

# CamIR<sup>1550</sup>Adapter

#### **MANUAL | NOTES FOR OPERATION**





### Thank you for choosing the **CamIR**<sup>1550</sup> **Adapter**. Before proceeding to install the device, please read the contents of this Operation Manual.

The CamIR<sup>1550</sup> Adapter inserts between a large format lens and a 1/2" CCD camera.

The CamIR1550 Adapter has a 17.5mm back focal length for attaching to a 1/2" C-mount CCD camera, and an M42 lens mount (C-mount adapter also supplied) which allows connection of a large format lens. A focus ring toward the rear of the CamIR<sup>1550</sup> Adapter allows focus adjustment for wavelength-focus variation and focus optimisation onto the CCD camera.



#### WARRANTY

Scintacor warrants that all products sold will be to the agreed specification, free from defective materials and workmanship from the invoice date and that if such defects occur within the first year following purchase, the defective items will be replaced or the entire unit will be repaired, free of any charges to the buyer other than expenses incurred in returning the unit to the factory. Scintacor's obligation under this warranty is specifically limited to the aforementioned replacements or repairs, and their obligation with respect to transportation expenses is limited to the cost of shipping the repaired or replaced items to the buyer.

### choosing the right camera

#### Sensitivity

For optimal 1550nm conversion choose a camera that has high NIR spectral sensitivity at the tail end of the silicon response curve. The 975-1025nm range is of particular importance for the CamIR<sup>1550</sup> Adapter.

Many cameras have IR cut-off filters in front of the CCD which can easily be identified by their blue tint. In this case the CamIR<sup>1550</sup> Adapter will not function efficiently for 1550nm conversion.

Sensitivity is also determined by the gain of the camera. High gain cameras with minimum sensitivity levels below 0.01 LUX are ideal, but also cameras with the ability to integrate are particularly useful for improving the sensitivity.

*For example:* The COHU-4920 with a SONY EXView CCD is particularly suitable which has a cooled CCD yielding low noise and high 975-1025nm sensitivity whilst allowing integration control and manual gain control.

#### Resolution

Resolution can be optimised by using a good quality lens which has an image format size of >28mm; 35mm photographic lenses with macro functionality are particularly suitable.

The CamIR<sup>1550</sup> Adapter is specifically designed to interface with cameras with 1/2" CCD format. Choose this format to ensure the full active area of the CCD is filled.

1/3" CCD cameras can be used, but the image resolution will be reduced. 2/3" CCD cameras may show clipping around the perimeter of the image.

#### **Dynamic Range**

Dynamic range of the camera is important due to the non-linear relationship between input power and output power of the 1550nm conversion within the CamIR<sup>1550</sup> Adapter.

The following table gives an idea of the IR converted dynamic range which can be expected from specific cameras:

Camera example	Camera dynamic range (S:N ratio)	Estimated system dynamic range (S:N ratio)
WATEC 902	43 dB	30 dB
	(1:140)	(1:30)
COHU 4910	56 dB	40 dB
	(1:630)	(1:100)
VDS-CCD-1300	LN	
12-bit	66 dB	48 dB
	(1:2000)	(1:250)
14-bit	85 dB	60 dB
	(1:16384)	(1:1000)
16-bit	96 dB	68 dB
	(1:65536)	(1:2500)



## choosing the right lens

#### When choosing a lens, two primary factors are considered:

What is the required field of view (FOV)?

What is the required working distance (WD)?

The CamIR<sup>1550</sup> Adapter has a 27.5mm diameter active area that requires a lens able to generate an image of equally as large diameter. Standard CCD camera lenses are generally designed for up to 2/3" format CCD's which have an 11mm active diameter. Lenses which produce larger images are called 'large format lenses'.

Large format lenses are readily used in photography, although these usually have long working distances. Photographic Macro lenses allow close up photography and may be a convenient choice for use with the CamIR<sup>1550</sup> Adapter. The disadvantage of this type of lens is that a bayonet to C-mount adapter must also be used to enable attachment to the CamIR<sup>1550</sup> Adapter.

A good range of large format lenses are available for line scan cameras. These lenses typically have either an F-mount or M42 mount. F-mount to C-mount adapters are available. M42 mount lenses will attach directly to the CamIR<sup>1550</sup> Adapter.

#### Example:

format lens

A user wishes to look at a light source which is 100mm wide from a distance of around 500mm. What focal length lens is needed when using the CamIR<sup>1550</sup> Adapter with a 1/2" CCD camera?

Using the relation: FOV = WD x Sensor size / Focal length

 $100 = 500 \times 22 / f$ => f = 110 mm

A large format lens of this focal length may or may not be available. In this case a 90mm focal length TAMRON SLR lens is available, but this would necessitate an adjustment in the WD in order to maintain the desired FOV:

 $100 = WD \times 22 / 90$ => WD = 409 mm.

(Other factors such as resolution, depth of focus and distortion should also be considered but are not discussed in further detail here. The user should also consider using extension tubes as a simple way of reducing the WD of a photographic lens)

35mm lens shown with C-mount adapters



### cleaning optical surfaces

#### Dust

Use a lens blower or compressed inert gas in a can. **DO NOT WIPE with a cloth.** If this fails to remove the dust then use a lens brush and lightly brush from the centre outward.

#### **Finger Prints**

Ensure there is no dust or dirt on the lens surface. Use a lens cleaning cloth with lens cleaning fluid and follow the instructions of the lens cleaner.

#### CAUTIONS

- Do not submerse or expose to moisture.
- Do not apply pressure to the front window.
- Do not look directly at a light source through the adapter with the eye.
- Do not drop or subject to high levels of shock.
- Both optical surfaces are antireflection coated. However, take the necessary precautions to ensure there are no hazardous reflections when working with lasers.
- Do not attempt to dismantle the CamIR<sup>1550</sup> Adapter. The manufacturer cannot be held responsible for equipment failure or personal injury caused by such action. Such action will invalidate the warranty.
- Do not exceed the maximum illumination limit. This may cause damage to the CamIR<sup>1550</sup> Adapter and will invalidate the warranty.
- Damage to the optical surfaces may occur from poor cleaning practices. Such damage will degrade the image quality and is not covered under the warranty.



# technical specification

Optical		
Active Area	Ø 27.5mm (22 x 16.5mm with 1/2" CCD camera)	
IR Spectral Sensitivity	1495 - 1595nm	
Peak IR Sensitivity	1510 / 1540nm	
Maximum Resolution	12 lp/mm over active area. 40 lp/mm at CCD focal plane	
Converted IR output $\lambda$	950 - 1075nm	
Distortion	-1.0% Distortion (inverted image) (Mottling of the image is normal and is characteristic of the IR converter)	
Linearity	Non-linear. IR converted output ∞ IR input intensity ^1.41	
1465 - 1595 nm Efficiency	0.001% @ 1 W/cm <sup>w</sup> (reduces with reducing illumination)	
Spectral Transmission	360 - 2000 nm at f/# F30.8	
Maximum Illumination	1 W/cm <sup>2</sup> (damage may occur if this limit is exceeded)	
Dynamic Range	Examples of expected dynamic range: Analogue cameras: WAT902 (30 dB), Cohu 4920 (40 dB) Digital cameras: VDS1300LN 12 bit (48 dB), 16 bit (68 dB)	

#### Technical

Dimensions	Ø 46mm x L 97mm	
Operating Temperature	-10°C to +40°C	
Storage Temperature	-20°C to +50°C	
Moisture Protection	None	
Shock	Avoid severe shock. Do not drop or bang on hard surfaces	
Weight	210g	

### camera and lens

Requirements	
Lens Mount	42 mm mount and C-mount (adapter supplied)
	(T, Canon FD, Minolta, Pentax K, Nikon, Olympus adapters available separately)
Lens Format	Large format (>28mm image circle)
Camera Format	Optimised for use with 1/2" format CCD's
Camera Mount	C-mount
	For CS cameras use a 5mm CS-C mount spacer between the camera and CamIR <sup>1550</sup> Adapter

#### Spectral Response

Data taken with a 2nm resolution monochromator. Data shown for guidance only. Actual response may vary.





125 Cowley Road Cambridge Commercial Park Cambridge, CB4 0DL United Kingdom

**t** +44 (0)1223 223060

e sales@scintacor.com

www.scintacor.com

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