# Ophir Optical Camera Trigger™
# User Guide

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# Chapter 1 -– General Information

## 1.1. Introduction

The Optical Camera Trigger is an optical sensor that detects pulsed light sources and generates an output to trigger a camera or similar device. It provides two types of outputs – TTL logic output and "Open Drain" output. The type of output used depends on the characteristics of the camera or other device.

Several cable assemblies are designed for use with cameras sold by Ophir-Spiricon. Please specify which cable is needed when ordering.

***WARNING:***

***To prevent electrical shock, do not remove covers. No user serviceable parts are inside. Defer servicing to qualified service personnel.***

## 1.2. Maintenance and Cleaning

Aside from battery replacement, any internal maintenance or repair of the Optical Camera Trigger must be done by the factory. The exterior of the device may be cleaned with a soft, damp cloth and non-abrasive liquid. Use filtered compressed air to remove dust particles from the surface of the optical sensor.

# Chapter 2 – Setup and Operation

## 2.1. Setup

The key to successful use of the Optical Trigger is to first determine what light source will serve as the trigger source. Once this has been decided, a mounting scheme may be selected.

### 2.1.1. Configuring the Optical Source

The front aperture of the Optical Trigger must be directed at a light source that provides the necessary properties for trigger activation (e.g. a laser flash lamp or a pick-off source from the main beam). The light source may be a direct or indirect pulsed waveform.

The Optical Trigger system is supplied with a C-Mount adapter, a ¼-20 adapter, M6-1.0 adapter and Through-Hole adapter options which allow attachment of the Optical Triger in a multitude of mounting configurations. Mounting is not limited to the few options presented here.

*Note: When mounting the Optical trigger, ensure the trigger output cable cannot be introduced into the beam path during operation.*

**C-mount Adapter with CCD Cameras**

**LT665**

**SP920G**

**SP900 Series**

The Optical Trigger is mounted parallel to the beam path in these instances. The C-mount adapter allows the Optical Trigger to rotate to any desired orientation around the camera aperture.

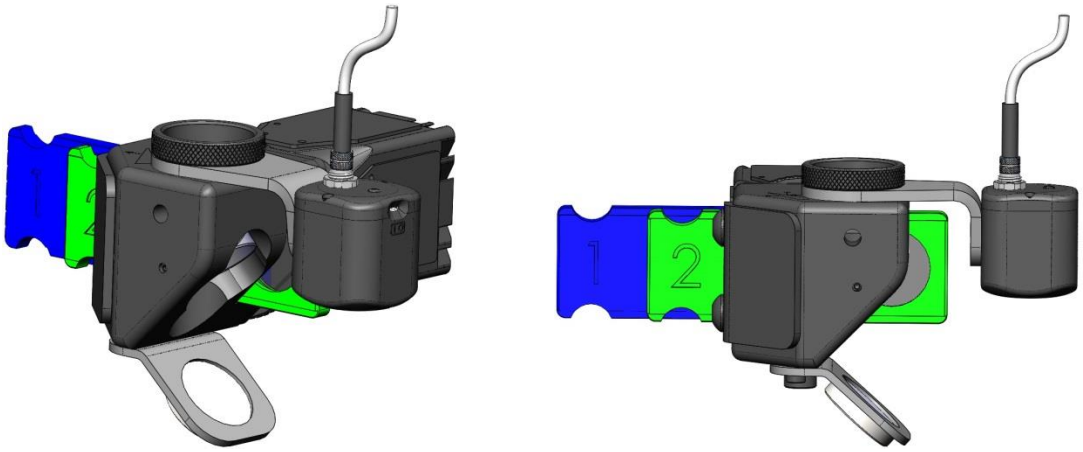
**C-mount Adapter with Pyrocam Cameras**

**Pyrocam III$_{HR}$**

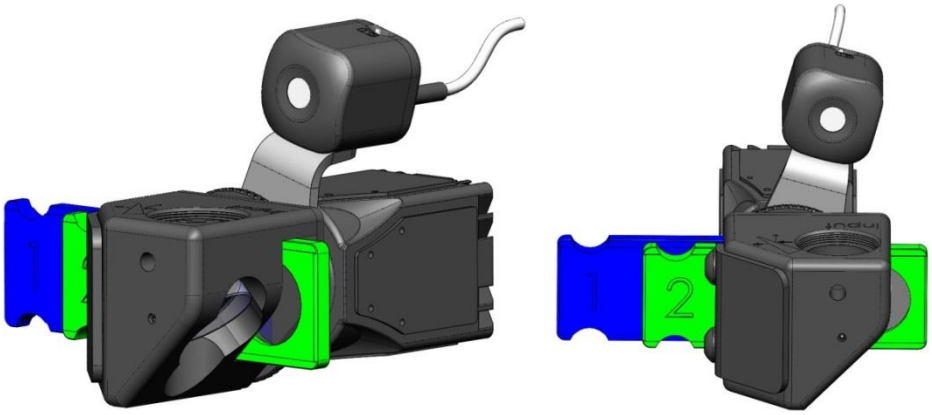
**Pyrocam IV**

When using the C-Mount adapter with the Pyrocam cameras the Optical Trigger is limited in its orientation. This is due to the output cable on the rear face of the Optical Trigger.

**C-mount Adapter with LBS-300 Beam Sampler**

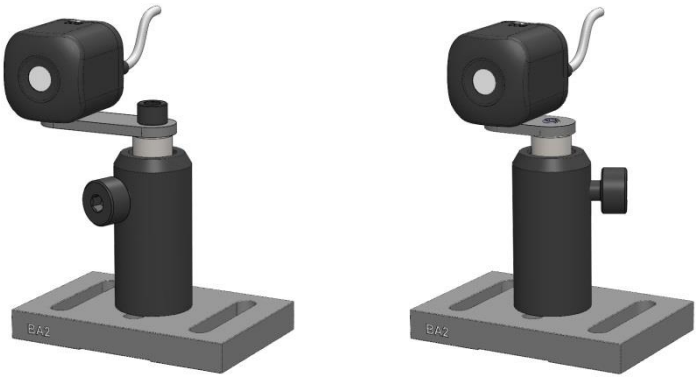



In the images above, an LT665 is coupled with a LBS-300. The Optical Trigger is mounted to the Input C-mount on the LBS-300, viewing the beam as it reflects off the deflector on the bottom of the LBS-300.




In the next example, the Optical Trigger is mounted between the LT665 and the LBS-300. This configuration is triggering by the beam as it enters the LBS-300. Note the Optical Trigger is rotated so the beam passes directly in front of the Optical Trigger detector.

### Through-Hole and Threaded Mounts



There are 3 options of post mounts: through-hole mount (above left), ¼-20 threaded mount, and M6 threaded mount (above right). Each adapter can be mounted in 4 different orientations on the Optical Trigger 90° apart.

*Note: If the through-hole mount is used in the forward or rear position a low profile screw may be required.*

### Through-Hole Mount with Pyrocam and L11059

**Pyrocam IIIHR** **Pyrocam IV** **L11059**

The through-hole mount may be utilized to mount the Optical Trigger to any available ¼-20 or M6 threaded hole in the camera body such as those available on the L11059 or the Pyrocam.

The through-hole mount may also be assembled between the camera body and an optical mounting post if desired.

### 2.1.2. Connect the Cable Assembly

Plug the cable assembly that was shipped with the device into the back of the Optical Trigger. Tighten the connection by turning the knurled thumbscrew on the connector clockwise.

### 2.1.3. Powering the Device

The Optical Trigger is powered from either the internal battery or from the host camera if the camera provides power for an external device. The SP920G and SP907 cameras support this option. To turn the Optical Trigger device on, slide the switch on the top of the housing to the On position (see Figure 1).

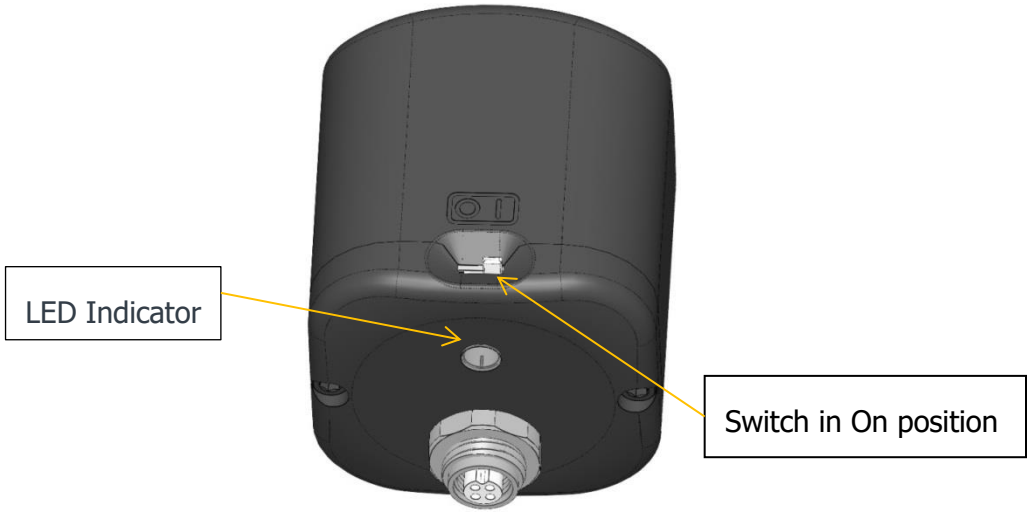



*Figure 1*

## 2.2. Battery Removal and Installation

1. Unscrew cable assembly from the back of the unit (see Figure 2).

*Figure 2*

2. Remove the two screws holding the back cover with a 1/16 hex wrench (see Figure 3).

*Figure 3*

3. Slide the back cover with the attached battery circuit out of the device housing (see Figure 4).

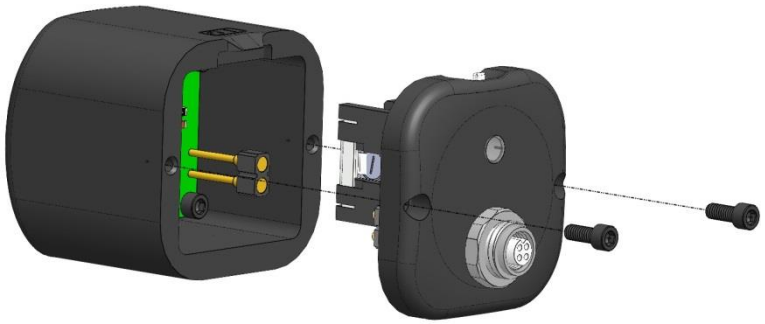


*Figure 4*

4. Replace the battery making sure to observe polarity (see Figure 5).

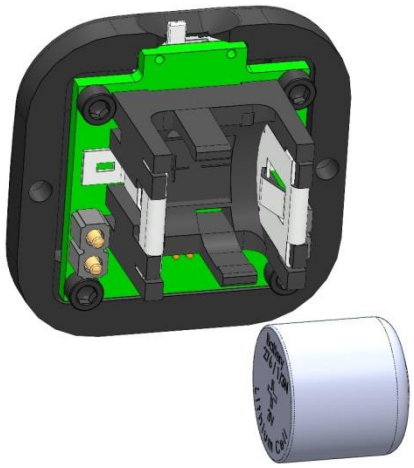


*Figure 5*

5. Reassemble in reverse order.

## 2.3. Operation

The Optical Trigger is designed to produce a TTL/CMOS compatible pulse capable of triggering a camera when energy from a pulsed light source is received. Below are examples of possible light sources:

1. Direct impingement from low power laser source
2. Beam splitter pick-off of main beam
3. Flash lamp/backscatter

The trigger circuit is designed to reject steady background light and pulse trains with a frequency higher than 1KHz.

## 2.4. Troubleshooting

### 2.4.1. Multiple or False Triggers

The most common concern with the Optical Trigger is false triggering/multiple triggers from a single light pulse. Although the trigger circuit is designed with hysteresis to reject most false events, some may still occur due to setup and environmental issues. To help reduce the incidents of multiple trigger events:

1. Make sure that the Optical Trigger has adequate power – replace old batteries or verify the external source is providing at least 3.0V.
2. Keep trigger cable away from noisy electrical appliances and other cables.
3. Do not use extensions or unnecessarily long trigger cables. Avoid branching circuits or terminators on the trigger cable.
4. Add or remove attenuation (e.g. ND filters) in the optical path to trigger.

### 2.4.2. Battery Life

The life of the battery is mostly affected by the trigger frequency, the trigger period, and the amount of drive current required by the camera's internal trigger circuit. Many cameras have optically isolated triggers which require more current than standard logic triggers. The lithium battery used by the Optical Trigger is rated for 160mAh. The quiescent current needed by the device is much less than 1mA. Under typical use the battery should last 15 to 30 days.

# Appendix A – Optical Camera Trigger Specifications

**GENERAL**

Wavelength range:

| | |
|---|---|
| Model 1100 | 190nm to 1100nm |
| Model 1800 | 320nm to 1800nm |

Detector Array Details

| Model | Model 1100 | Model 1800 |
|---|---|---|
| # Elements | 1 | 1 |
| Material | Si | InGaAs |
| Active Area | 2.4mm x 2.4mm | Ø 0.3mm |

| | |
|---|---|
| Minimum Pulse Width | 1us |

Optical Threshold

| Wavelength | Model 1100 | Model 1800 |
|---|---|---|
| 200nm | 10.0uJ | N/A |
| 633nm | 3.5uJ | N/A |
| 1064nm | 5uJ | 1.4 uJ |
| 1550nm | N/A | 1uJ |

| | |
|---|---|
| Mounting | see section 2.1.1 |

**TRIGGER OUTPUT**

| | |
|---|---|
| Interface | TTL/CMOS compatible logic, 20mA sourcing |
| Output Logic High | 3.0 – 4.5 VDC |
| Output Logic Low | 0.0 – 0.8 VDC |
| Maximum Output Current | 20mA |

**ENVIRONMENTAL**

| | |
|---|---|
| Operating Temperature | +5°C to +50°C |
| Storage Temperature | -30°C to +85°C |
| Humidity | 95% max non-condensing |

**POWER REQUIREMENTS**

| | |
|---|---|
| Battery | 3V Lithium/Manganese Dioxide ($LiMnO_2$) |
| | Size 276 / 1/3N (see 0 for equivalents) |
| DC Input | 3VDC—5VDC, device dependent |

**WEIGHT**

| | |
|---|---|
| Trigger | 49.6 g (1.75 oz.) |

**DIMENSIONS**

See 0

**ELECTRICAL**

| | |
|---|---|
| Supply Current | 0.5 mA |
| Power Consumption | 2.5mW max |
| TTL/CMOS Output | 5VDC max / 20mA max |
| Maximum Trigger Rate | ~1 kHz |

## Appendix B - Optical Camera Trigger Dimensions

(without cables)

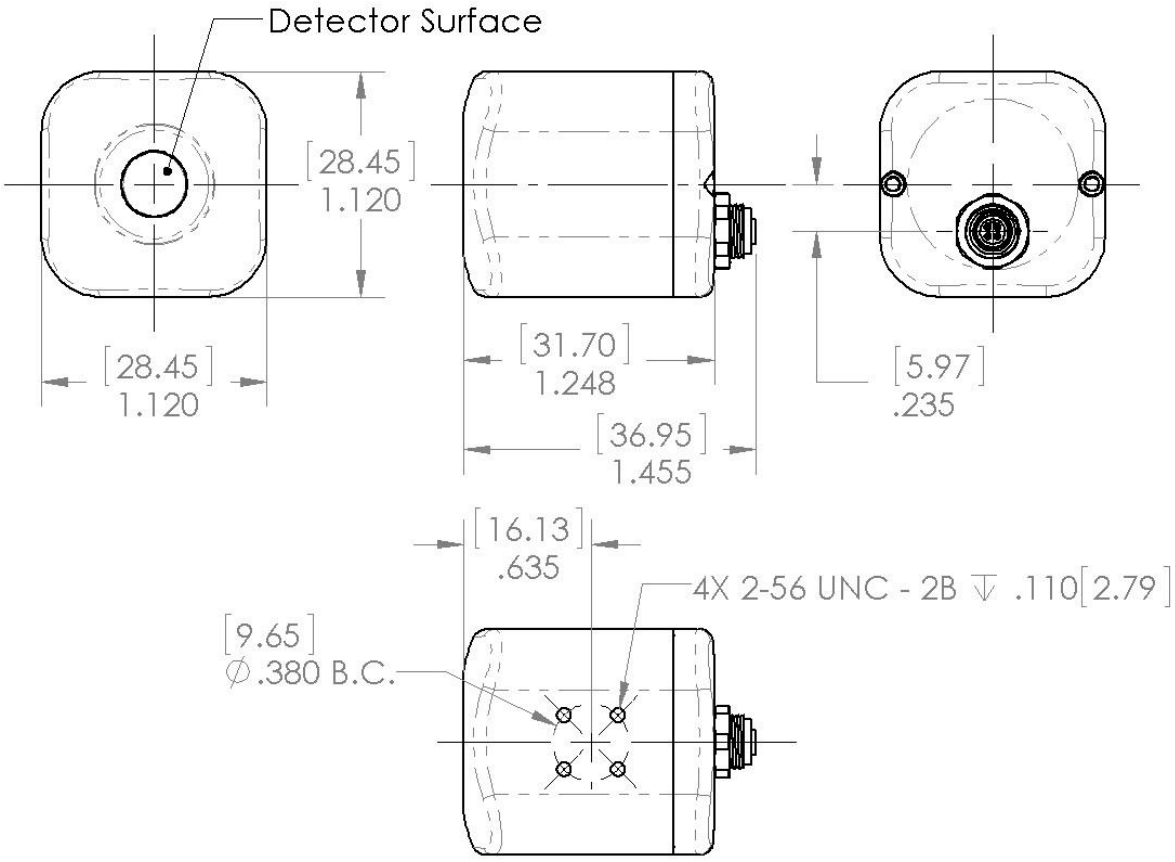



Photo Diode Trigger

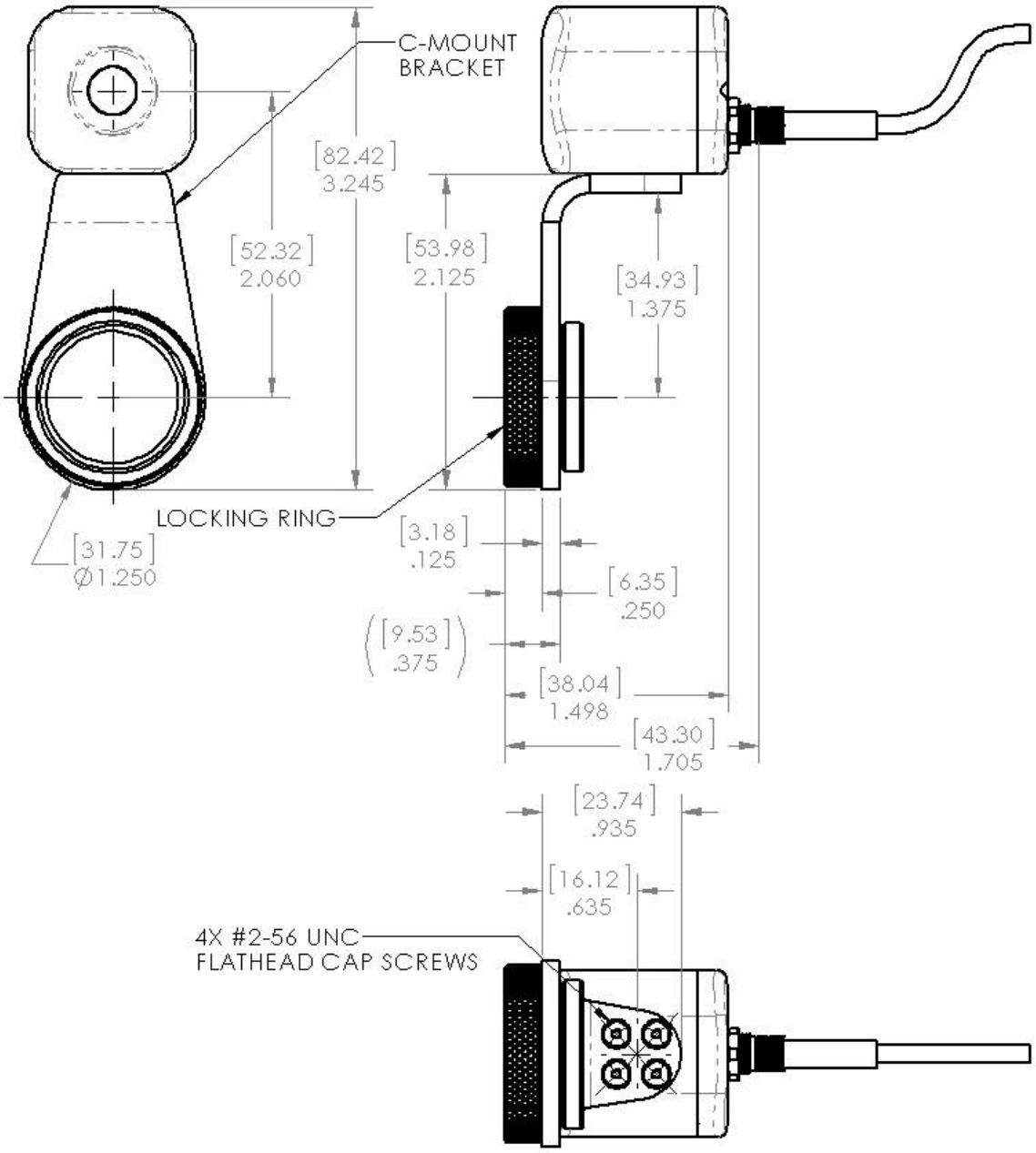
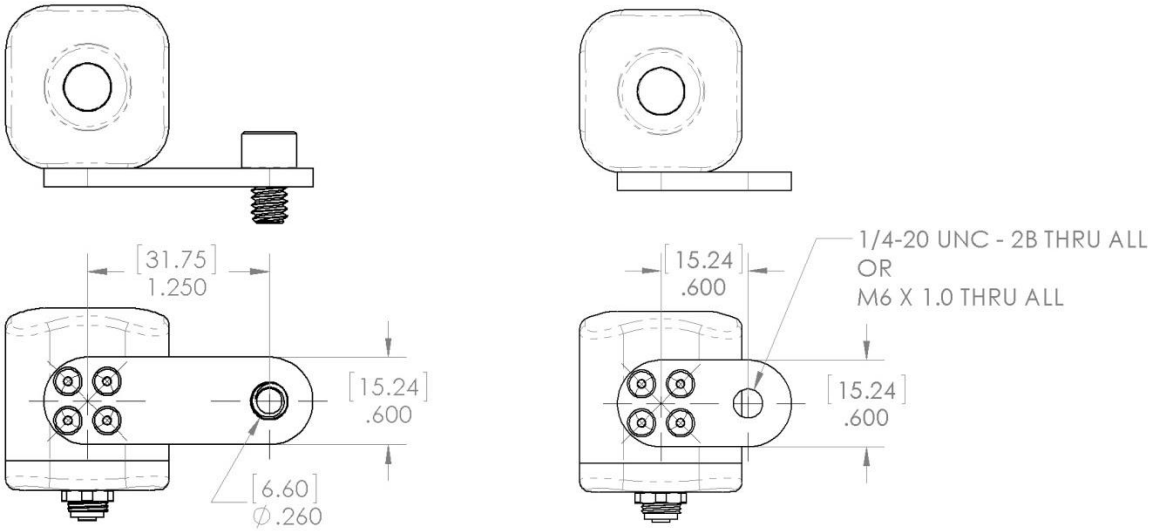



Photo Diode Trigger with C-mount Adapter

The C-mount bracket can be mounted in 4 different directions on the Optical Trigger 90° apart. The Locking Ring can be mounted in the forward position as shown above, or reversed on the C-mount Bracket. This allows the Optical Trigger to be rotated around the Locking ring to the user's desired location. The Locking Ring has external and internal C-mount threads. Therefore you can include it in a stack of attenuation filters, tubes, etc.




The Thru-Hole Adapter and Thread Mount Adapter can be mounted in 4 different directions on the Optical Trigger 90° apart. If the Through-Hole Adapter (above left) is used in the forward or rear position a low profile screw like a Button Head may be required for the application.

## Appendix C - Camera Cable Assemblies

| Camera | Cable Assembly Part No. |
|---|---|
| SP920G | SP90430 |
| SP900 Series | SP90431 |
| SMA | SP90432 |
| BNC | SP90434 |

All cables are 6 feet in length.

## Appendix D – Battery Compatibility Cross-Reference

Duracell DL-1/3N
3N
Ray-O-Vac 867
2L76
Energizer 2L76BP
2L76-BP
CR1108
IEC CR11108
CR1-3N
DL1-3N
Dantona Comp 15
Duracell DL1/3N
NL1/3N
Energizer LR1/3N
Eveready 2L76
L76BP

I.E.C. 3V CR1/3N
CR1/3N
CR11108
Innotek M041101
Kodak K58L
National HM-N
NR-52
NEDA 5008L
5008LC
Nikon F-1
Sony CR1/3N
Varta CR1/3N
LaserMax LMS-1/3N
LaserMax LMS-1/3N 5PK
LaserMax LMS-UNI-G

## Appendix E – Mounting Options

| | | |
|---|---|---|
| SP90437 | C-Mount Mounting Plate & Locking Ring |  |
| SP90436 | Through-Hole Mounting Plate |  |
| SP90434 | ¼-20 Mounting Plate |  |
| SP90435 | M6 X 1.0 Mounting Plate |  |

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