Scope

CCS Group and their subsidiary company, Effilux offer a large variety of lighting. This document gives an overview of the available equipment and shows how it can be used with Mako cameras.

Precautions

NOTICE
Damage to the connected devices
Read the manufacturer documentation before connecting the components.

Lighting with CCS

CCS lights

CCS lights are made from high power LEDs for maximum uniformity and intensity for precise inspections. The most common lights are shown below, but many more types are available.
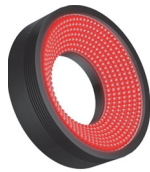
Triggering CCS lights with Mako cameras
To trigger CCS lights with a camera, you need the light control unit CN-PoE on page 2.

Ring lights

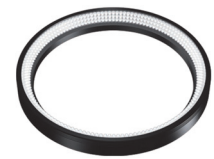**Direct ring light:**
LDR2

www.ccs-grp.com/products/
series/1

Mid-low angle light:
LDR2-LA

www.ccs-grp.com/products/
series/3

Low angle light:
LDR2-LA1

www.ccs-grp.com/products/
series/4
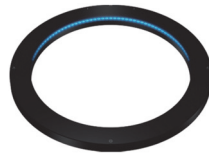
Diffuse, multi angle light:
HPR2

www.ccs-grp.com/products/
series/168

Bar lights

Direct bar light:
LDL2

www.ccs-grp.com/products/
series/114
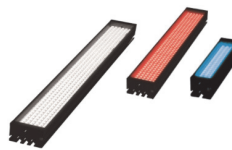
Diffuser and polarizer
options available

Back light

Intense and uniform light:
TH2

www.ccs-grp.com/products/
series/198

Dome lights

High power, diffuse light:
HPD2

www.ccs-grp.com/products/
series/169

Flat dome light:
LFX3 and LFXV

LFX3: www.ccs-grp.com/
products/series/203.

LFXV: www.ccs-grp.com/
products/series/301.
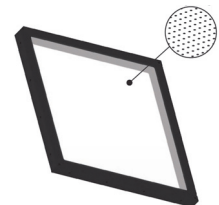
Coaxial light

Uniform on-axis light:
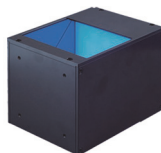**LVF3**

www.ccs-grp.com/products/
series/150

CCS light control unit

CN-PoE

The CCS CN-PoE (Power over Ethernet) light control unit allows you to
control CCS lights via an Ethernet connection.

www.ccs-grp.com/products/series/302

Triggering CCS lights

In the following application example, Mako cameras trigger CCS lights by CN-PoE.

Setup
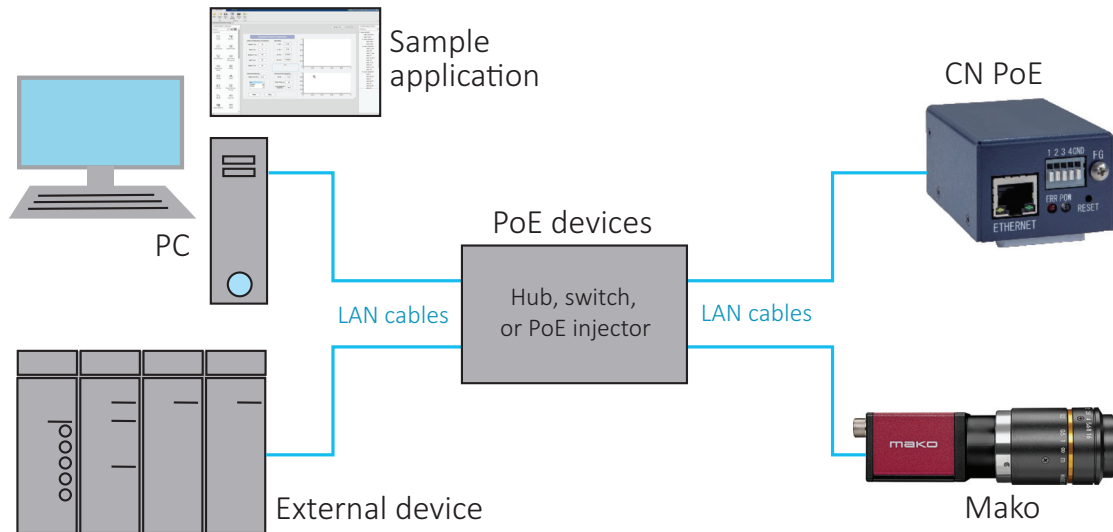
Figure 1: Application setup with Mako triggering CCS lights

Required hardware

Table 1 lists the included components. Bullets show where you can select between various items.

Component	Product	Product details
Camera	Mako	All models
Camera I/O cable	Hirose 8-pin female to open end	• K1200196 (2 m) • K1200197 (5 m)
Light control unit	CCS light control unit	CN-PoE
Lighting system	CCS light	See CCS lights on page 1.
Extension cable between CCS lights and CN-POE	SM female to male	• FCB-1[1] • FCB-2[1] • FCB-3[1] • FCB-5[1]
I/O cable	Bare wire	See CN-PoE trigger wiring specifications on page 4.
[1]Length in meter		

Table 1: Required hardware

CN PoE specifications

Feature	Specification or description
Channel modes	2 and 4
Lighting modes	Continuous and strobe
Trigger-Link Mode	Turns on both channels with a single trigger
Trigger-Rotation Mode	In the order of the channel number, trigger input controls the lamps.
Intensity levels	256
Supported CCS LED lights	Approximately 350 different models (up to 10 W total)

Table 2: CN-PoE specifications

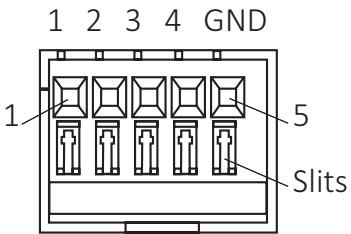## CN-PoE trigger input terminal description

	Pin	Signal
	1	Trigger signal L1
	2	Trigger signal L2
	3	Trigger signal L3
	4	Trigger signal L4
	5	Trigger signal L5
	L1 to L5 represent Light1 to Light5.	

Table 3: CN PoE trigger input terminal pin assignment

CN-PoE trigger wiring specifications

Feature	Value
Type	Solid wires or stranded wires AWG 28 to 22
Stripping length	9 mm
Cable length	Maximum 2 m

Table 4: CN-PoE trigger wiring specifications

Connecting trigger cables

	NOTICE
!	**Damage to the connected devices** • Observe polarity. • Avoid short circuits when you insert the wires.

Do the following for the corresponding trigger connection.
1. Push and hold the slit with a flat-blade screwdriver.
2. Pushing the slit, insert the wire into the terminal.
3. Release the slit.

Trigger logic on CN-PoE

The following tables display how signals are used to trigger lights.

> When the lighting mode is set to **continuous**, the lighting status depends on your settings by Ethernet communications.

Trigger signal state	Input pin state
On	One of the pins 1 to 4 and pin 5 are **open**.
Off	One of the pins 1 to 4 and pin 5 are **closed**.

Table 5: Trigger logic on CN-PoE trigger controller

Trigger logic[1]	Trigger signal	Lighting mode = continuous[2]		Lighting mode = strobe[2]
		Light = on (default)	Light = off	
Normal (default)	On	Light unit = on	Light unit = off	Light unit = flash
	Off	Light unit = off	Light unit = off	Light unit = off
Reversed	On	Light unit = on	Light unit = off	Light unit = off
	Off	Light unit = on	Light unit = on	Light unit = flash
[1]Trigger command setting			[2]On or off controlled by Ethernet communications	

Table 6: Selecting the lighting status on CN-PoE trigger controller

> **Available downloads**
> - **Sample application** to configure the CN-PoE, such as for intensity and lighting mode
> - CN-PoE **manual**
>
> See www.ccs-grp.com/products/series/302.

I/O connections

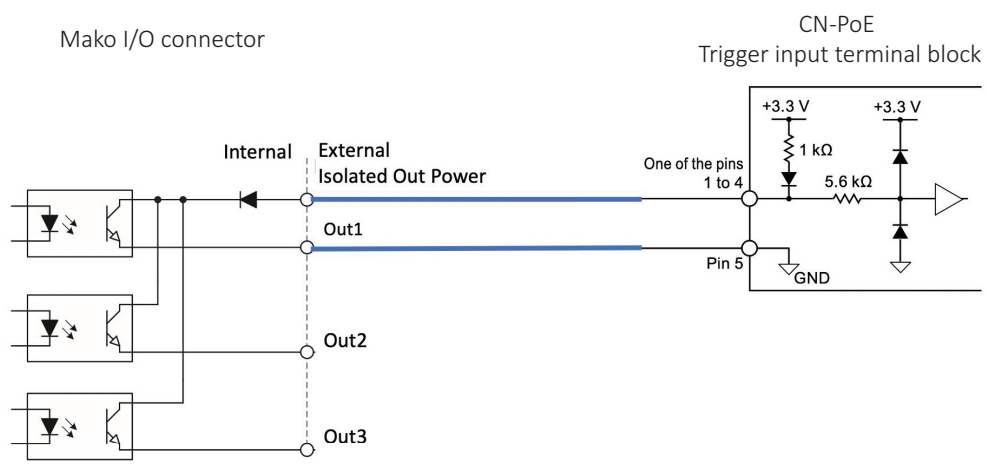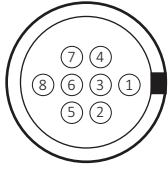Figure 2 describes how Mako outputs connect to CN-PoE trigger inputs.

Figure 2: I/O connection between Mako and CN-PoE

Mako output description

> Mako cameras are not intended to be connected to a DC distribution network. The maximum length for I/O cables must not exceed 30 meters.

The general purpose I/O port uses a Hirose HR25-7TR-8PA(73) connector on the camera side. The mating cable connector is Hirose HR25-7TP-8S. Table 3 describes the I/O connector pin assignment, camera side Hirose HR25-7TR-8PA(73).

Pin	Signal	Direction	Level	Description
1	Out 1	Out	Open emitter, maximum 20 mA	Opto-isolated output 1
2	Out 2	Out	Open emitter, maximum 20 mA	Opto-isolated output 2
3	Out 3	Out	Open emitter, maximum 20 mA	Opto-isolated output 3
For input definitions, see the Mako manual.				

Table 7: Mako output pin assignment

Mako feature configuration

We recommend you to use the following settings.

Light pulse width equal to exposure time

Feature group	Feature	Value
Strobe	StrobeDelay	0
	StrobeDuration	0
	StrobeDurationMode	Source
	StrobeSource	Trigger
SyncOut	SyncOutLevels	0
	SyncOutPolarity	Negative
	SyncOutSelector	SyncOut1
	SyncOutSource	Exposing

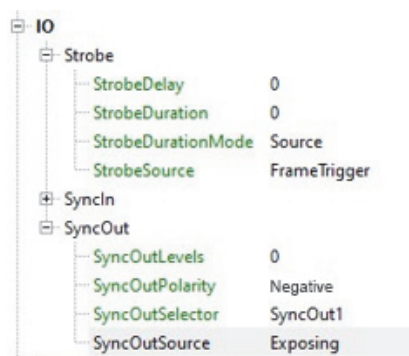*Table 8: Feature configuration for light pulse width equal to exposure time*

Figure 3: Feature configuration for light pulse width equal to exposure time

Start of exposure with a timed strobe delay and duration

Feature group	Feature	Value
Strobe	StrobeDelay	10^1
	StrobeDuration	100^1
	StrobeDurationMode	Controlled
	StrobeSource	Exposing
SyncOut	SyncOutLevels	0
	SyncOutPolarity	Negative
	SyncOutSelector	SyncOut1
	SyncOutSource	Strobe1
[1]Example values		

Table 9: Feature configuration for start of exposure with a timed strobe delay and duration
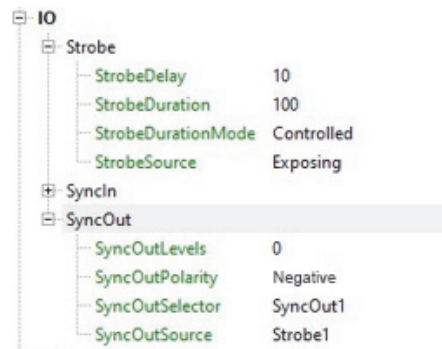

Figure 4: Feature configuration for start of exposure with a timed strobe delay and duration

Lighting with Effilux

Effilux lights are equipped with high power LEDs and provide multiple solutions with the ability to create a variety of illumination performances. Effilux provides bar lights, ring lights, back lights, flat dome lights, and more.

Using Effilux lights with Mako cameras

Effilux lights have a built-in controller, so they can work directly with Allied Vision cameras, no additional light controller is required.

Flood lights

The lens inside the light can be adjusted to different positions to control the emitting angle. This way, the same light can be made into a narrow or wide light, or a median of the two.
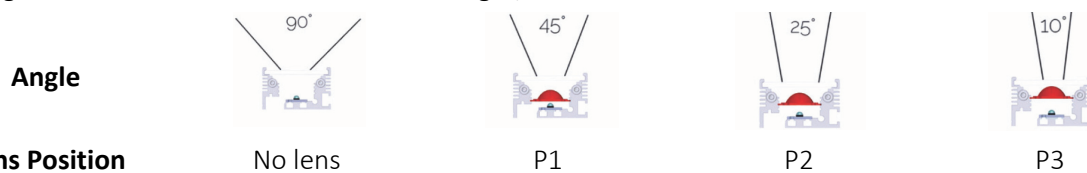
Angle	90°	45°	25°	10°
Lens Position	No lens	P1	P2	P3

Figure 5: Adjusting the lens of the light

Bar light: Effi-Flex

The Effi-Flex LED bar light is equipped with high power LEDs. The flexibility of the light creates solutions for a variety of applications.

www.effilux.com/en/products/led-bar/effi-flex#optical

In addition to the ability to adjust the lens of the light, you can select between three different windows to create the perfect balance between intensity and uniformity for your individual application.
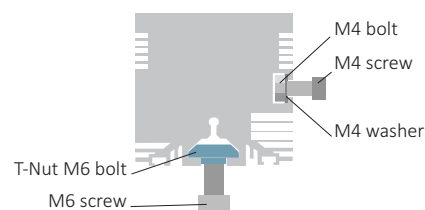
Maximum intensity ◄──────► Maximum uniformity

Figure 6: Selecting the window of the light

Accessories

Use the **polarizer** to remove glare and the **line scan diffuser** to increase light uniformity.

Benefits

- Lengths from 50 mm to 4 meters
- IP-class: IP67 or IP69K
- Easy mounting by standard T-slot (see right)

M4 bolt
M4 screw
M4 washer
T-Nut M6 bolt
M6 screw

Intensity and time

The trigger width equals the light pulse width. Figure 7 describes the behavior when Effi-Flex is triggered in auto-strobe mode. If the trigger signal is less than 2 s, the light overdrives at 300% intensity for two seconds. If the trigger signal is longer than 2 s, the light overdrives at 300% intensity for two seconds, then switches to continuous mode with normal 100% intensity to avoid overheating.
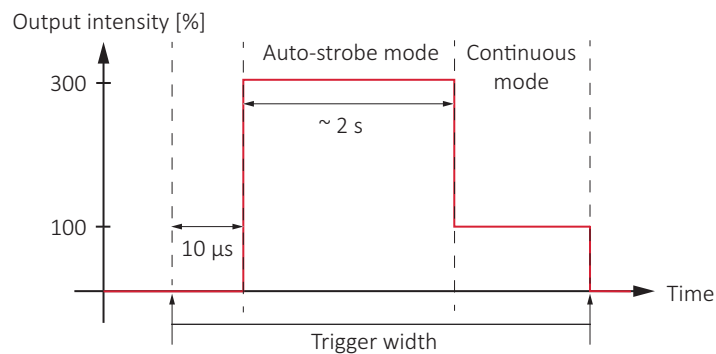

Figure 7: Effi-Flex intensity and time

Ring light: Effi-Ring

The Effi-Ring is a high-power adjustable ring light. With the same flexibility as the Flex, it can solve many applications. It is a good match for robot guidance applications and wide FOV (field of view) inspections.

www.effilux.com/en/products/ring/effi-ring#optical.

In addition to the ability to adjust the lens of the light (see Figure 5 **on page** 8), you can select between three different windows to create the perfect balance between intensity and uniformity for your individual application.

Maximum intensity ← → Maximum uniformity

Figure 8: Selecting the window of the light

Accessories

Use the **polarizer** to remove glare and the **line scan diffuser** to increase light uniformity.

Benefits

- Easy mounting for optional accessories
- Mounting system compatible with Allied Vision cameras

Intensity and time

The trigger width equals the light pulse width. Figure 9 describes the behavior when Effi-Ring is triggered in auto-strobe mode. If the trigger signal is less than 2 s, the light overdrives at 700% intensity for two seconds. If the trigger signal is longer than 2 s, the light overdrives at 700% intensity for two seconds, then switches to continuous mode with normal 100% intensity to avoid overheating.
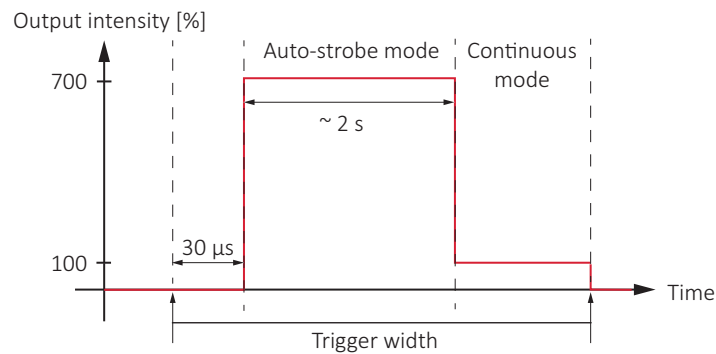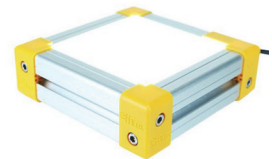

Figure 9: Effi-Ring intensity and time

Other lights

Back light: Effi-BL

This strong and robust LED back light has superior uniformity for highest contrast.

- Any size in 50 mm increments up to 1 m squared
- IP class: IP67 or IP69K
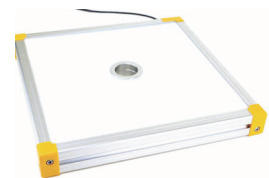
www.effilux.com/en/products/backlight/effi-bl#optical

Flat dome light: Effi-FD

This powerful and robust backlit LED flat dome light has a high uniformity for improved contrast.

- Any size in 50 mm increments up to 1 m squared
- Lens hole sizes: 39 mm, 50 mm, 58 mm, and 65 mm

www.effilux.com/en/products/backlight/tbd.

Effi-Bl and Effi-FD support continuous mode, but not auto strobe mode.

Triggering Effilux lights

In the following application example, Mako cameras trigger Effilux lights by a camera trigger cable.
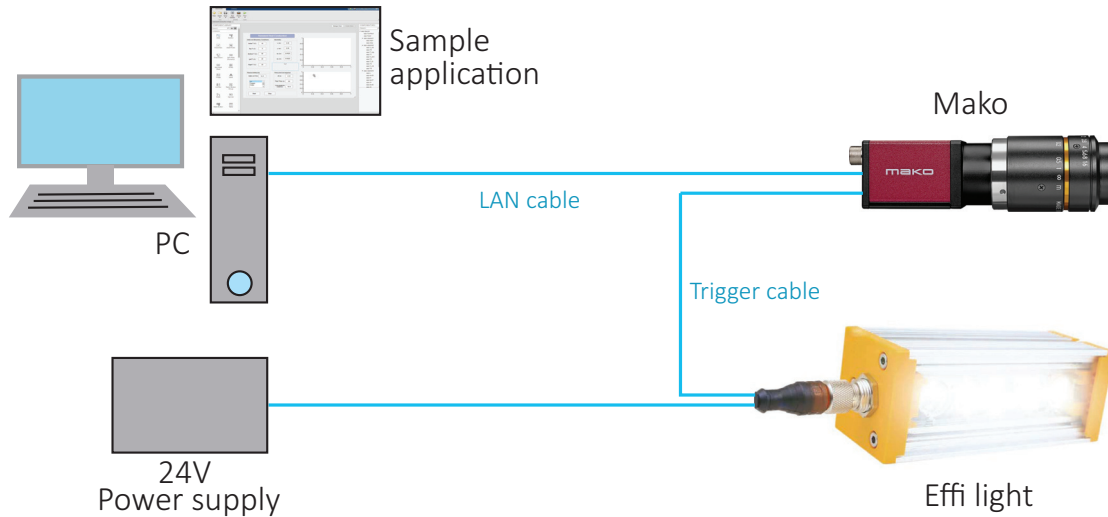
Setup

Figure 10: Application setup with Mako triggering Effilux lights

Required hardware

Table 10 lists the included components. Bullets show where you can select between various items.

| Component	Product	Product details
Camera	Mako	All models
Camera I/O cable	Hirose 8-pin female to open end	• K1200196 (2 m) • K1200197 (5 m)
Lighting system	Effilux light	• Effi-Flex (Adjustable beam angle LED bar) • Effi-Ring (Adjustable beam power ring) • Effi-BL (Backlight) • Effi-FD (Flat dome)
Lighting I/O and power cable	M12 female to open end	• EFFC-CAB-M12-F-5-D-L2[1] • EFFC-CAB-M12-F-5-D-L5[1] • EFFC-CAB-M12-F-5-D-L10[1]
[1]Length in meter		

Table 10: Required hardware

Effilux light connector
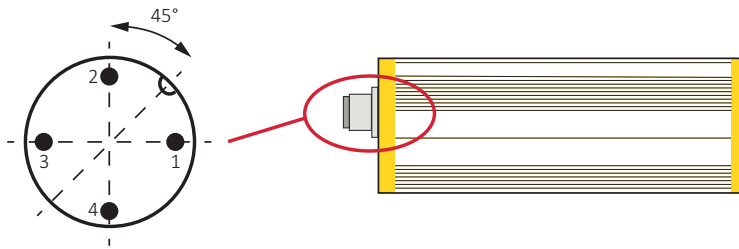
Figure 11: Effilux light connector pin assignment

Pin	Signal	Level	Description	I/O cable color
1	PWR IN	+24 VDC	Power supply voltage	Brown
2		Not applicable		White
3	GND	0 VDC	Power supply ground	Blue
4	IN	See Pin 2, EXT-GPIO 0	Trigger PNP (rising edge) for auto-strobe if $V_{PNP} > 3$ VDC	Black

Table 11: Effilux light connector pin assignment

I/O connections

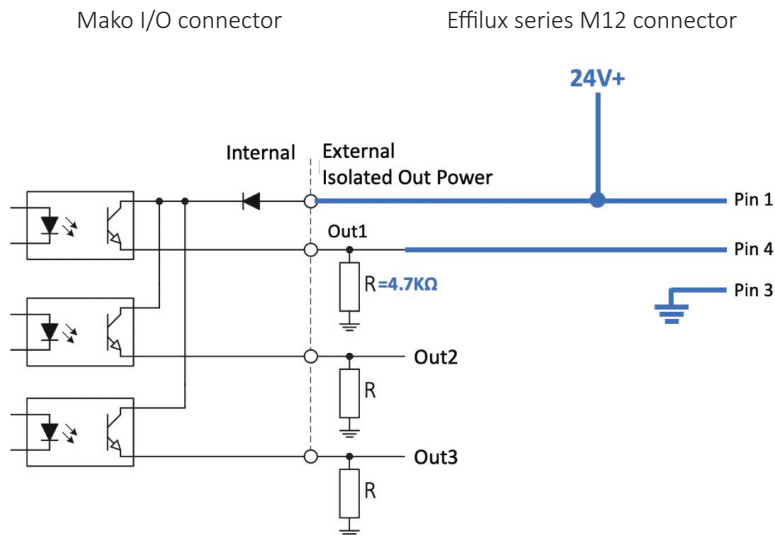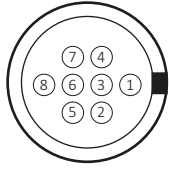Figure 12 describes how Mako outputs connect to Effilux lights.

Figure 12: I/O connection between Mako and Effilux lights

Mako output description

Mako cameras are not intended to be connected to a DC distribution network. The maximum length for I/O cables must not exceed 30 meters.

The general purpose I/O port uses a Hirose HR25-7TR-8PA(73) connector on the camera side. The mating cable connector is Hirose HR25-7TP-8S. Table 3 describes the I/O connector pin assignment, camera side Hirose HR25-7TR-8PA(73).

Pin	Signal	Direction	Level	Description
1	Out 1	Out	Open emitter, maximum 20 mA	Opto-isolated output 1
2	Out 2	Out	Open emitter, maximum 20 mA	Opto-isolated output 2
3	Out 3	Out	Open emitter, maximum 20 mA	Opto-isolated output 3
For input definitions, see the Mako manual.				

Table 12: Mako output pin assignment

Mako feature configuration

We recommend you to use the following settings.

Light pulse width equal to exposure time

Feature group	Feature	Value
Strobe	StrobeDelay	0
	StrobeDuration	0
	StrobeDurationMode	Source
	StrobeSource	Trigger
SyncOut	SyncOutLevels	0
	SyncOutPolarity	Normal
	SyncOutSelector	SyncOut1
	SyncOutSource	Exposing

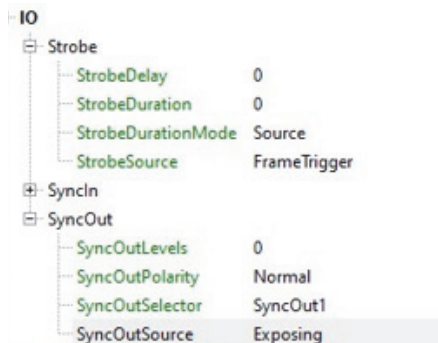*Table 13: Feature configuration for light pulse width equal to exposure time*

Figure 13: Feature configuration for light pulse width equal to exposure time

Start of exposure with a timed strobe delay and duration

Feature group	Feature	Value
Strobe	StrobeDelay	10^1
	StrobeDuration	100^1
	StrobeDurationMode	Controlled
	StrobeSource	Exposing
SyncOut	SyncOutLevels	0
	SyncOutPolarity	Normal
	SyncOutSelector	SyncOut1
	SyncOutSource	Strobe1
[1]Example values		

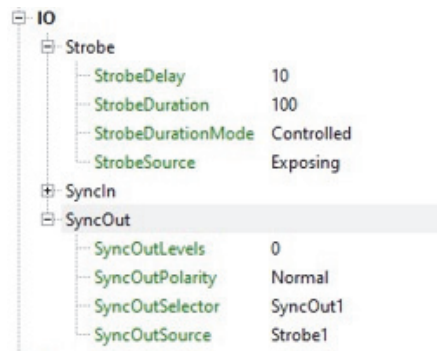*Table 14: Feature configuration for start of exposure with a timed strobe delay and duration*

Figure 14: Feature configuration for start of exposure with a timed strobe delay and duration

Technical data and ordering

CCS and Effilux equipment

Website

CCS products
www.ccs-grp.com

Effilux products
www.effilux.com

Headquarters

CCS America, Inc.
6 Lincoln Knoll Lane
Suite # 102
Burlington, MA. 01803

T// 781-272-6900

Email

Sales
sales@ccsamerica.com

Mako cameras

Website

General
www.alliedvision.com/en/contact

Distribution partners
www.alliedvision.com/en/about-us/where-we-are

Email

General
info@alliedvision.com

Support
support@alliedvision.com

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Europe, Middle East, and Africa	T// +49 36428 677-230
North and South America	Toll-free: +1 877 USA 1394
	T// +1 978 225 2030
	California: +1 408 721 1965
Asia-Pacific	T// +65 6634 9027
China	T// +86 21 64861133

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