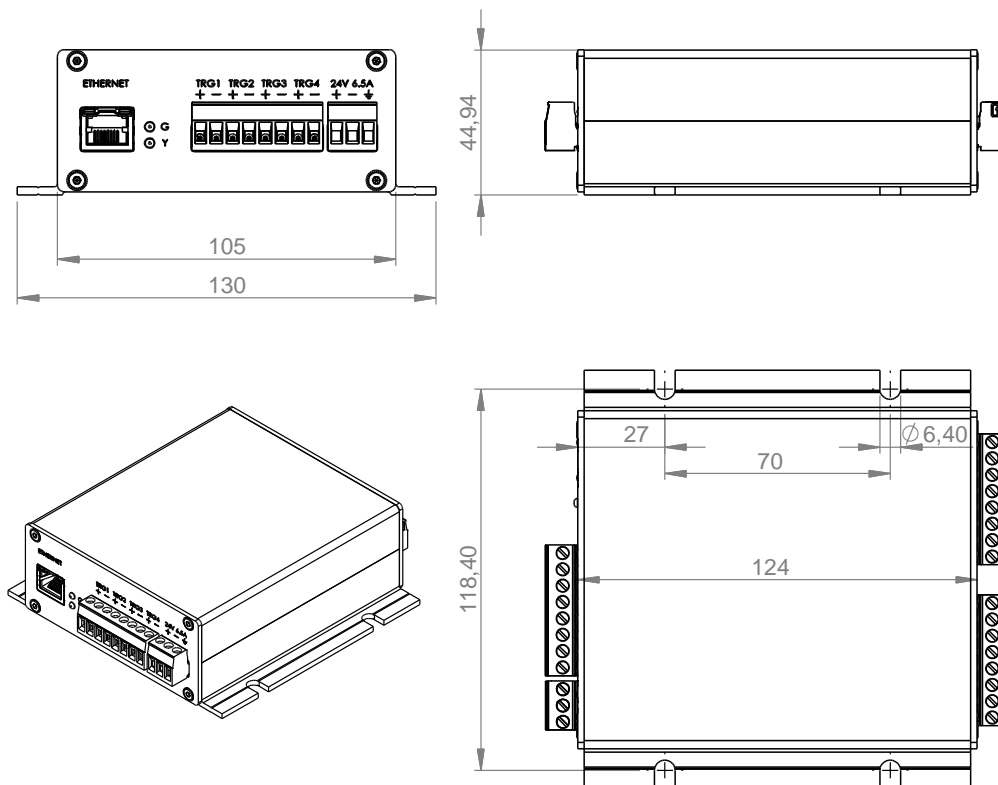*Figure 8: Dimensions of HPSC2 in mm*

2.4.4. Dimensions of HPSC4

Figure 9: Dimensions of HPSC4 in mm

3. IPSC-Series

3.1. IPSC1

Figure 10: IPSC1 – Front panel view

Specification	IPSC1
Output channels	1
Operating Modes	Continuous, External Trigger, Internal Trigger, Software Trigger, External Switch
Max. Voltage	200V (pulsed) 55V (continuous)
Max. current pulse (depending on pulse width)	20A @ 200V
Max. continuous current	2A @ 30V
Pulse output range	1µs – 1000ms in 1µs steps
Maximum frequency (External Trigger)	4,9kHz
Maximum frequency (Internal Trigger Generator, External Switch Mode)	997Hz
Trigger input	0 – 5V or 0 – 24V level, positive or negative edge (not opto-isolated)
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 additional heat sink
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
Conformity	CE, RoHS2

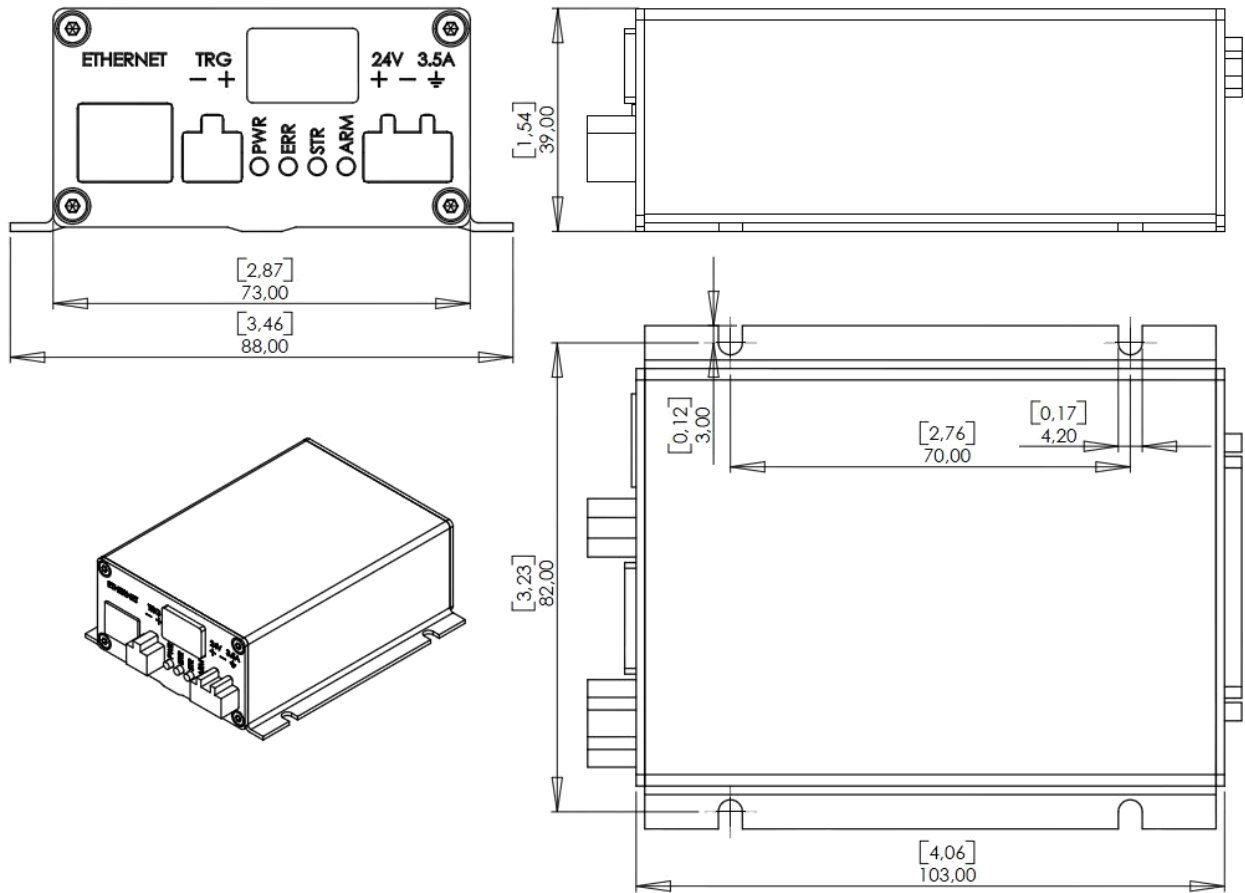*Table 11: IPSC1 - Specification*

3.1.1. Dimensions

Figure 11: Dimensions of IPSC1 in mm and [inch]

3.2. IPSC2

Figure 12: IPSC2 – Front panel view

Specification	IPSC2
Output channels	2
Asynchronous Operation	No timing independent channels
Operating Modes	Continuous, External Trigger, Internal Trigger, Software Trigger, External Switch
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)
Maximum frequency (External Trigger)	4,9kHz
Maximum frequency (Internal Trigger Generator, External Switch Mode)	997Hz
Pulse output range	1µs – 1000ms in 1µs steps
Trigger input	0 – 5V or 0 – 24V level, positive or negative edge (not opto-isolated)
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 additional heat sink
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
Conformity	CE, RoHS2

Table 12: IPSC2 - Specification
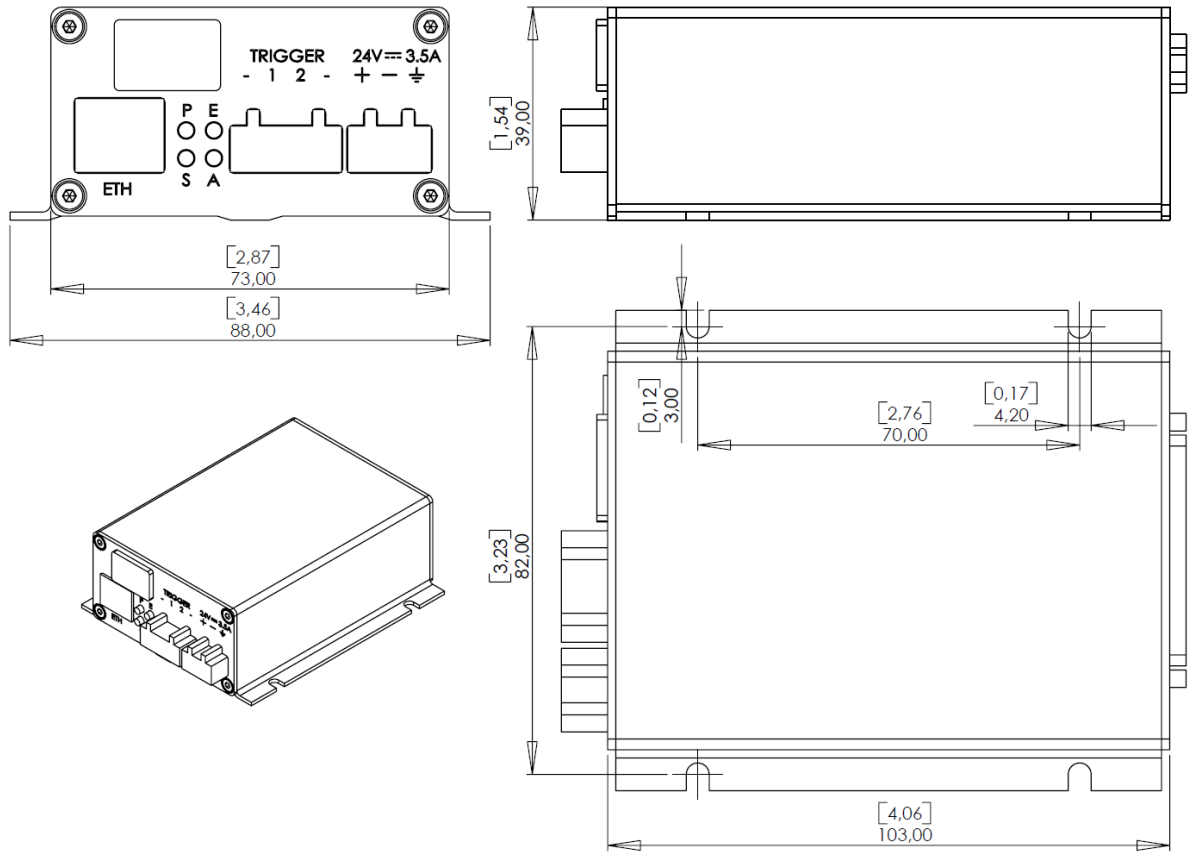
3.2.1. Dimensions

Figure 13: Dimensions of IPSC2 in mm and [inch]

3.3. IPSC4

Figure 14: IPSC4 – Front panel view

Specification	IPSC4
Output channels	4
Asynchronous Operation	No timing independent channels
Operating Modes	Continuous, External Trigger, Internal Trigger, Software Trigger, External Switch
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 – 1000ms in 1µs steps
Maximum frequency (External Trigger)	4,9kHz
Maximum frequency (Internal Trigger Generator, External Switch Mode)	997Hz
Trigger input	0 – 5V or 0 – 24V level, positive or negative edge (not opto-isolated)
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 additional heat sink
Housing:	Black aluminum case
External dimensions (H / W / L)	55 x 130 x 124 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
Conformity	CE, RoHS2

Table 13: IPSC4 - Specification
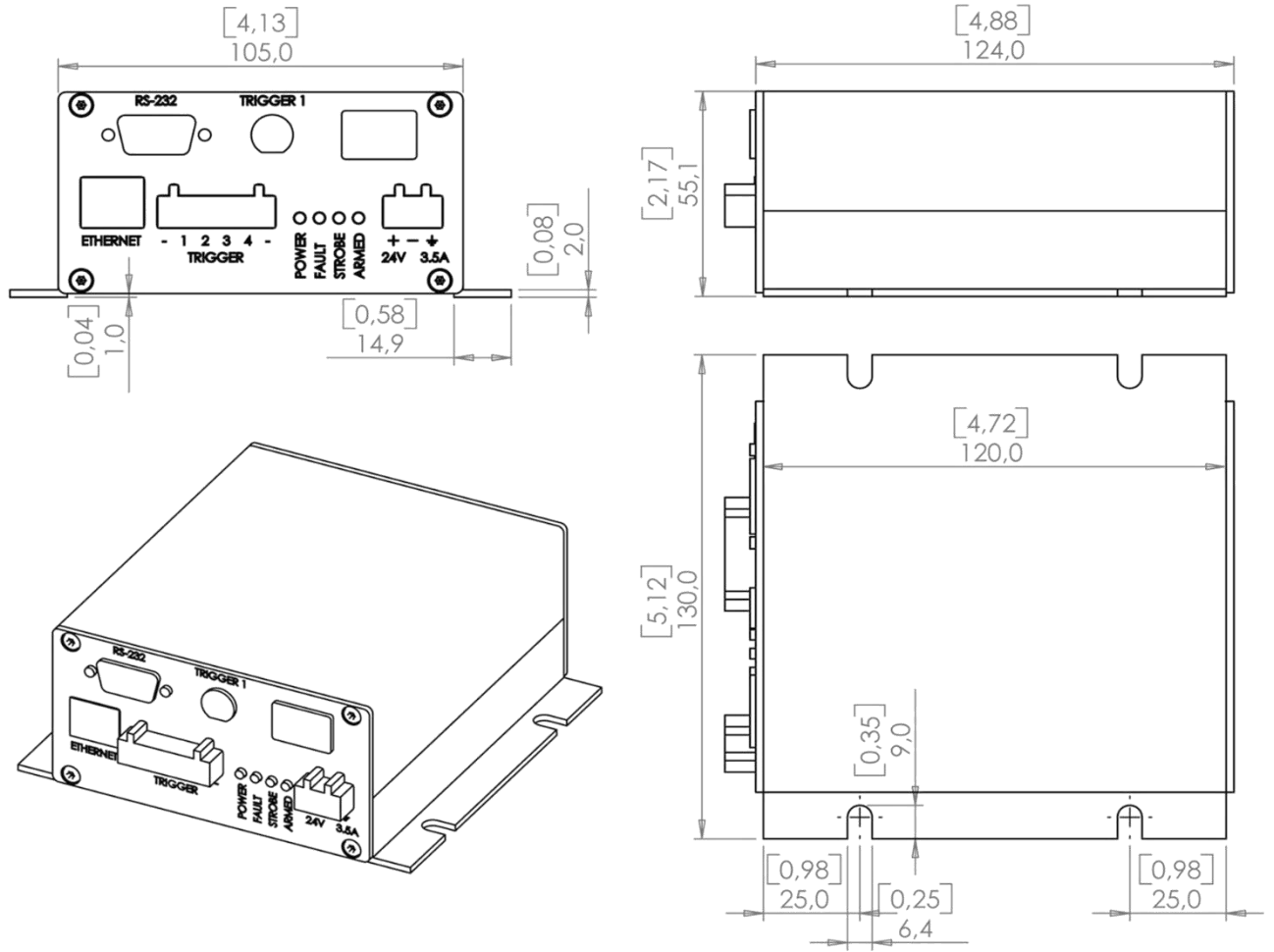
3.3.1. Dimensions

Figure 15: Dimensions of IPSC4 in mm and [inch]

3.4. Physical Interfaces

3.4.1. 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 C*hapter 3.*
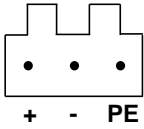
Pin No.	Description
Type	Phoenix Contact MSTB 2,5/ 3-ST-5,08 **+** **-** **PE**
+	Power Supply (+12 to 24V DC)
-	Power GND
PE	Protective Earth

Table 14: Power connector description IPSC-Series

3.4.2. Output Connector

Figure 16: IPSC1/2/4 – Rear panel view with output connector
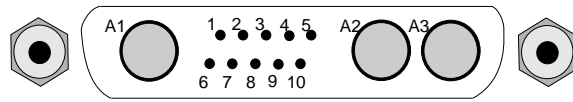
Pin#	IPSC1	IPSC2	IPSC4
Type	Deltron DT13W3		
1	CH1-, Channel 1 -	CH1-, Channel 1 -	CH1-, Channel 1 -
2	*Not assigned*	CH2-, Channel 2 -	CH2-, Channel 2 -
3		*Not assigned*	CH3-, Channel 3 -
4			CH4-, Channel 4 -
5			*Not assigned*
6			
7	Analog ID		
8	Signal GND (GND for signals 7,9,10)		
9	Trigger Output 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 15: Output connector description IPSC-Series

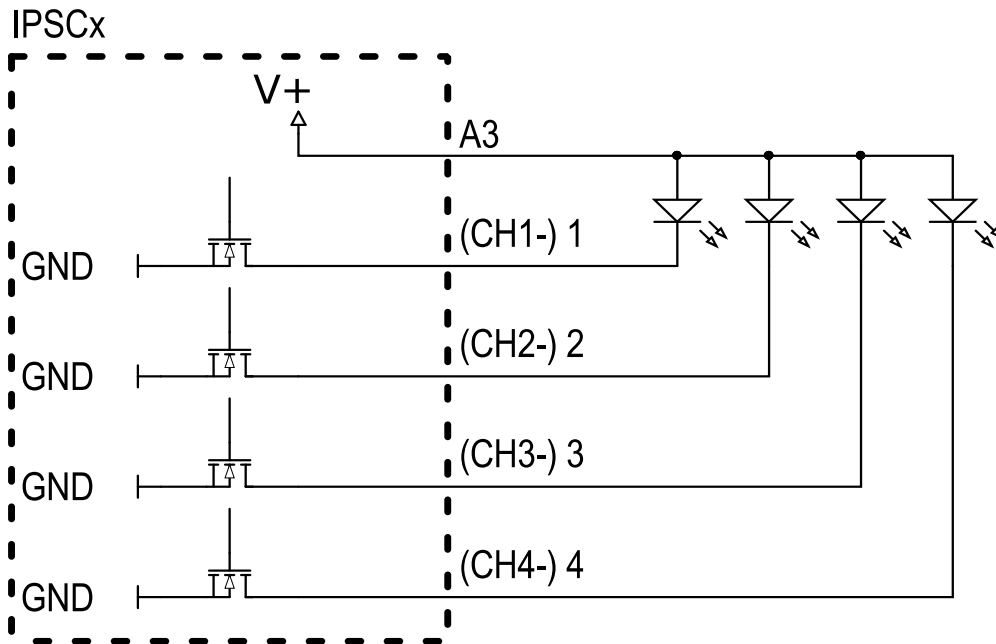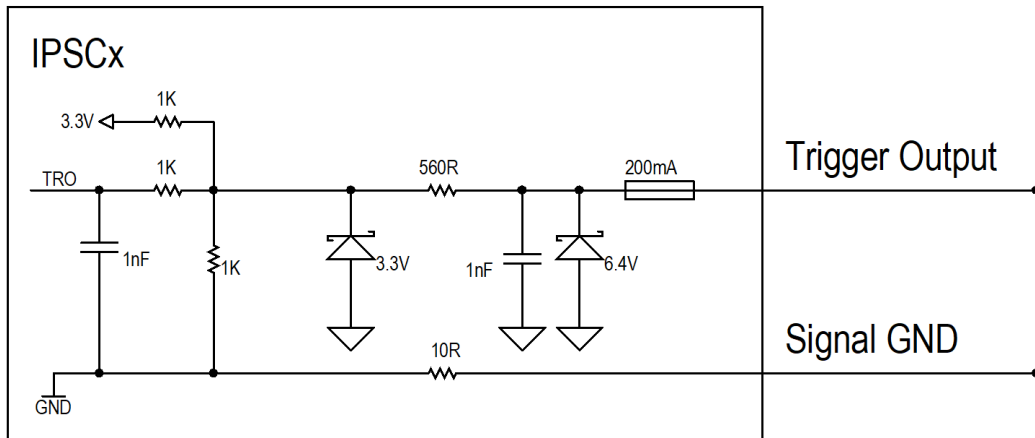*Figure 17: Connecting scheme for LED output*

Figure 18: IPSC-Series - Trigger Output – Schematics

3.4.3. 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 16: Trigger input connector description IPSC-Series
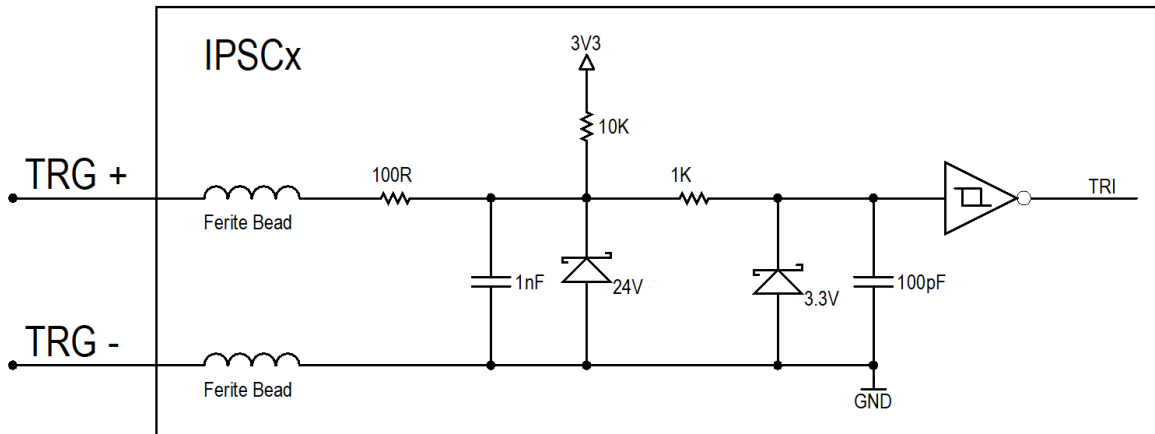
Figure 19: Internal input trigger scheme for IPSC-Series

Logical State	Voltage
HIGH / Logical 1	+3V to +24V DC
LOW / Logical 0	0 to +0,5V DC
Undefined State	+0,5V to +3V DC

Table 17: Electrical Specification - Trigger Input(s)

3.4.3.1. Opto-Isolated Trigger Source

Figure 20 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 1,2kΩ resistor should be rated for at least 0,5W power.
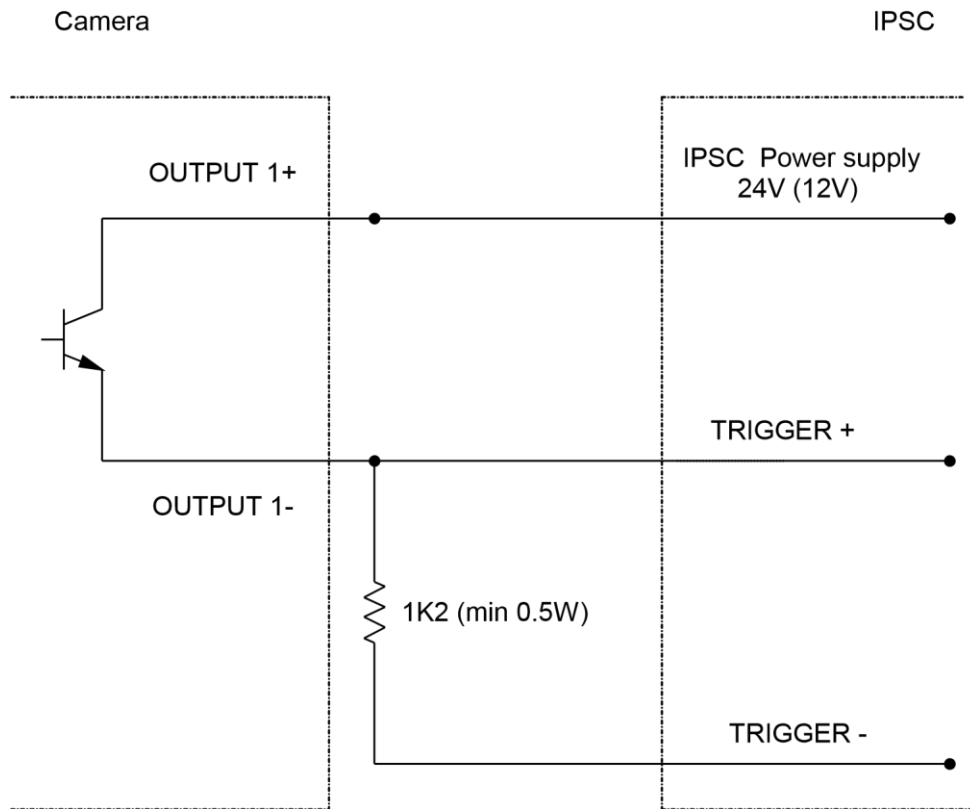

Figure 20: Trigger circuit example from Opto-Isolated source

4. Interfaces for Configuration

4.1. Ethernet

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

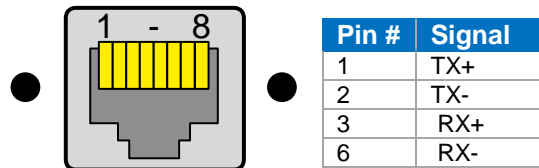Standard protocols used are HTTP, UDP and TCP.

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

Table 18: Ethernet connector PIN assignment

	IPSCx / HPSC1	HPSC1 v2 / HPSC2 / HPSC4
Connector	RJ45	RJ45
Specification	10Base-T	10Base-T/100Base-TX
Standards	IEEE802.3	IEEE802.3/802.3u, ISO802-3/IEEE802.3 (10Base-T), IEEE 802.3az

Table 19: Supported Ethernet Standards

Note: Using a 10/100Mbit network adapter for a direct connection to an IPSC and HPSC1 strobe controller makes it necessary to use cross-over cabling (HPSC1 v2, HPSC2 and HPSC4 excluded).

4.2. Serial RS-232

To connect a strobe controller to the PC using its RS-232 interface, a D-SUB DB9 cable (RS232) can be used. The assignment of the connector on the strobe controller can be found below.
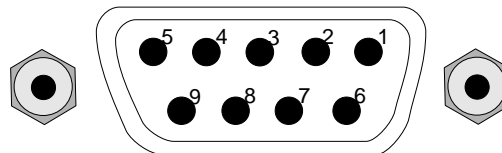
Pin	PC	IPSC	HPSC
2	RxD	TxD	TxD
3	TxD	RxD	RxD
5	GND	GND	GND
4←→6, 7←→8	Handshaking loop back		
1, 9	Not connected		

Table 20: RS-232 connector assignment

Note: The IPSCs and HPSCs series can be connected using a straight-through 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.
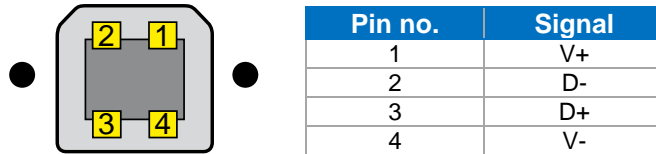

Pin no.	Signal
1	V+
2	D-
3	D+
4	V-

Table 21: 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 Strobe Controllers of the HPSC-series provide a *green* and a *yellow* status LED on the front panel of the device. Due to the different microcontroller architecture and differences in the boot-up routine, the HPSC1 and others (HPSC1 v2, HPSC2 and HPSC4) are slightly different in signaling. They are coded as shown in the following sections.

Note: The HPSC1 USB and RS-232 versions provide separated status LEDs, on the Ethernet version these LEDs are part of the Ethernet / RJ45 connector.

HPSC1

Status	Green LED	Yellow LED	Description
Error	OFF	OFF	No sign of life
		Flashing	Number of consecutive flashes as described in chapter 5.3 – Error / Fault codes
Normal Operation	ON	OFF	Running Mode: "OFF" active
		ON	Running Mode: "Continuous" active
		Flashing (fast) (1Hz)	Running Mode: "External Trigger" or "Software Trigger" active
		Flashing (slow) (0.5Hz)	Running Mode: "External Switch" or "Internal Trigger"
Booting	Flashing	---	Device in bootloader mode
		Flashing	Receiving on data interface

Table 22: HPSC1 - Status LEDs and description

HPSC1 v2, HPSC2 and HPSC4

Status	Green LED	Yellow LED	Description
Error	OFF	OFF	No sign of life
		Flashing	Number of consecutive flashes as described in chapter 5.3 Error / Fault codes
Normal Operation	ON	OFF	Running Mode: "OFF" active
		ON	Running Mode: "Continuous" active
		Flashing (max. 17Hz)	Other Running Modes: Indicates trigger, flashing rate is limited to max. 17 Hz

Table 23: HPSC1 v2, HPSC2 and HPSC4 - Status LEDs and description

5.2. IPSC-Series

On the devices of the IPSC-series, there are 4 status LEDs on the front panel:

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 24: IPSC - Identification of status LEDs on different models

When powering the device, POWER (green) and STROBE (yellow) LEDs are constantly ON, and the FAULT (red) LED is flashing for 5 seconds. After the startup process is completed, only the POWER (green) LED stays persistently ON.

The different LED status are shown in Table 25.

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 25: IPSC - Status LEDs and description

5.2.1. Ethernet Status

The Ethernet connector provides a *yellow* and a *green* LEDs, where the *green* LED indicates link, the *yellow* one activity.

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

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

Table 26: IPSC 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, too high* or changed (> ±2.4V)*
8	Cannot read DID from light head (IPSC-series only)
	*HPSC1 v2, HPSC2 and HPSC4 only

Table 27: Error codes

Depending on detected error code, the FAULT (IPSC) or Yellow LED (HPSC) is flashing in repeating sequences. Each sequence consists of several 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 and can be accessed 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

The following section describes the required components and a generalized procedure to put a Strobe Controller of the HPSC or IPSC series into operation. Figure 21 shows a simplified setup, whose single components are described in the following chapter.
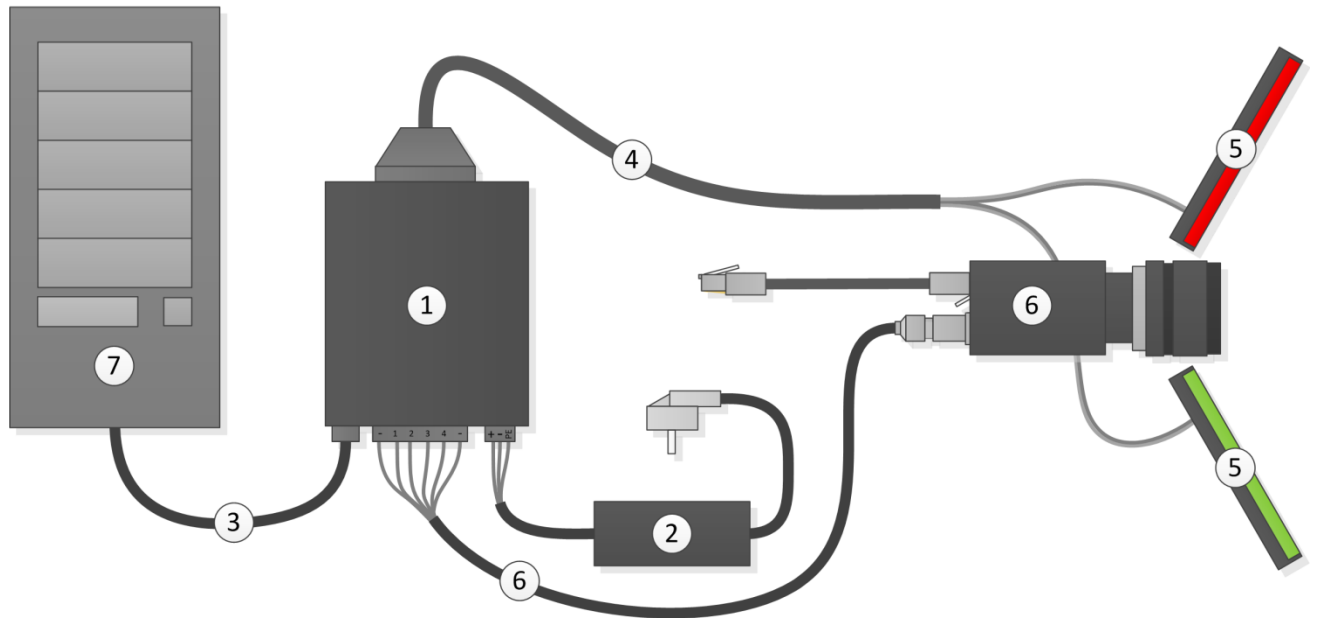
Figure 21: Basic setup with an IP Strobe Controller

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 / HPSCx: 12V to 24V DC with at least 135W / 150W

(3) **Cable for communication**:
- Ethernet: Patch cable with RJ45 plugs; IPSC-Series/HPSC1: Direct connections to 10/100 Mbit network cards require a crossover cable
- Serial: RS-232 straight-through cable with male to female 9-pole D-Sub plugs
- USB: USB2.0 A-to-B cable

(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,

Note: Shielded cables (grounded at illumination) are strongly recommended, further suggestions can be found in Chapter 1.3.

(5) **LED illumination**
- o Note: The illumination must not be equipped with any additional internal / external control electronics!

(6) **Trigger source** (optional)
- o 0 – 24V (voltage level for logical "1" from 3V).
- o 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
- o 10Mbit Ethernet network card (or faster), RS232 interface or USB1.x/2.0 interface
- o SMARTEK Vision *ScLib* PC configuration software, optional web browser software.

6.2. Software Installation – SMARTEK Vision ScLib

Step 1: Download the latest SMARTEK Vision ScLib SDK from:
http://www.SMARTEK.vision/media-center

Step 2: To start the installation **Run** the ScLib SDK software installation. Please follow the installation instructions to complete the installation process.

6.3. Getting Started with the Strobe Controller

Step 1 – Connect device: Connect the strobe controller with an appropriate communication cable to the target PC or switch. Connect the positive and negative leads of the power supply to the power terminal of the strobe *controller*. Connecting the protective earth conductor is mandatory for field operation and harsh environments.

Step 2 – Startup and IP setup: 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→ ScLibClient

Press the button 🖳 *Find Controllers* to search for devices over Ethernet, RS232 and USB. All found devices are shown in the list below.

Note (Ethernet devices): 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 🖳 S*et 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 – Establishing a connection: 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 be reached with their web-interface by typing the configured IP address into the address field of your web browser (e.g. http://169.254.1.1).

Step 4 – Pre-Configuration: As soon as the connection was established successfully, the strobe controller can be configured for the first start. Make sure that the *Running Mode* is set to OFF, and output voltage and current of each channel do not exceed the limits of the illumination to connect. After finishing the pre-configuration, the changes must be stored on the strobe controller by pressing the button ⬤ *Send & Save*. Subsequent press the button 🖧 *Disconnect*.

Step 6 – Connect illumination / light head: Switch OFF the strobe controller and unplug the power supply. Illuminations or light heads can be connected to the output panel connector(s) on the backside of the housing, according to connecting schemes in *3.4.2 – Output Connector* (IPSC-Series) and 2.3.3 – LED Output (HPSC-Series).

Step 7 – Connecting an external trigger: Depending on the strobe controller series and trigger source, one of the following input wirings can be applied to synchronize the strobe controller with external trigger sources.
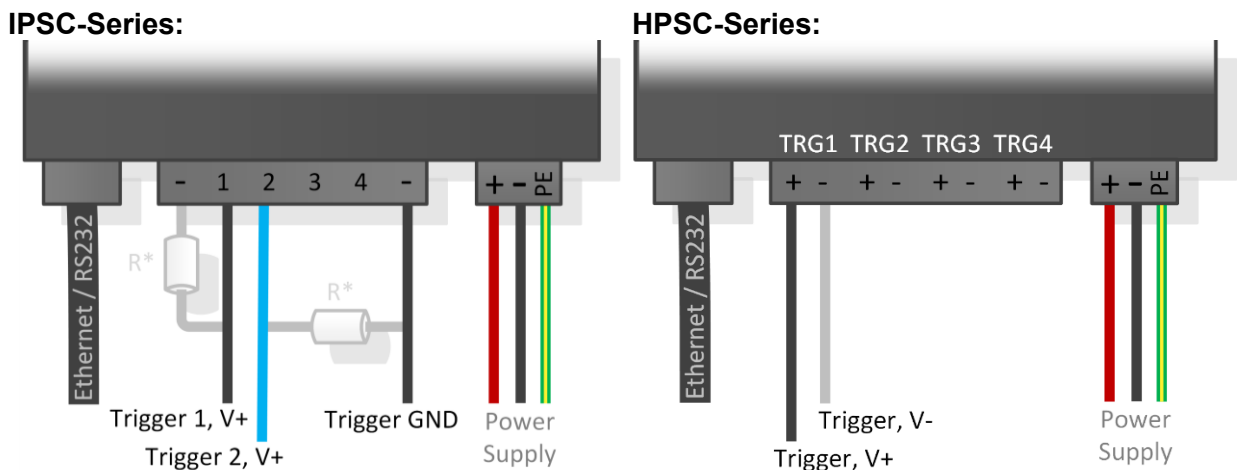
IPSC-Series: **HPSC-Series:**

Figure 22: Connecting input trigger of IPSC (left) and HPSC (right) - max. 24V

*IPSC-Series: For trigger source that switches 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, as shown in *Figure 22* (left).

Step 8: When all connections of Step 6 and 7 have been applied correctly, power the *strobe controller* and establish a connection via the *ScLibClient* or web-interface. Select the right *Running Mode* for your application and configure the *Trigger Inputs* as well as the *Physical Outputs* according to your requirements.

⚠️ **Warning:** Output currents over the specification of your illumination can lead to permanent damage of the illumination. Overdriving should only be done by advanced users and in pulse mode with appropriately short pulse durations.

Apply and store the settings by pressing the button 🔴 *Send & Save* which applies and stores the settings to the *strobe controller*. Further information on the configuration interface can be found in the following *Chapter 7 - Device Configuration with the ScLibClient.*

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 ScLib 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
ScLib PC Client software	Windows XP, Vista, Windows 7, 8, 10, (32 and 64bit) Linux (32 and 64bit)

Table 28: Software specifications

With the installation of the ScLib, the ScLibClient can be started from the Windows Start Menu or the binary folder of the installation.
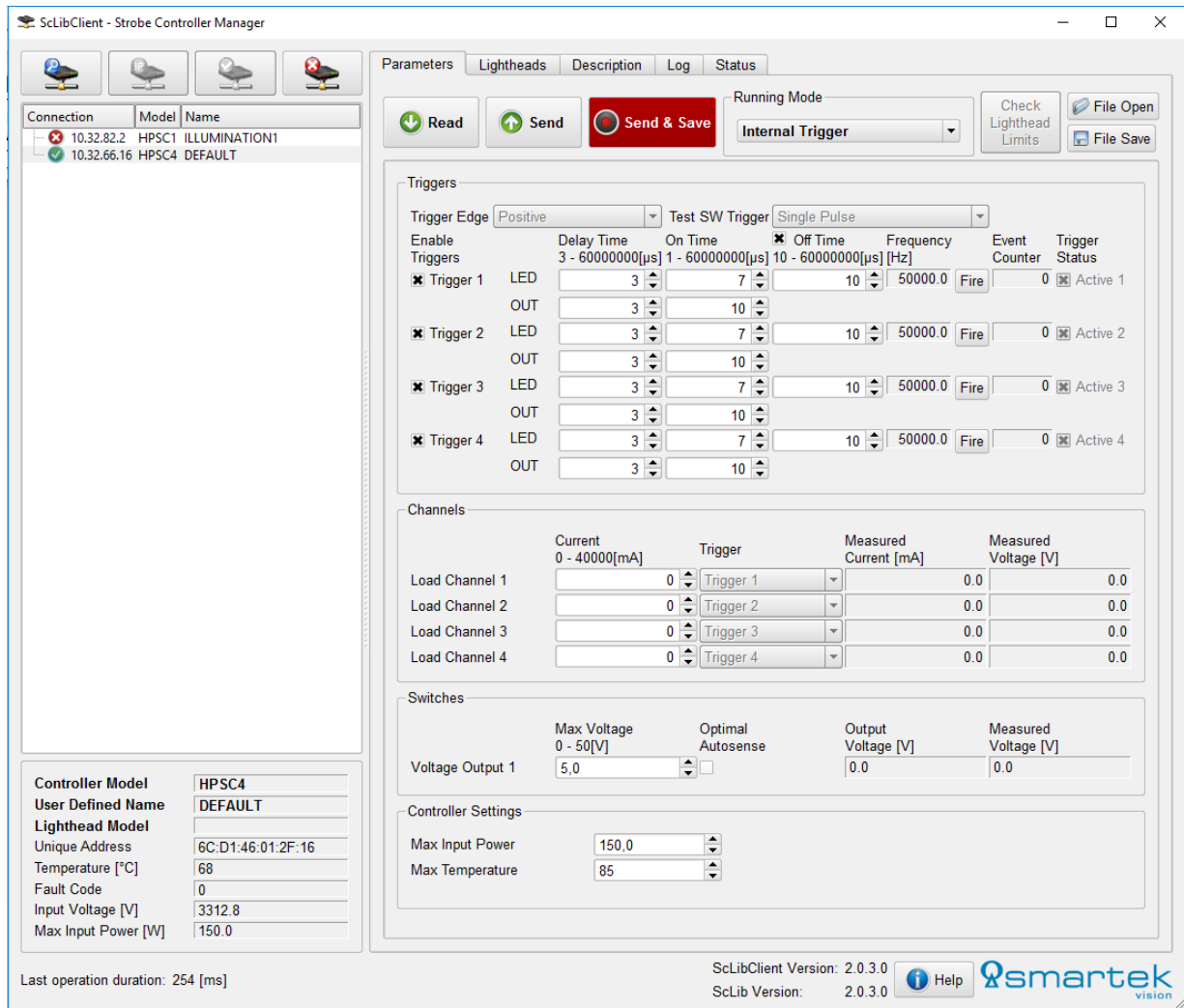
Figure 23: ScLibClient - Overview

7.1. Find Devices

Run the ScLibClient and click *Find* icon to start searching for devices.
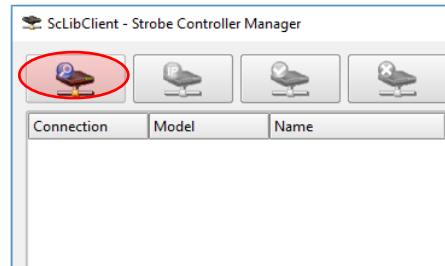
Figure 24: ScLibClient – Discovery Button

7.2. Discovery by Broadcast

The usual way to identify available devices on Ethernet, RS-232 or USB is to search for them using a broadcast. The basic settings for this in the *Find Controllers* window is to select *Broadcast* and make sure to check the relevant interfaces.
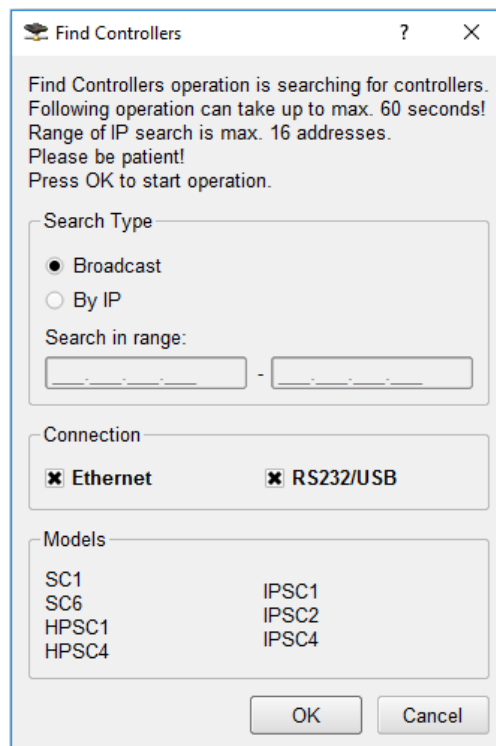

Figure 25: ScLibClient – Discovery Window

Select the target controller from the list of found devices and click on the *Connect* icon to establish a connection to the device.
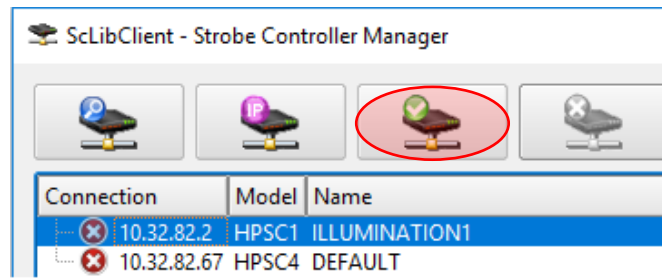
Figure 26: ScLibClient – Connect to Device

7.3. Ethernet Specific Discovery Options

When using an Ethernet connection, the user can choose between *Broadcast* and *search by IP*. *Broadcast* is the default option and the fastest way to discover devices within the home network.

Search by IP is designed to find controllers that are connected to the outside of your home network (via a router), where broadcast packages would not reach the device. Range of IP search is 16 addresses and takes approximately 1 second per IP address. If your input exceeds this range (as shown in Figure 22), 16 addresses will be searched starting with the address in the left box.

Note: *Search for IP* is currently supported only by HPSC1 v2, HPSC2 and HPSC4 devices and this will not find and IPSCx or HPSC1 Strobe controllers.
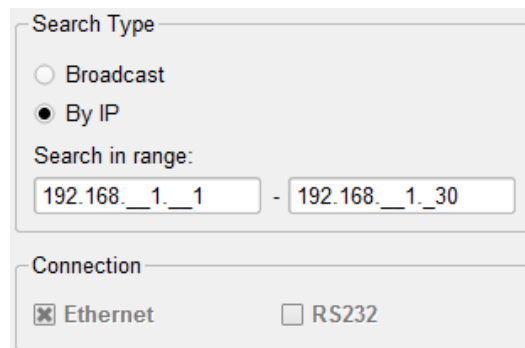
Figure 27: ScLibClient – Search by IP

Depending on the type of connection that is used towards the strobe controller, the results of a search might be different. Figure 28 shows how correct detected devices with a valid IP address are listed.
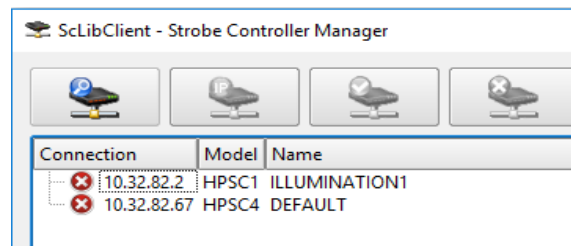
Figure 28: ScLibClient – Device List

If no controller is found, make sure every connection is plugged properly and the network interface card is enabled. Further the firewall-settings might block packets from the strobe controller and can be deactivated temporary for further investigation.

Invalid IP Address / Set IP Address

The strobe controller can have, for various reasons, an IP address that does not fit to the current network configuration, which is thus invalid for establishing a connection.

Further, all strobe controllers are shipped in DHCP mode, without a preconfigured IP address. In case no DHCP server is available in the network (peer-to-peer connection, switch, router without DHCP activated), the IP address of IPSCx and HPSC1 devices is set to the invalid IP address "0.0.0.0", while HPSC1 v2, HPSC2 and HPSC4 devices receive an LLA address.

To change the IP address of the device to be on the same subnet as the IP address in the Local Area Connection, click the *Set Address* icon.
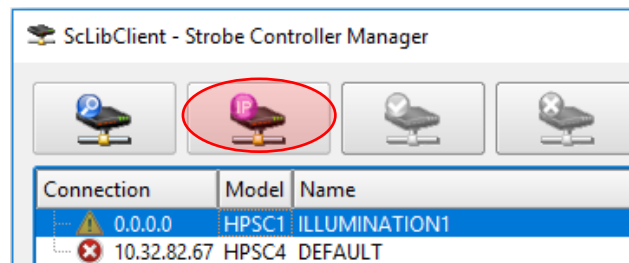

Figure 29: ScLibClient – Set IP Button

In the *Set Address*-window the new IP address, subnet mask, default gateway, DNS servers and name of the controller can be set. Make sure to provide an IP address to the controller that is not assigned to another device in the network.
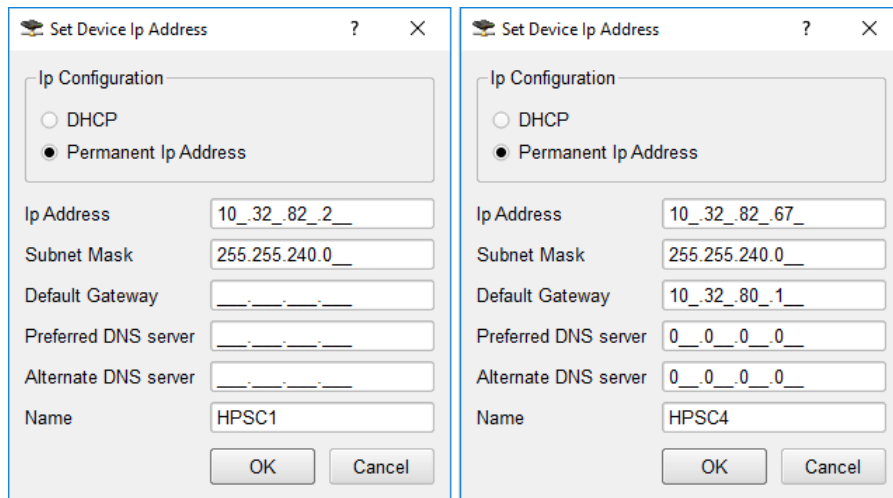
Figure 30: ScLibClient – Set IP Window

Note: When the Strobe Controller is in a different network as the PC, it can be discovered using *Search by IP* and connected only if the gateway is correctly set. Gateway and DNS are currently only implemented on HPSC1 v2, HPSC2 and HPSC4 devices.

7.4. Strobe Controller Status

When a 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.

Controller Model	HPSC1
User Defined Name	ILLUMINATION1
Lighthead Model	
Unique Address	6C:D1:46:01:18:3B
Temperature [°C]	36
Fault Code	0
Input Voltage [V]	25.7
Max Input Power [W]	56.8

Last operation duration: 66 [ms]

Figure 31: ScLibClient – Strobe Controller Status Output

7.5. Applying a Configuration

The ScLibClient has functions to read, send and store configurations. The *Read* button is used for reading the complete parameter-set running currently on the controller, while the *Send & Save* button applies and stores the desired parameters to the device.

Additionally, devices of the latest generation support also the application of parameters only to the running configuration, using the *Send* button. These values are stored to volatile memory and will be dropped on power cycle or reset of the device.

7.6. Running Modes

All Strobe Controllers can be operated in different *Running Modes*, supporting pulsed and continuous DC current output.
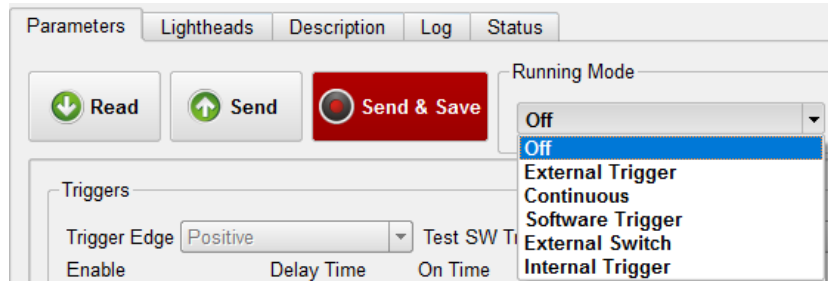

Figure 32: ScLibClient – Running Modes

In pulse-controlled output modes, a Strobe Controller generates electrical impulses on the output. The output pulses in this mode can be triggered by an external, internal or software generated trigger source. These modes are intended for pulsing and over-driving of LED light heads.

In DC controlled output modes, the Strobe Controller operates as a DC current source intended for continuous currents on the output. Corresponding running modes are the *Continuous* and *External Switch* mode.

Note (IPSC-Series): When the device reacts on one of the trigger signals, or currently drives an LED output, all further incoming triggers are ignored. The trigger signals are only processed sequentially and thus it is not possible to operate several channels asynchronously to each other. For asynchronous application, please use one of our HPSC devices.

7.6.1. Off

The controller is in idle mode and does not respond to any input triggers. There is no voltage on any output line.

7.6.2. External Trigger

In the *External Trigger* mode, the device is ready to accept external trigger signals and generates a very precise output pulse according to the user configuration. The *External Trigger* mode is the most precise mode and the usual way of pulse operation.

7.6.3. Software Trigger

In *Software Trigger* mode the Strobe Controller is waiting for software triggers to generate output pulses according to the user configuration. These triggers are issued by the PC using the communication interface and is for that reason not as precise as the *External Trigger* mode. In *Software Trigger* mode devices do not respond to any external trigger inputs.

7.6.4. Continuous

In *Continuous* operation mode the output provides a constant current. The device operates as a DC current source, configured by the user. As soon as the parameters have been sent to the Strobe Controller, the output is immediately driven according to the set voltage and current. The timing parameters are ignored in this mode.

7.6.5. External Switch

In *External Switch* mode the device acts as a switch. The Strobe Controller is armed and generates output pulses according to the external trigger signal. In contrast to the *External Trigger* mode, the pulse length is defined by the trigger pulse length. If a trigger arrives, the device will send continuous current on the output if the trigger is active. The timing parameters are not used in this mode.
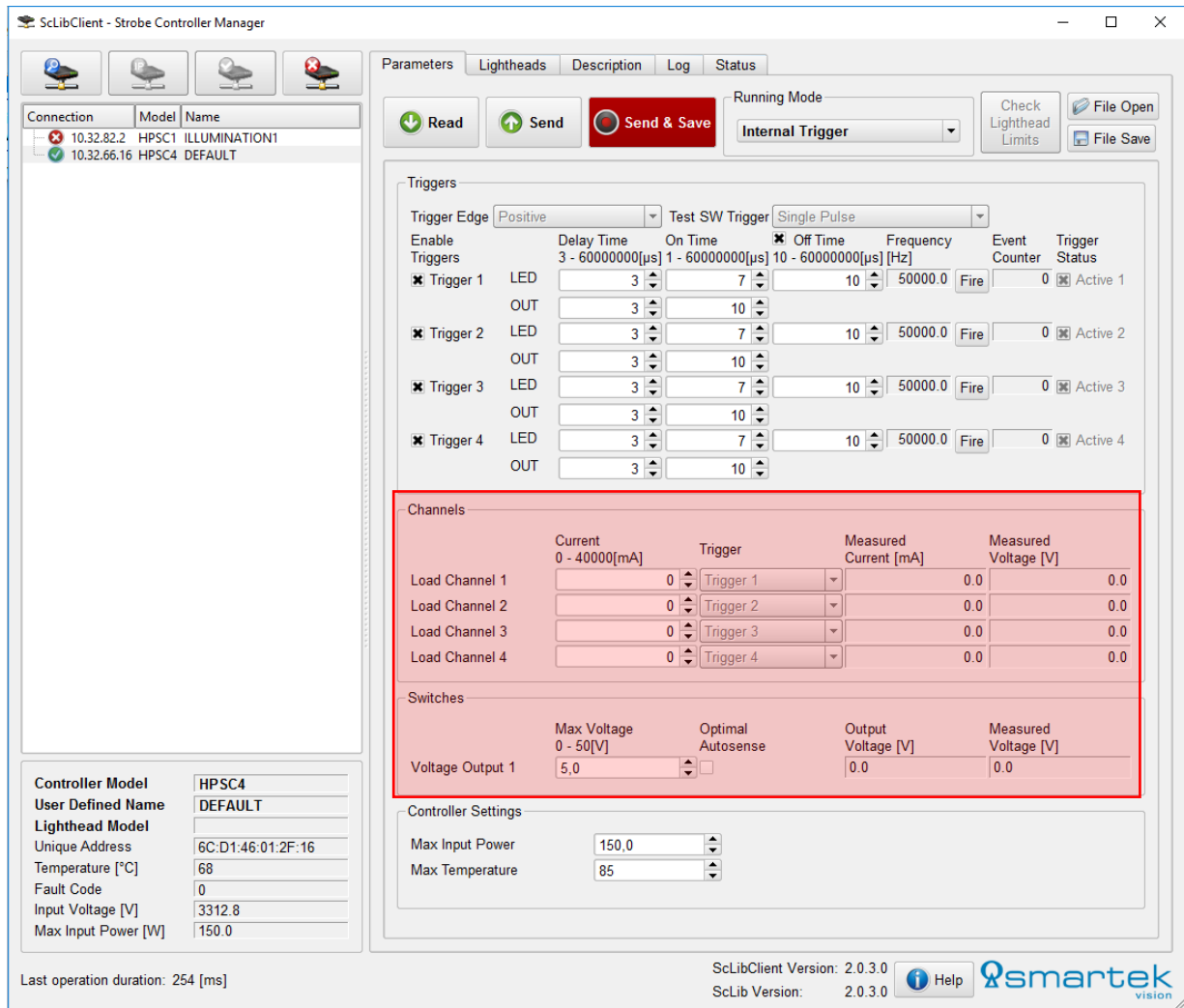
Note: As the pulse duration is not controllable in this mode, the maximum voltage and current levels are same as in the *Continuous* operating mode. The precision is slightly lower than in *External Trigger* mode, which is to prefer if possible.

7.6.6. Internal Trigger

The *Internal Trigger* mode allows to generate constant triggering by the strobe controller itself, which can be used to drive one or more outputs. The signal is defined by the configured On-Time, Off-Time and Delay-Time. In this mode any external or software triggers are ignored.

7.7. Output Parameters

Using the output parameters, current and voltage can be configured individually for each channel. These parameters should only be applied carefully, meeting the specifications of the connected LED illumination. Too high output parameters can lead to permanent damage of the illumination.

Figure 33: ScLibClient – Output Parameters

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 output line(s)
- *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

7.7.1. 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: Exchanging the illumination (even with the same light head type) can show differences in brightness. This is caused by normal tolerances in manufacturing that might make slightly higher voltages necessary to reach the specified current.

7.7.2. Controller Settings

The controller settings allow the user to modify general values of the strobe controller's internal sensing.
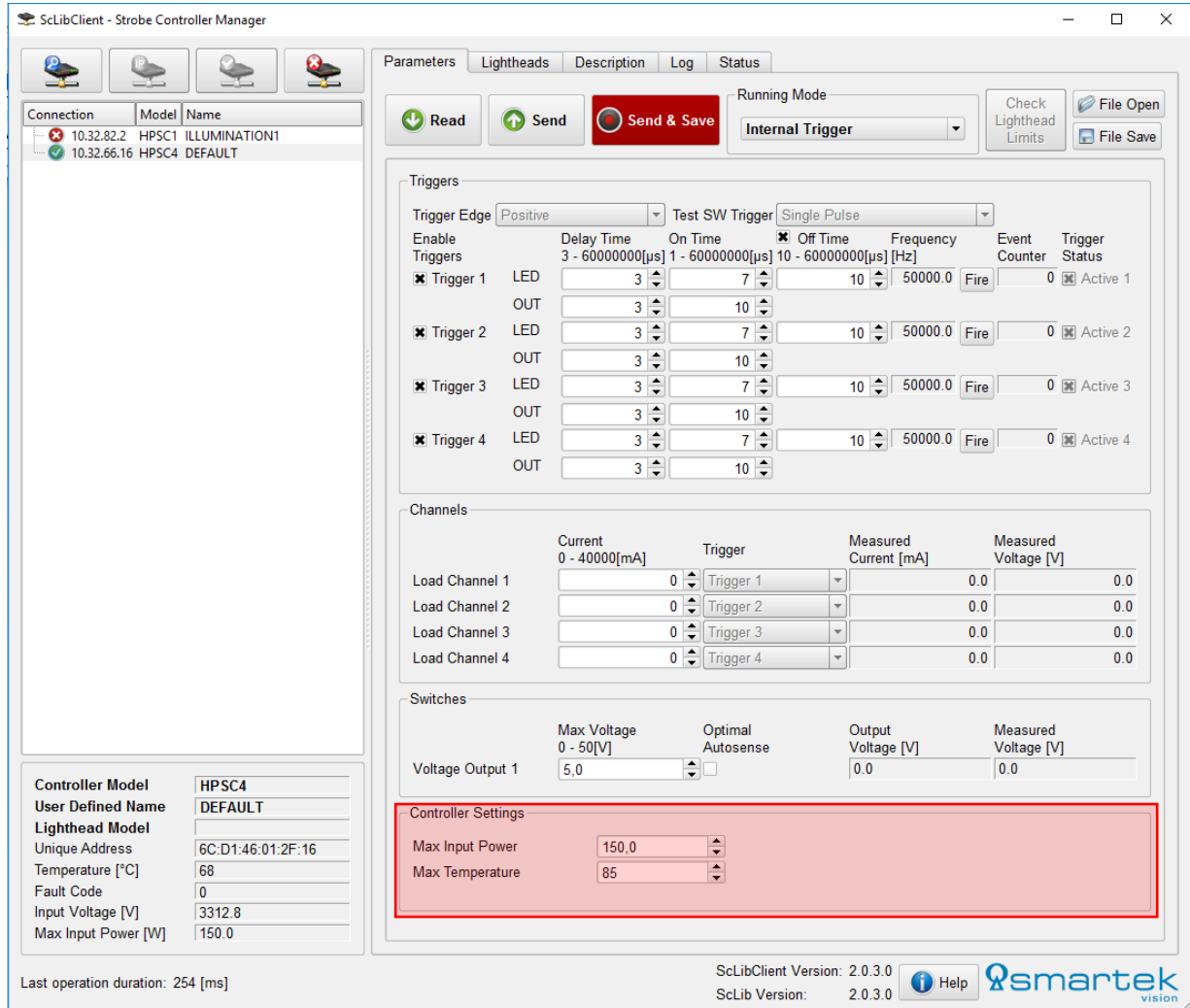

Figure 34: ScLibClient – Controller Settings

This feature is only supported by HPSC1 v2, HPSC2 and HPSC4 devices and comprises:

- *Max. Input Power* – Limits the maximum recharging rate, used to limit the load on the external power supply while recharging internal capacitors.
- *Max. Temperature* – Maximum Temperature before the device goes into safe shutdown, used to limit the maximum temperature for heat sensitive environments e.g. in medical applications.

7.8. Trigger Input

7.8.1. Trigger Input Parameters

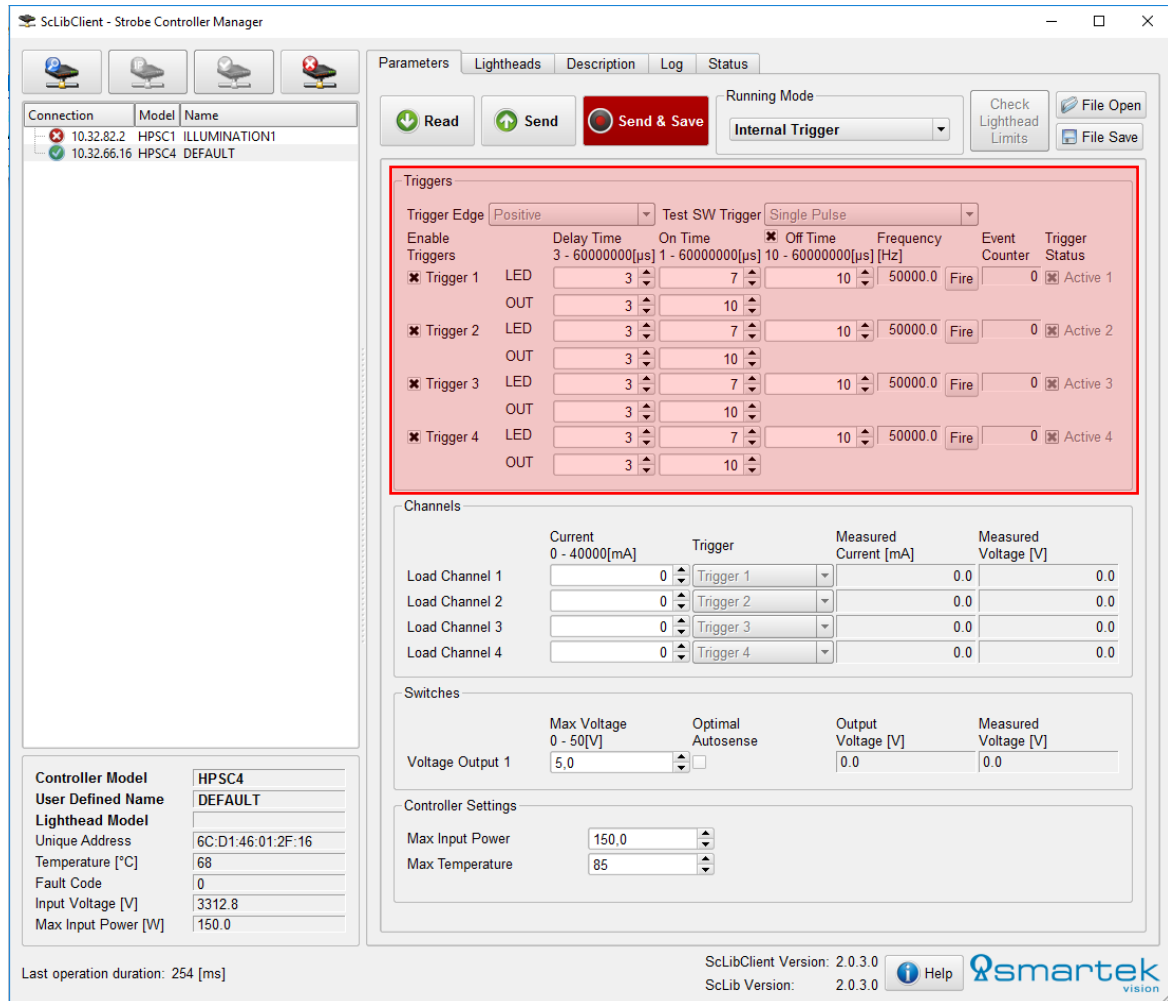With the trigger parameters, the timing options of the Trigger- (OUT) and LED-outputs (LED) are configured.

Figure 35: ScLibClient – Trigger Parameters

All parameters have a 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. The minimal delay time depends on device, current setup and number of enabled channels.

- *On Time* – definition of the pulse length. Please be careful with this parameter, too high values of On Time can damage the light heads.

- *Off Time* – the time when no trigger is accepted, internal capacitors are recharged.

- *Trigger 1, 2, 3, 4 (flag)* – enable or disable trigger.

The *Trigger Input(s)* parameters are not used if the controller is in *Continuous*, *External Switch* or *Off* mode. The HPSC1 v2, HPSC2 and HPSC4 series provide different trigger Delay/On times for LED and OUT used for manual synchronization of camera and light source.

Figure 36 below shows how the timing of each trigger input line is transferred to the corresponding output(s).
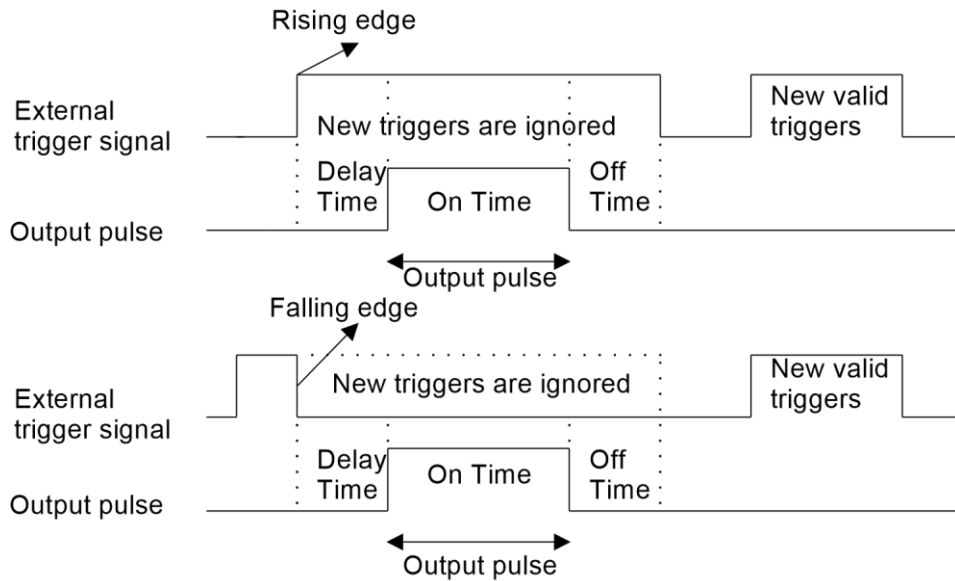

Figure 36: Process of generating pulses

7.9. Lightheads (IPSC-series only)

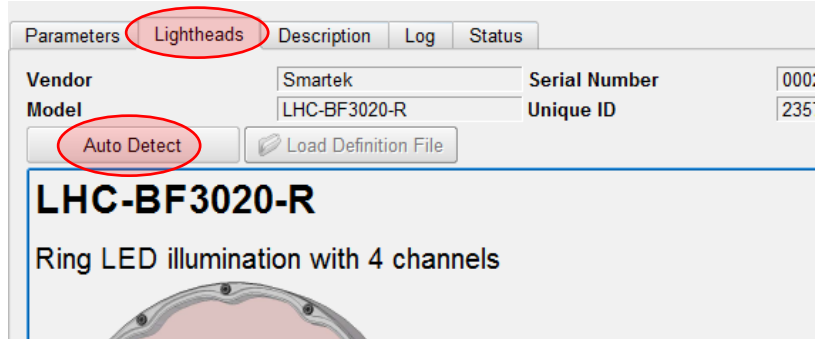To access the light heads options, click on the Light heads tab.

Figure 37: 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.

7.9.1.   Digital EEPROM Lighthead 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.
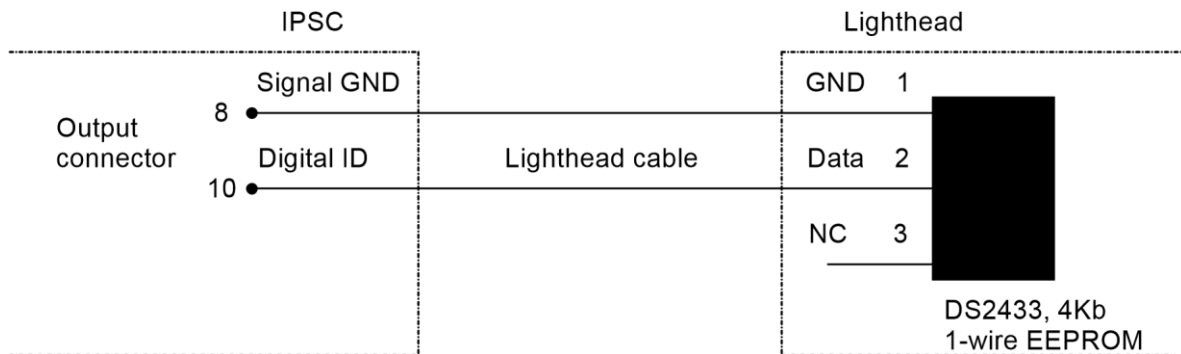

Figure 38: Digital ID Interface for Lighthead Coding

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 Lighthead Signature window, additional information about strobe controller and light head is provided.
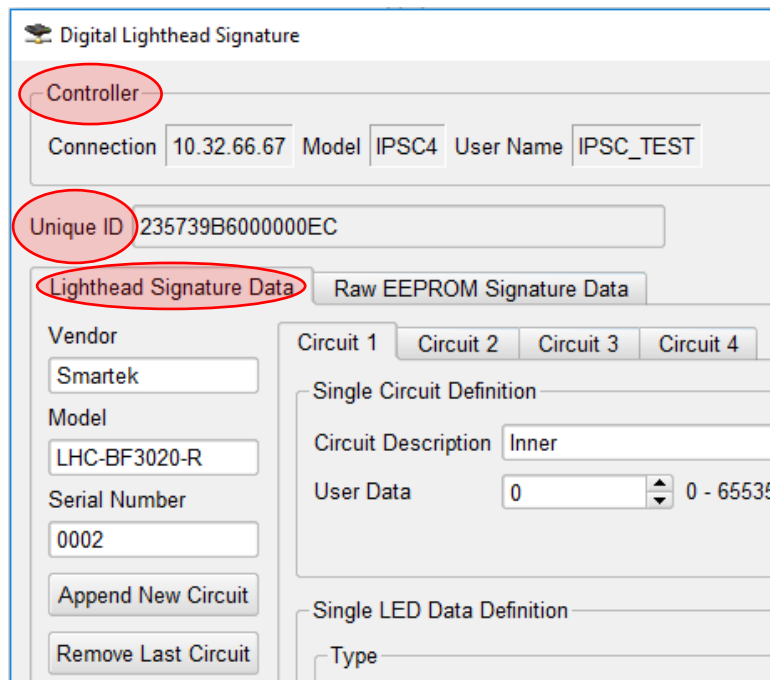
Figure 39: ScLibClient - Light head Information

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

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

7.9.1.1. Circuit

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.
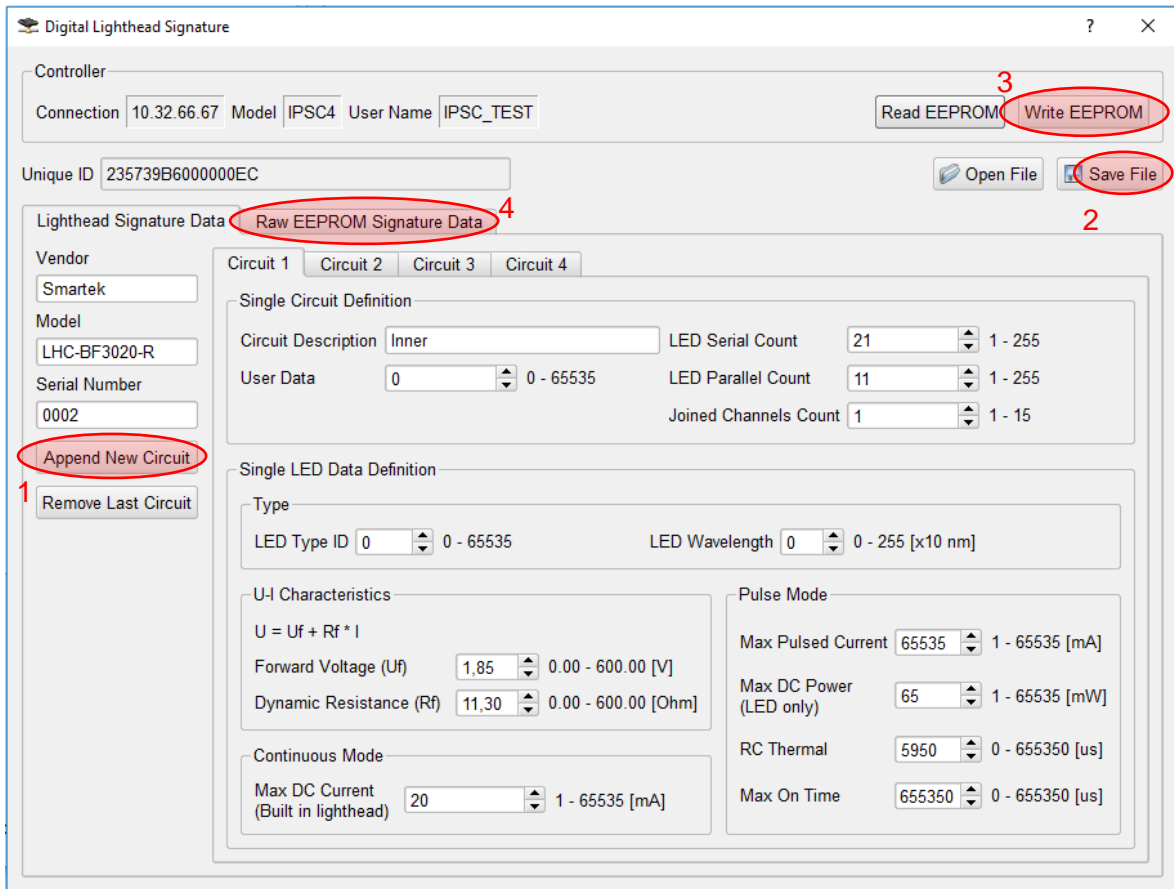
Figure 40: ScLibClient - Adding New Circuit

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 – 65535
- *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 – 65535 [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 – 65535 [us]

7.9.1.2. User custom LED light head connection diagram

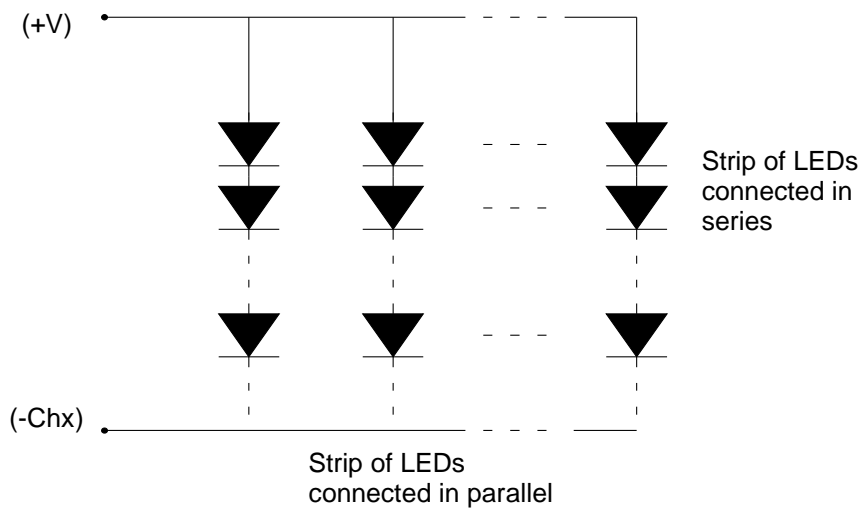The figure below is an example how the LEDs can be connected on one channel.

Figure 41: Parallel and serial LED connections

7.9.1.3. 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 perform checking of Digital ID and Analog ID. To change setting for ID Check Mode, please contact our sales partner or SMARTEK Vision support.
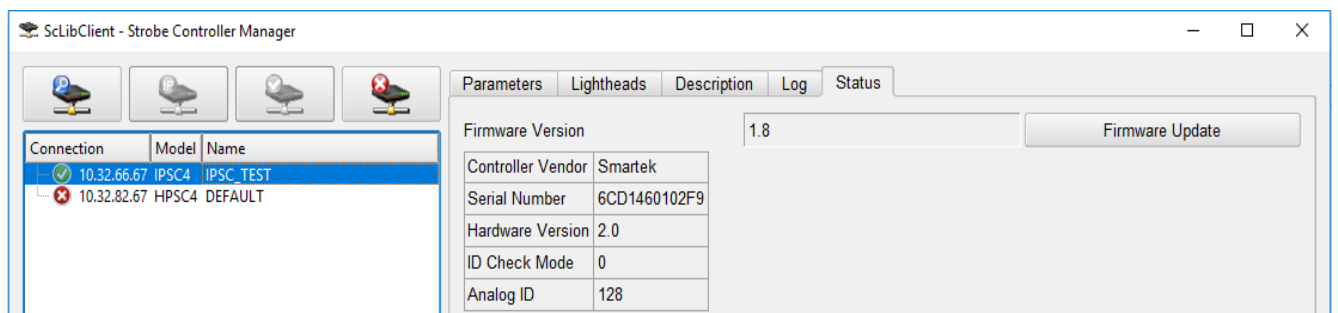

Figure 42: ScLibClient – Status Tab

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.
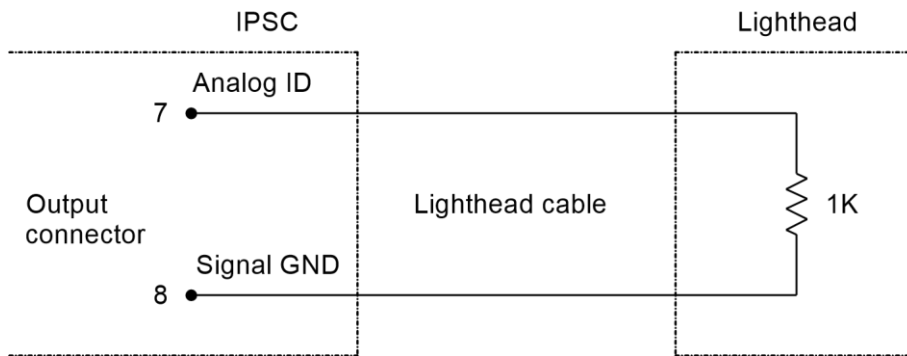

Figure 43: Analog ID interface

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

7.10. Firmware Update

Firmware updates are applied to a device by flashing a binary firmware file, using the configuration interface (Ethernet, RS-232 or USB) of the Strobe Controller. The device must be in OFF mode, updates via Ethernet must be applied having a permanent IP address (not DHCP) set.

To update the firmware, execute the following steps:

1) Start the ScLibClient and connect to the target Strobe Controller
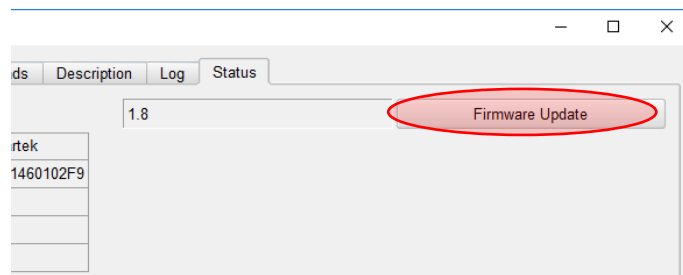2) Open the *Status* tab and press the *Firmware Update* button.

Figure 44: Firmware update

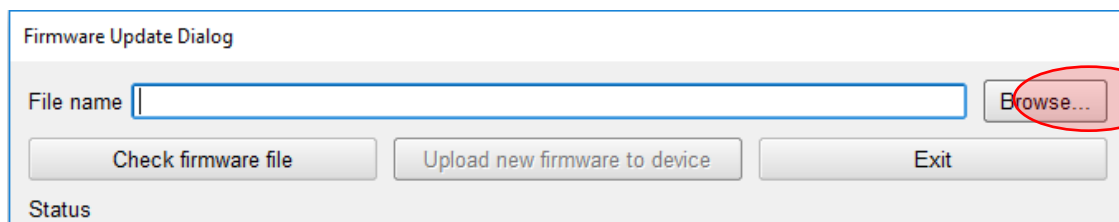3) Click the *Browse* button to select the firmware binary to install.

Figure 45: Firmware update (2)

4) After selecting a firmware, click on the *Check firmware file* button to run a compatibility test between the device and firmware.
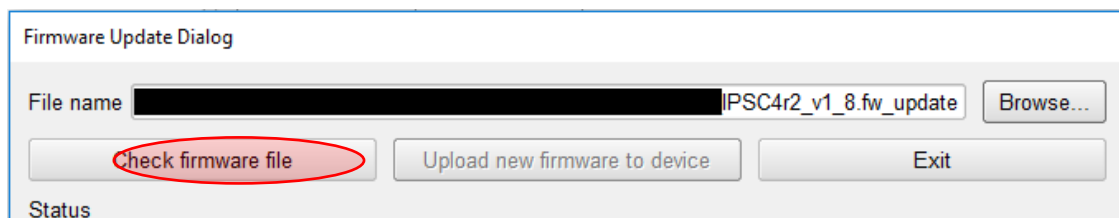

Figure 46: Firmware update (3)

5) If the selected firmware is compatible, "PASSED" is indicated in text window, and the *Upload new firmware to device* button will become available. Click on *Upload new firmware to device* to start updating the firmware.
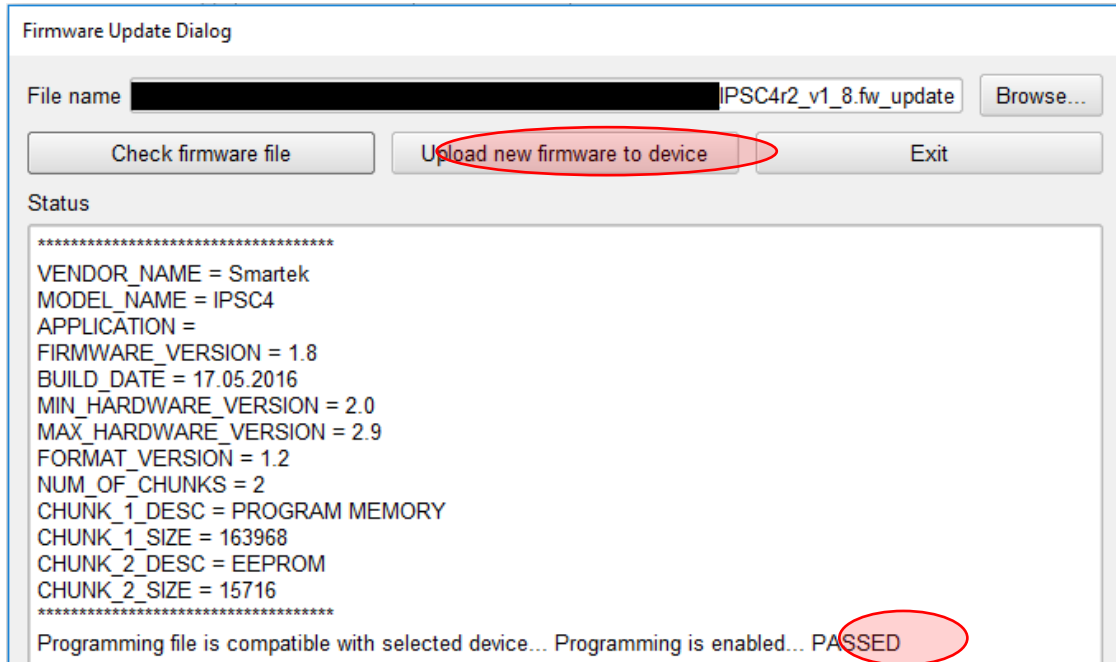
Figure 47: Firmware update (4)

6) After re-programming has successfully finished, "PASSED" is indicated in text window. Depending on the device, this process can take a couple of minutes. When updating of new firmware finishes, simply close the dialog box.
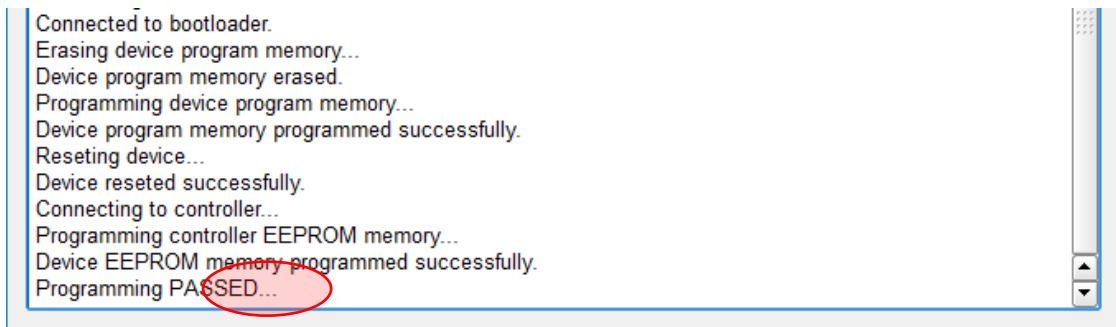

Figure 48: Firmware update (5)

7.11. Other features

The following section shows further features of the ScLibClient configuration software.

7.11.1. Description Tab

Open the *Description* tab to see major features, specifications and maximum ratings of the controller that is connected to the *ScLibClient*.
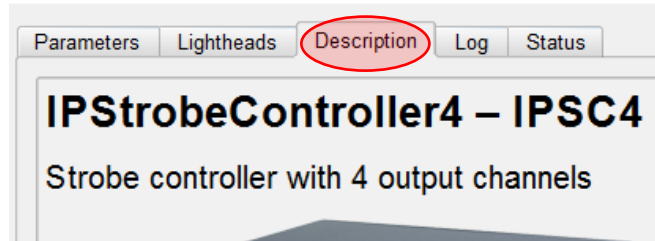
Figure 49: Additional features – Description tab

7.11.2. Log Tab

To see actual logging information, open the *Log* tab. To save the current log just click the *Save to File* button and save it to disk.
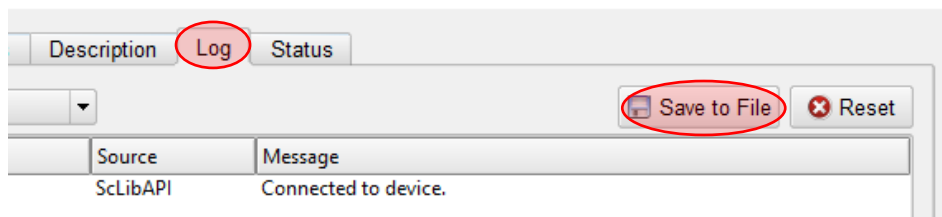
Figure 50: Additional features – Log tab

7.11.3. Status Tab

The current status information of the selected Strobe Controller can be viewed by selecting the *Status* tab.
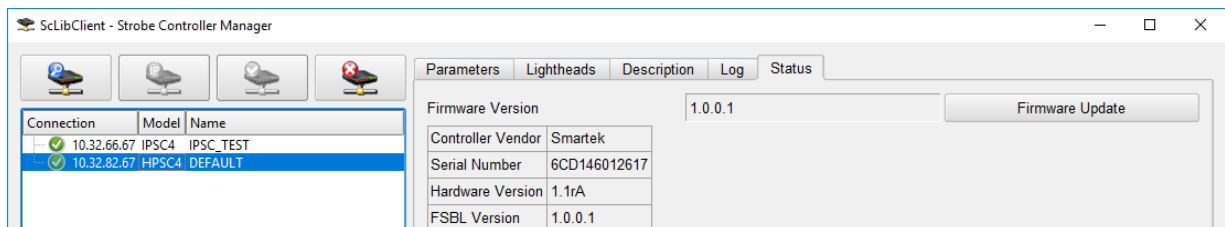
Figure 51: Additional features – Status tab

All controllers contain following information: Controller Vendor, Serial Number, Hardware and Firmware Versions. In the table below, you can see some controller specific information.

Controller	Specific Information
IPSCx	ID Check Mode, Analog ID
HPSC1 v2, HPSC2, HPSC4	FSBL Version, Format Version

Table 29: Controller information

8. Web Server

All Strobe Controllers with an Ethernet interface are accessible for configuration through a web interface. To gain access, just enter IP address (1) of the target device into your web browser. Use the web server to read and send parameters to the device (2), or to change its IP address (3).

Figure 52: IPSC devices web interface

9. Declarations of Conformity

9.1. CE

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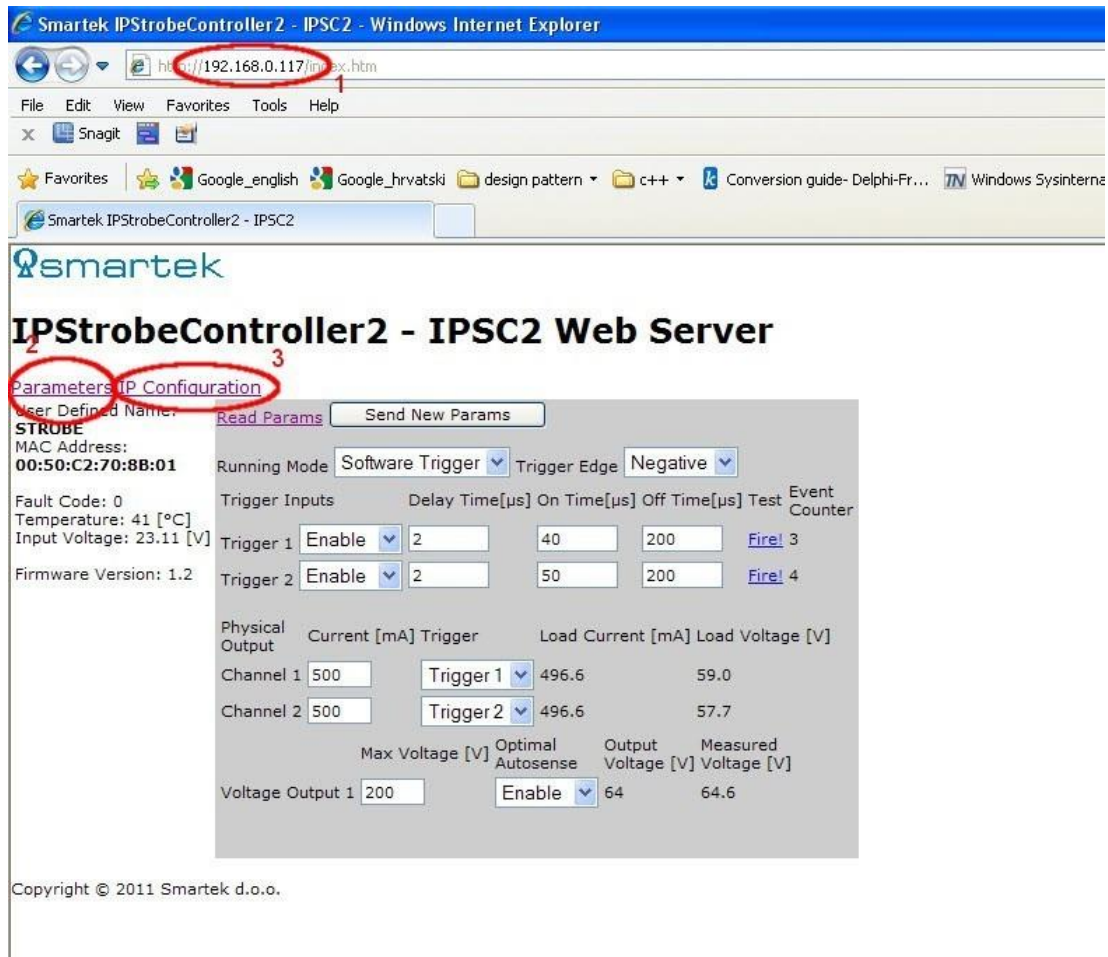Dobrise Cesarica 5
HR-40000 Cakovec
Croatia

CE

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

Type of Equipment: IPSC1, IPSC2, IPSC4, HPSC1, HPSC1 v2, HPSC2, HPSC4

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

Reference No.   Title:

2014/30/EU   Electromagnetic Compatibility (EMC directive)

Following standard or normative document:
EN 61326-1:2013

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.

Date of issue: 2017-09-20

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 Performance Strobe Controller (HPSC)

Type of Equipment: IPSC1, IPSC2, IPSC4, HPSC1, HPSC1 v2, HPSC2, HPSC4

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

Date of issue: 2017-09-20

_____

Damir Dolar
Technical Director
Smartek d.o.o.

9.3. RoHS II

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

Product: LED Strobe Controller

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

Type of Equipment: IPSC1, IPSC2, IPSC4, HPSC1, HPSC1 v2, HPSC2, HPSC4

This equipment is in compliance with the essential requirements and other relevant provisions of the following RoHS Directive 2011/65/EU.

Date of issue: 2017-09-20

Damir Dolar
Technical Director
Smartek d.o.o.

10.   Revision History

Version	Date	Description
v2.2.1	2018-04-24	Corrected dimensions for IPSC4, HPSC4, descriptions updates, minor fixes
v2.2.0	2018-01-18	Added specifications for HPSC1 v2 and HPSC2
v2.1.1	2017-04-28	Initial release

11. Contact Information

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