Ultra high speed framing cameras & tracking systems for scientific research

1 billion frames per second and beyond
Delivering individual, specific ultra high-speed solutions that meet our clients needs exactly, whatever the application.

That's our commitment.
Specialised Imaging is an internationally renowned company that focuses on the design and manufacture of ultra-high-speed imaging cameras for industrial, scientific and defence research applications.

The company was formed in 2003, its founder members having previously worked together in the high-speed imaging field and bringing over 80 years’ combined experience to the venture.

Specialised Imaging has successfully launched many new and innovative ultra-high-speed imaging systems.

The company is at the forefront of world-wide innovation in the high-speed imaging field, having won the BEEA’s Small Company of the Year award in 2009, the Queen’s Award for Enterprise in 2011 and 2016.

This commitment to development has enabled the company to establish a reputation as an exciting and creative player in the high-speed camera market.
Innovative imaging solutions that incorporate the latest technological advances.

That's our passion.
To provide you with a total ultra-high-speed imaging solution, we have formed strong, strategic relationships with manufacturers in a variety of related fields. These strategic partnerships enable us to offer fully optimised imaging systems that include illumination, optical components, supports and triggering devices.

Close cooperation with our major suppliers also allows us to access and incorporate custom-designed components to specifically enhance the performance of our systems.

Our reputation today extends worldwide with customers in North America, Asia-Pacific, Europe and the Middle East regions.

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**Supporting you... and your camera**

At Specialised Imaging we relish new technological challenges, and we enjoy creating effective solutions. Producing a system that exactly meets your requirements, demands a company prepared and able to create specific optimised solutions.

Specialised Imaging has a strong track record in working with clients to design and develop new functions and facilities that fulfil their requirements.

This level of commitment and support continues throughout the life of your product – on-going advice, problem-solving and the design and reconfiguration of software are all part of our after-sales service.

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**World-wide partnerships**

To provide you with a total ultra-high-speed imaging solution, we have formed strong, strategic relationships with manufacturers in a variety of related fields. These strategic partnerships enable us to offer fully optimised imaging systems that include illumination, optical components, supports and triggering devices.

Close cooperation with our major suppliers also allows us to access and incorporate custom-designed components to specifically enhance the performance of our systems.

Our reputation today extends worldwide with customers in North America, Asia-Pacific, Europe and the Middle East regions.
The Specialised Imaging SIMD Framing Camera offers up to 32 images without creating shading, or parallax. Highly accurate timing and fully flexible intensified CCD sensors provide almost infinite control over interframe time, gain and exposure to capture even the most difficult ultra-fast phenomena.

Comprehensive triggering adjustment and a wide range of output signals are controlled using the custom software package which also includes measurement and image enhancement functions.

The SIMD has an optional port for the addition of a high-speed video camera to allow longer duration and simultaneous image capture. The Duplex camera configuration allows the number of images captured to be twice the number of channels.

**FEATURES**
- Fully adjustable interframe time to 1ns
- Fully adjustable exposure down to 3ns
- Gain adjustment up to 7,000X
- Adjustable output triggers
- Nikon lens mount fitting
- Ethernet communications
- Duplex configuration camera
### MODELS

<table>
<thead>
<tr>
<th></th>
<th>SIMD4</th>
<th>SIMD8</th>
<th>SIMD16</th>
<th>SIMD24</th>
<th>SIMD32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Channels</strong></td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td><strong>Number of images</strong></td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>32</td>
</tr>
</tbody>
</table>

### OPTICAL

| **Optics** | Single input beam splitting optics Channels can be fitted with individual filters |
| **Lenses** | Nikon F-Mount |
| **Internal electro-mechanical iris** | F2.8 - F22 |
| **Shutter** | Electro-mechanical |
| **Distortion** | Nominally zero |
| **Channel Registration** | Within one pixel after software correction |
| **Intensity Variation** | Better than 5% across the image |
| **Auxiliary Optical Channel Interface** | Nikon F-mount bayonet (Optional) |

### INTENSIFIER / SENSOR

| **Image Sensor** | ICX285AL (Intensified) |
| **Active CCD Pixel** | 1360 (H) x 1024 (V) |
| **Pixel Size** | 6.45 µm (H) x 6.45 µm (V) |
| **Dynamic Range** | 12 bits |
| **Intensifier** | 18mm High resolution MCP Input window Fused Silica Output window Fibre Optic Photocathode S25, others on request Phosphor screen P46 |
| **Gain** | Variable up to 7,000 |
| **System resolution** | >36 lp/mm |

### MECHANICAL

| **Dimension cm (w/d/h)** | 22.5 x 63.0 x 53.0 (8CH, without lens) |
| **Mount** | 3/8-16 UNC Female |
| **Weight** | 24Kg (8CH without lens) |

### TIMING PARAMETERS

| **System Clock** | 1GHz quartz crystal controlled |
| **Exposure Mode (Each image)** | Single exposure or multiple exposures (Max. 8) per channel |
| **Exposure Time** | 3ns - 10ms in 1ns steps independently variable |
| **Separation Time (Multiple exposure mode)** | 30ns - 20ms in 1ns steps independently variable |
| **Interframe Time** | 0ns - 20ms in 1ns steps independently variable |
| **Delay to 1st exposure** | 65ns to 10ms in 1ns steps, independently variable |
| **Flash Outputs** | 5ns - 1ms in 1ns steps independently variable |
| **Framing rates** | up to 1 Billion fps |

### INPUT / OUTPUT SIGNALS

| **Trigger 1** | Electrical signal (BNC connector) Threshold variable from ± 25V Positive or Negative polarity, Make/Break 500 or 1kΩ termination |
| **Trigger 2** | Electrical signal (BNC connector) Threshold variable from ± 25V Positive or Negative polarity, Make/Break 500 or 1kΩ termination |
| **Timing Monitor Pulses** | Pulse width (min. 3ns) and position user programmable TTL into 50Ω |
| **Flash Trigger Outputs** | Pulse width (min. 5ns) and position user programmable TTL into 50Ω |
| **Camera control** | Data and command transfer via 100Mbps ethernet cable length 10m (standard), other lengths up to 100m |
| **Software** | Custom software compatible with Microsoft Windows Operating Systems for camera control, image data archiving in various file formats. |
| **Power Requirements** | 100-240V AC 2A, 50-60Hz |

### ENVIRONMENTAL

| **Storage temperature** | -10°C to +50°C |
| **Operating temperature** | -5°C to +40°C |
| **Humidity** | 10 - 90% RH non condensing |
| **Vibration shock** | 10 - 40 Hz Max. 1g in any direction |
| **EMC** | Meets all EC harmonized standards |

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Tel +49 8141 666 89 50

As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
The Specialised Imaging SIMX Framing Camera offers up to 16 high resolution images without creating shading, or parallax. Highly accurate timing and fully flexible intensified CCD sensors provide almost infinite control over interframe time, gain and exposure to capture even the most difficult ultra-fast phenomena.

Comprehensive triggering adjustment and a wide range of output signals are controlled using the custom software package which also includes measurement and image enhancement functions.

The SIMX has an optional port for the addition of a high-speed video, or streak camera to allow either simultaneous long duration or ultra high temporal resolution capture. A multi-spectral configuration SIMX camera can provide up to 16 different multi-spectral images with 5 colour and 1 monochrome images.
### SIMX - High resolution multi channel framing camera

#### MODELS

<table>
<thead>
<tr>
<th>SIMX4</th>
<th>SIMX8</th>
<th>SIMX16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Channels</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

#### OPTICAL

- **Optics**: Single input beam splitting optics
- **Channels can be fitted with individual filters**
- **Lenses**: Nikon F-Mount
- **Internal electro-mechanical iris**: f2.8 - f22
- **Shutter**: Electro-mechanical
- **Distortion**: Nominally zero
- **Channel Registration**: Within one pixel after software correction
- **Intensity Variation**: Better than 5% across the image
- **Auxiliary Optical Channel Interface**: Nikon F-mount bayonet (Optional)

#### INTENSIFIER / SENSOR

- **Image Sensor**: ICX285AL (Intensified)
- **Active CCD Pixel**: 1360 (H) x 1024 (V)
- **Pixel Size**: 6.45 µm (H) x 6.45 µm (V)
- **Dynamic Range**: 12 bits
- **Intensifier**: 18mm High resolution MCP
  - Input window: Fused Silica
  - Output window: Fibre Optic Optic
- **Photocathode**: S25, others on request
- **Phosphor screen**: P43
- **Gain**: Variable up to 10,000
- **System resolution**: 50 lp/mm

#### MECHANICAL

- **Dimension cm (w/d/h)**: 22.5 x 63.0 x 53.0 (8CH, without lens)
- **Mount**: 3/8-16 UNC Female
- **Weight**: 24Kg (8CH without lens)

#### TIMING PARAMETERS

- **System Clock**: 1GHz quartz crystal controlled
- **Exposure Mode (each image)**: Single exposure or multiple exposures (Max. 8) per channel
- **Exposure Time**: 3ns - 10ms in 1ns steps independently variable
- **Interframe Time**: 0ns - 20ms in 1ns steps independently variable
- **Delay to 1st exposure**: 65ns to 10ms in 1ns steps, independently variable
- **Flash Outputs**: 5ns - 1ms in 1ns steps independently variable
- **Framing rates**: up to 1 Billion fps

#### INPUT / OUTPUT SIGNALS

- **Trigger 1**: Electrical signal (BNC connector)
  - Threshold variable from ± 25V
  - Positive or Negative polarity, Make/Break
  - 500 or 1kΩ termination
- **Trigger 2**: Electrical signal (BNC connector)
  - Threshold variable from ± 25V
  - Positive or Negative polarity, Make/Break
  - 500 or 1kΩ termination
- **Timing Monitor Pulses**: Pulse width (min. 3ns) and position user programmable
  - TTL into 500
- **Flash Trigger Outputs**: Pulse width (min. 5ns) and position user programmable
  - TTL into 500
- **Camera control**: Data and command transfer via 100Mbps ethernet cable length 10m (standard), other lengths up to 100m available 100FX fibre optic ethernet link (up to 2Km) - optional
- **Software**: Custom software compatible with Microsoft Windows Operating Systems for camera control, image data archiving in various file formats.
- **Power Requirements**: 100-240V AC 2A, 50-60Hz

#### ENVIRONMENTAL

- **Storage temperature**: -10°C to +50°C
- **Operating temperature**: -5°C to +40°C
- **Humidity**: 10 - 90% RH non condensing
- **Vibration shock**: 10 - 40 Hz Max. 10g in any direction
- **EMC**: Meets all EC harmonized standards

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As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
The Specialised Imaging KIRANA is a true Ultra high-speed video camera that combines the flexibility of a video camera with the speed/resolutions approaching those only available with Framing cameras.

The unique custom design sensor offers 180 images at capture speeds up to 5 Million Images/second at full resolution.

In line with high-speed video cameras the KIRANA can be Frame synchronised with an external device such as another KIRANA or laser.

The KIRANA can also be recording prior to the event and triggered before, during or after the event.

**FEATURES**

- Up to 5 Million images/second
- Adjustable exposure down to 100ns
- Pre & Post event triggering
- External synchronisation
- Nikon lens mount fitting
- Gigabit ethernet communications
- Compact and rugged design

*Kirana1M* Up to 1 Mfps
*Kirana5M* Up to 5 Mfps
### MODEL SPECIFICATION

<table>
<thead>
<tr>
<th>Kirana 1M</th>
<th>Kirana 5M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame Rate</strong>&lt;br&gt;(Frames per second)</td>
<td>Up to 1 Mfps</td>
</tr>
<tr>
<td><strong>Exposure Time</strong>&lt;br&gt;(minimum)</td>
<td>1µs</td>
</tr>
<tr>
<td><strong>Trigger Mode</strong></td>
<td>Start, End and Center</td>
</tr>
</tbody>
</table>

### OPTICAL

- **Lenses**: Nikon F-Mount
- **Shutter**: Electro-mechanical
- **Distortion**: Zero

### INTENSIFIER / SENSOR

- **Sensor**: µCMOS (Non-intensified)
- **Number of Active Pixels**: 924 (W) x 768 (H)
- **Pixel Size**: 30µm
- **Digitisation**: 10bits Monochrome
- **Number of Frames**: 180

### MECHANICAL

- **Dimension mm (w/d/h)**:
  - Head: 22.8cm x 42cm x 19cm (without lens)
  - Power supply: 19.5cm x 39.5cm x 19.5cm (inc. handle)
- **Weights**:
  - Head: 10.6Kg (23lbs) without lens.
  - Power Supply: 4.8Kg (10.5lbs)
- **Head Mounting**: 3/8-16 UNC Female in head base.

### TIMING PARAMETERS

| **System Clock** | 200MHz quartz crystal controlled |
| **Exposure time** | 100ns - 1/Frame rate |
| **Framing rates** | 1000fps - 1Mfps or 5Mfps |

### INPUT / OUTPUT SIGNALS

- **Trigger (2 off)**: Electrical signal (BNC connector) Threshold variable from ± 25V Maximum Input level 50V Integral Velocity measurement system Positive or Negative polarity, Make/Break 500 or 1kΩ termination
- **Video Out**: XVGA
- **Aux Out**: FSync or user programmable pulse width and position for strobe/laser illumination sources. TTL into 500
- **Sync In**: Input to allow the synchronisation of multiple cameras in Master-Slave configuration
- **Camera Control**: Remote control via Standard 1Gbps Ethernet
- **Software**: Custom software compatible with Microsoft Windows Operating Systems for control and data archiving in various file formats
- **Power Requirements**: 100-240V AC 2A, 50-60Hz
- **Saved Image Format**: TIFF, JPEG, AVI or RAW

### ENVIRONMENTAL

- **Storage temperature**: -10°C to +50°C
- **Operating temperature**: -5°C to +40°C
- **Humidity**: 10—90% RH non condensing
- **Vibration shock**: 10—40 Hz Max. 10g in any direction
- **EMC**: Meets all EC harmonised standards
Comprehensive High-Speed Linear Tracker System

Award winning flight follower system
Multiple tracking modes
Remote control motorised adjustment
Multiple high-speed camera options

The Specialised Imaging Tracker² is the next generation of projectile tracking platforms for high-speed video and measurement.

Full motorised remote control of three axis rotation and multiple inputs for real-time velocity adjustment contribute to the evolution of this award-winning system.

Built on a sturdy mount, the fully weatherproofed mirror and camera housings allow a large range of high-speed video cameras and long focal length lens options.

Custom software controls the Tracker system and provides calculators for Tracker placement, camera fields-of-view and velocities.

FEATURES

- Full remote control operation
- Multiple operating modes allow capture of decelerating, accelerating, user defined velocity profiled projectiles
- Scan ratio range from 0.1 to 100
- Scanning accuracy of ± 0.2°
- Gigabit ethernet communications
- Built in camera power, communications and trigger
- No calibration required
### OPERATING MODES

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Velocity</td>
<td>Single trigger using known velocity</td>
</tr>
<tr>
<td>Velocity</td>
<td>The scan is corrected using the measured velocity from at least 2 of the 8 available detector inputs.</td>
</tr>
<tr>
<td>Position</td>
<td>The scan position is corrected from the detector inputs. Known velocity is assumed.</td>
</tr>
<tr>
<td>Drag / Acceleration</td>
<td>The scan is corrected using the measured velocity and drag / acceleration from at least 3 of the 8 available detector inputs.</td>
</tr>
<tr>
<td>Pre-defined profile</td>
<td>Programmable Velocity Vs Time curve. Triggered using single trigger. Used for non-linear projectile trajectories.</td>
</tr>
<tr>
<td>Advanced User Functions</td>
<td>Specialised Imaging is prepared to customise modes of operation to user requirements.</td>
</tr>
<tr>
<td>Skewed Geometry</td>
<td>Allows non perpendicular operation</td>
</tr>
</tbody>
</table>

### OPERATING PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan Ratio (SR)</td>
<td>0.1 to 100 (defined as the ratio of projectile velocity/stand-off distance)</td>
</tr>
<tr>
<td>Scanning range (Max.)</td>
<td>-60° to +60 °</td>
</tr>
<tr>
<td>Scanning Distance</td>
<td>&gt;=2x stand-off distance (distance from the line of flight to Tracker2)</td>
</tr>
<tr>
<td>Scanning Accuracy</td>
<td>±0.2°</td>
</tr>
<tr>
<td>Positional Accuracy</td>
<td>±0.018°</td>
</tr>
<tr>
<td>Calibration</td>
<td>Not required</td>
</tr>
<tr>
<td>Projectile Velocity</td>
<td>SR x Standoff distance</td>
</tr>
<tr>
<td>Projectile Drag</td>
<td>0 to 100 m/s/m</td>
</tr>
<tr>
<td>Acceleration Angle</td>
<td>1° - 5° depending on scan rate (defined as the angle required to accelerate the mirror from rest to full scanning speed)</td>
</tr>
</tbody>
</table>

### ENVIROMENTAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage temperature</td>
<td>-10 °C to +74 °C</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-5 °C to +50 °C</td>
</tr>
<tr>
<td>Warmup Period</td>
<td>Not Required</td>
</tr>
<tr>
<td>Humidity</td>
<td>10 - 90% RH non-condensing</td>
</tr>
<tr>
<td>Operational vibration</td>
<td>10G, 10-40Hz Max, any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonized standards</td>
</tr>
</tbody>
</table>

### MECHANICAL

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions mm (w/d/h)</td>
<td>1340 x 670 x 590 (without tripod)</td>
</tr>
<tr>
<td>Mount</td>
<td>Tripod Included</td>
</tr>
</tbody>
</table>

### MIRROR

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Optical flat elliptical Silicon Carbide Mirror</td>
</tr>
<tr>
<td>Size (HxW) mm</td>
<td>135 x 85 x 2</td>
</tr>
</tbody>
</table>

### CONTROL UNIT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Clock</td>
<td>10MHz quartz crystal controlled</td>
</tr>
<tr>
<td>Trigger Jitter</td>
<td>&lt;1us</td>
</tr>
</tbody>
</table>

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Tracker Lite

TrackerLite

Compact High-Speed Linear Tracker System

Built on award winning flight follower system

Multiple tracking modes

Manual positional adjustment

Integrated high-speed camera options

The Specialised Imaging TrackerLite is a smaller, lighter system that retains the core functions of the Award winning Tracker² system.

Manual adjustment of three axis rotation and a single input for real-time velocity adjustment contribute to the simplification of the system.

Built on a standard tripod, the fully weatherproofed mirror and camera housing allow a dual line of high-speed video cameras and long focal length lens options.

Custom software controls the Tracker system and provides calculators for Tracker placement, camera fields-of-view and velocities.

FEATURES

- Multiple operating modes allow capture of decelerating, accelerating, user defined velocity profiled projectiles
- Scan ratio range from 1 to 40
- Scanning accuracy of ± 0.2°
- Gigabit ethernet communications
- Built in camera power, communications and trigger
- No calibration required
## Operating Modes

<table>
<thead>
<tr>
<th>Fixed Velocity</th>
<th>Single trigger using known velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Velocity</td>
<td>The scan is corrected using the measured velocity from at least 2 of the 3 available detector inputs.</td>
</tr>
<tr>
<td>Position</td>
<td>The scan position is corrected from the detector inputs. Known velocity is assumed.</td>
</tr>
<tr>
<td>Drag</td>
<td>The scan is corrected using the measured velocity and drag from 3 detector inputs.</td>
</tr>
<tr>
<td>Pre-defined profile</td>
<td>Programmable Velocity Vs Time curve. Triggered using single trigger. Used for non-linear projectile trajectories.</td>
</tr>
<tr>
<td>Advanced User Functions</td>
<td>Specialised Imaging is prepared to customise modes of operation to user requirements.</td>
</tr>
<tr>
<td>Skewed Geometry</td>
<td>Allows non perpendicular operation</td>
</tr>
</tbody>
</table>

## Operating Parameters

<table>
<thead>
<tr>
<th>Scan Ratio (SR)</th>
<th>1 to 40 (defined as the ratio of projectile velocity/stand-off distance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning range (Max.)</td>
<td>-50° to +50 °</td>
</tr>
<tr>
<td>Scanning Distance</td>
<td>&gt;2x stand-off distance (distance from the line of flight to Tracker2)</td>
</tr>
<tr>
<td>Scanning Accuracy</td>
<td>±0.2°</td>
</tr>
<tr>
<td>Calibration</td>
<td>Not required</td>
</tr>
<tr>
<td>Projectile Velocity</td>
<td>SR x Stand-off distance</td>
</tr>
<tr>
<td>Projectile Drag</td>
<td>0 to 100 m/s/m</td>
</tr>
<tr>
<td>Acceleration Angle</td>
<td>1° - 5° depending on scan rate (defined as the angle required to accelerate the mirror from rest to full scanning speed)</td>
</tr>
</tbody>
</table>

## Environmental

<table>
<thead>
<tr>
<th>Storage temperature</th>
<th>-10°C to +74°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-5°C to +65°C</td>
</tr>
<tr>
<td>Warmup Period</td>
<td>Not Required</td>
</tr>
<tr>
<td>Humidity</td>
<td>10 - 90% RH non-condensing</td>
</tr>
<tr>
<td>Operational vibration</td>
<td>10G, 10-40Hz Max, any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonized standards</td>
</tr>
</tbody>
</table>

## Mechanical

<table>
<thead>
<tr>
<th>Dimensions (mm (w/d/h))</th>
<th>650 x 230 x 310 (without tripod)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>16kg / 35lbs (without camera and lens)</td>
</tr>
<tr>
<td>Mount</td>
<td>3/8-16 UNC Female</td>
</tr>
</tbody>
</table>

## Mirror

| Type | Optical flat elliptical surface silvered |
| Size (HxW) mm | 135 x 85 |

## Input / Output Signals

| Detector In | BNC |
| Number of inputs | 3 |
| Trigger In | Rising or Falling Edge pulse Make/break |
| Camera Trigger | TTL positive pulse |
| Communication Interface | Data and command transfer via 1Gbps ethernet cable |
| Software | Custom software compatible with Microsoft Windows Operating Systems for control and data archiving in various file formats |

## Control Unit

| System Clock | 10MHz quartz crystal controlled |
| Trigger Jitter | < 1us |

## Integrated Camera Options

- **TrackerLite -A**
  - Phantom FASTCAM Mini AX100 - 1024x1024 @ 4,000pps
- **TrackerLite -V**
  - Phantom VEO410L 1280x800 @ 5,200pps
The Specialised Imaging LOMA system is the next generation of long range projectile tracking systems.

The system consists of an Azimuth module, Elevation module and payload platform, each constructed from stainless steel or aluminium to ensure rigidity and precision tracking.

The advanced servo control provided accurate (±100 micro-radians) movement of payloads up to 150Kg.

The LOMA system can be used in Manual, Slave or Optical tracking modes. IRIG-B timecode provided by existing range receiver or own receiver.

**FEATURES**

- ±100 micro-radians angular accuracy
- Unlimited Azimuth rotation
- Elevation -20° to +190°
- Turn and Plunge capable
- Ethernet communications
- Built in camera power, communications and trigger
- IR and Visible spectrum tracking options
- Customised Platforms

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**Lightweight Optical Motion Analysis System**

- Compact Optical Tracking Pedestal mount
- Multiple Tracking Modes
- Up to 150KG Payload
- Multiple Tracking and Payload Camera Options
### OPERATING MODES

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>Joystick control for emplacement and maintenance</td>
</tr>
<tr>
<td>Slave</td>
<td>External input of Longitude, Latitude &amp; Elevation</td>
</tr>
<tr>
<td>Optical</td>
<td>Onboard camera tracking (Visible or IR)</td>
</tr>
</tbody>
</table>

### INPUT / OUTPUT SIGNALS

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command interface</td>
<td>RS232 (Controller to Pedestal)</td>
</tr>
<tr>
<td>Control interface</td>
<td>Gigabit Ethernet</td>
</tr>
<tr>
<td>Payload interface</td>
<td>Gigabit Ethernet, Coaxial.</td>
</tr>
<tr>
<td>Tracking interface</td>
<td>Video (tracking camera to Controller)</td>
</tr>
<tr>
<td>Azimuth/Elevation transfer</td>
<td>RS232</td>
</tr>
<tr>
<td>Timecode interface</td>
<td>IRIG-B from existing generator</td>
</tr>
<tr>
<td>Software</td>
<td>Custom software compatible with Microsoft Windows Operating Systems for Control of Pedestal and Tracking cameras</td>
</tr>
<tr>
<td>Electrical Power</td>
<td>AC: 110-240V AC 50/60Hz or DC: 24-48V 30A</td>
</tr>
</tbody>
</table>

### MECHANICAL

<table>
<thead>
<tr>
<th>Dimension (w/d/h)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Pedestal</td>
<td>41cm x 39cm x 78.6cm (16.1&quot; x 15.4&quot; x 30.9&quot;)</td>
</tr>
<tr>
<td>Control Unit</td>
<td>72cm x 60cm x 50cm (28.3&quot; x 23.6&quot; x 19.7&quot;)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Pedestal</td>
<td>70Kg (154lbs) without base or Payload</td>
</tr>
<tr>
<td>Control Unit</td>
<td>35Kg (77lbs)</td>
</tr>
<tr>
<td>Transit Locks</td>
<td>Locking stow pins in Azimuth &amp; Elevation</td>
</tr>
</tbody>
</table>

### OPERATING PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Accuracy</td>
<td>± 100 micro-radians, 2σ</td>
</tr>
<tr>
<td>Travel</td>
<td>Azimuth: Continuous (360°)</td>
</tr>
<tr>
<td></td>
<td>Elevation: -20° to +190°</td>
</tr>
<tr>
<td>Torque (azimuth &amp; elevation)</td>
<td>27Nm continuous (40Nm peak)</td>
</tr>
<tr>
<td>Nominal Payload</td>
<td>150Kg (at rated payload MoI)</td>
</tr>
<tr>
<td>Angular Velocity</td>
<td>Azimuth: 90° / second</td>
</tr>
<tr>
<td></td>
<td>Elevation: 90° / second</td>
</tr>
<tr>
<td>Angular Acceleration</td>
<td>Azimuth: 90° / second²</td>
</tr>
<tr>
<td></td>
<td>Elevation: 90° / second²</td>
</tr>
<tr>
<td>Non-Orthogonality</td>
<td>± 10 arc seconds</td>
</tr>
<tr>
<td>Drive System</td>
<td>Direct drive</td>
</tr>
<tr>
<td>Encoders</td>
<td>25-bit absolute, both axis</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-120°C to +70°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-10°C to +60°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>20-80% RH non condensing</td>
</tr>
<tr>
<td>Vibration Shock</td>
<td>10-40 Hz Max. 10g in any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonised standards</td>
</tr>
</tbody>
</table>

As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
The Specialised Imaging CERBERUS camera system offers framing camera image capture performance with the addition of multiple camera control.

Each camera head can capture either one or two 1.4 MegaPixel 12-bit images with exposure times down to 5ns.

A maximum of 8 Control modules can be connected to allow a total of 64 cameras controlled from a single PC.

The CERBERUS system is flexible enough to allow multiple 3D/Stereoscopic image pairs or sequential images with a 5ns interframe time, equating to 200 Million Frames/second.

**FEATURES**

- Control up to 64 camera heads
- Adjustable exposure down to 5ns
- Head to Head adjustable interframe time down to 5ns
- Nikon lens mount fitting
- Ethernet communications
- Compact and rugged design

---

The Specialised Imaging CERBERUS camera system offers framing camera image capture performance with the addition of multiple camera control.

Each camera head can capture either one or two 1.4 MegaPixel 12-bit images with exposure times down to 5ns.

A maximum of 8 Control modules can be connected to allow a total of 64 cameras controlled from a single PC.

The CERBERUS system is flexible enough to allow multiple 3D/Stereoscopic image pairs or sequential images with a 5ns interframe time, equating to 200 Million Frames/second.
Multi-head Intensified Camera System

**OPTICAL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lenses</td>
<td>Nikon F-mount (ruggedized mounting system)</td>
</tr>
<tr>
<td>Shutter</td>
<td>Electro-mechanical</td>
</tr>
<tr>
<td>Distortion</td>
<td>Nominally zero</td>
</tr>
<tr>
<td>Intensity variation</td>
<td>Better than 5% across the image</td>
</tr>
</tbody>
</table>

**INTENSIFIER / SENSOR**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Sensor</td>
<td>ICX285AL (Intensified)</td>
</tr>
<tr>
<td>Active CCD Pixel</td>
<td>1360 (H) x 1024 (V) pixels</td>
</tr>
<tr>
<td>Pixel Size</td>
<td>6.45 µm (H) x 6.45 µm (V)</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>12 bits</td>
</tr>
<tr>
<td>Intensifier</td>
<td>8mm High resolution MCP</td>
</tr>
<tr>
<td>Input window Fused Silica</td>
<td></td>
</tr>
<tr>
<td>Output window Fibre Optic</td>
<td></td>
</tr>
<tr>
<td>Photocathode S25, others on request</td>
<td></td>
</tr>
<tr>
<td>Phosphor screen P43</td>
<td></td>
</tr>
<tr>
<td>Gain</td>
<td>Up to 7,000</td>
</tr>
<tr>
<td>Dynamic resolution</td>
<td>&gt;50lp/mm</td>
</tr>
<tr>
<td>Images</td>
<td>Single Two (550ns interframe time)</td>
</tr>
</tbody>
</table>

**MECHANICAL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension mm (w/d/h) Head (without lens)</td>
<td>9.4cm x 21cm x 9.4cm (3.7” x 8.2” x 3.7”)</td>
</tr>
<tr>
<td>Controller</td>
<td>19” rack mount 3U case</td>
</tr>
<tr>
<td>Weights</td>
<td>Head 3kg (6.6lbs) Controller 7kg (15.4lbs)</td>
</tr>
<tr>
<td>Head Mounting</td>
<td>3/8-16 UNC Female in head base</td>
</tr>
</tbody>
</table>

**TIMING PARAMETERS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Clock</td>
<td>200MHz quartz crystal control</td>
</tr>
<tr>
<td>Inherent Delay</td>
<td>500ns</td>
</tr>
<tr>
<td>Exposure Mode (each head)</td>
<td>Single exposure or multiple exposures (Max. 8) per head</td>
</tr>
<tr>
<td>Exposure Time</td>
<td>5ns – 10ms in 5ns steps</td>
</tr>
<tr>
<td>Interframe Time (head-to-head)</td>
<td>5ns – 20ms in 5ns steps</td>
</tr>
<tr>
<td>Delay to 1st exposure</td>
<td>500ns – 10ms in 5ns steps</td>
</tr>
<tr>
<td>Flash Outputs</td>
<td>5ns to 1ms in 5ns steps</td>
</tr>
<tr>
<td>Separation Time</td>
<td>30ns – 20ms in 5ns steps (multiple exposures on same channel)</td>
</tr>
</tbody>
</table>

**INPUT / OUTPUT SIGNALS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trigger 1</td>
<td>Electrical signal (BNC connector)</td>
</tr>
<tr>
<td>Threshold variable from ±25V</td>
<td>Positive or Negative polarity, Make/Break 500 or 1K termination</td>
</tr>
<tr>
<td>Trigger 2</td>
<td>Electrical signal (BNC connector)</td>
</tr>
<tr>
<td>Threshold variable from ±25V</td>
<td>Positive or Negative polarity, Make/Break 500 or 1K termination</td>
</tr>
<tr>
<td>Timing Monitor Pulse</td>
<td>Pulse width [min. 5ns] and position user programmable TTL into 500</td>
</tr>
<tr>
<td>Flash Trigger Outputs</td>
<td>Pulse width [min. 5ns] and position user programmable TTL into 500</td>
</tr>
<tr>
<td>Remote Camera Interface</td>
<td>Data and command transfer via custom 10m cable.</td>
</tr>
<tr>
<td>Camera head control</td>
<td>Data and command transfer via 100Mbps Ethernet cable length 10m [standard], other lengths up to 100m available 100FX Fibre optic Ethernet link (up to 2km) – optional</td>
</tr>
<tr>
<td>Software</td>
<td>Custom software compatible with Microsoft Windows Operating Systems for camera control, image data archiving in various file formats.</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>100-240V AC 2A, 50-60Hz</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>19” Rack Mount 2U case</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-10°C to +50°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-5°C to +40°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>10 – 90% RH non condensing</td>
</tr>
<tr>
<td>Vibration shock</td>
<td>10 – 60 Hz Max. 10g in any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonized standards</td>
</tr>
</tbody>
</table>

As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
The Specialised Imaging T-Cam Camera offers single high resolution images for ambient or low light capture.

Comprehensive triggering adjustment and a wide range of output signals are controlled using the custom software package which includes measurement and image enhancement functions.

**FEATURES**

- Fully adjustable exposure from 1µs to 10ms
- Adjustable output triggers
- Nikon lens mount fitting
- Gigabit ethernet communications

High Resolution non-intensified camera

Single image capture

Up to 11 MegaPixel
12-bit images

Compact and rugged construction
T-Cam
High Resolution non-intensified camera

OPTICAL

<table>
<thead>
<tr>
<th>Lenses</th>
<th>Nikon F-mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Aperture</td>
<td>Limited by lens</td>
</tr>
<tr>
<td>Distortion</td>
<td>Nominally zero</td>
</tr>
</tbody>
</table>

INTENSIFIER / SENSOR

<table>
<thead>
<tr>
<th>T-Cam 43100</th>
<th>T-Cam 22100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Sensor</td>
<td>KAI11002M (Non intensified)</td>
</tr>
<tr>
<td>Active CCD Pixel</td>
<td>4008 (H) x 2688 (V)</td>
</tr>
<tr>
<td>Pixel Size</td>
<td>9µm (H) x 9µm (V)</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>12 bits</td>
</tr>
</tbody>
</table>

MECHANICAL

<table>
<thead>
<tr>
<th>Dimension mm (w/d/h)</th>
<th>17.8cm x 18.5cm x 19.7cm (7.0&quot; x 7.3&quot; x 7.8&quot;) without lenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount</td>
<td>1/4–20 UNC Female (standard tripod)</td>
</tr>
<tr>
<td>Weight</td>
<td>6Kg (13.2lbs) without lens</td>
</tr>
</tbody>
</table>

INPUT / OUTPUT SIGNALS

<table>
<thead>
<tr>
<th>Trigger 1</th>
<th>Electrical signal (BNC connector)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Threshold variable from ± 25V</td>
</tr>
<tr>
<td></td>
<td>Positive or Negative polarity, Make/Break</td>
</tr>
<tr>
<td></td>
<td>500 or 1KΩ termination</td>
</tr>
<tr>
<td>Trigger 2</td>
<td>Electrical signal (BNC connector)</td>
</tr>
<tr>
<td></td>
<td>Threshold variable from ± 25V</td>
</tr>
<tr>
<td></td>
<td>Positive or Negative polarity, Make/Break</td>
</tr>
<tr>
<td></td>
<td>500 or 1KΩ termination</td>
</tr>
<tr>
<td>Flash Trigger Output</td>
<td>Pulse width (min. 10ns) and position user programmable.</td>
</tr>
<tr>
<td></td>
<td>TTL into 50Ω</td>
</tr>
<tr>
<td>Camera Control</td>
<td>Data and command transfer via Gigabit Ethernet</td>
</tr>
<tr>
<td></td>
<td>Cable length 10m (standard), other lengths up to 100m</td>
</tr>
<tr>
<td></td>
<td>available 1000FX fibre optic Ethernet link (up to 2Km) -</td>
</tr>
<tr>
<td></td>
<td>optional</td>
</tr>
<tr>
<td>Software</td>
<td>Custom software compatible with Microsoft Windows</td>
</tr>
<tr>
<td></td>
<td>Operating Systems for camera control, image data archiving in various file formats.</td>
</tr>
</tbody>
</table>

Power Requirements 100–240V AC 2A, 50–60Hz

ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Storage temperature</th>
<th>-10°C to +50°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-5°C to +40°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>10—90% RH non condensing</td>
</tr>
<tr>
<td>Vibration shock</td>
<td>10—40 Hz Max. 10g in any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonised standards</td>
</tr>
</tbody>
</table>

As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
Compact image intensifier/converter

Range of Intensifier tube options
Up to 40lp/mm resolution
Gate times down to 50ns
Comprehensive triggering for High-speed video and Standard cameras

The Specialised Imaging SIL3 image intensifier is the latest generation of intensifier that can be synchronised to almost any high-speed video, conventional video or stills camera.

Maximum equivalent frame rates ranging from 100,000fps to 1,000,000fps and minimum gate (exposure) time of 50ns.

The range of Intensifier tube options include output window diameters, Phosphor decay times and Wavelength responses (inc. UV) provide a unique enhancement to any camera.

Intuitive custom control software allows gain, gate/exposure and delay adjustment via Ethernet.

FEATURES
- 25mm and 40mm Intensifier tube options
- Fully adjustable gating time down to 50ns
- Gain adjustment up to 500,000X
- Nikon lens mount fitting
- Optical camera coupling
- Ethernet communications
- UV wavelength conversion option
As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
High Resolution Dual Image Intensified camera

Single or Double image capture
Up to 10.7 MegaPixel
12-bit images
Lightweight and Rugged construction

The Specialised Imaging SIR3 Framing Camera offers up to 2 high resolution images, 100µs apart. Fully flexible intensified CCD sensor provides control over interframe time, gain and exposure.

Comprehensive triggering adjustment and a wide range of output signals are controlled using the custom software package which also includes measurement and image enhancement functions.

FEATURES

- Fully adjustable interframe time to 100µs
- Fully adjustable exposure down to 10ns
- Gain adjustment up to 10,000X
- Adjustable output triggers
- Nikon lens mount fitting
- Gigabit ethernet communications
### OPTICAL

<table>
<thead>
<tr>
<th></th>
<th>SIR3-18D</th>
<th>SIR3-25D</th>
<th>SIR3-40D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lenses</td>
<td>Nikon F-mount (ruggedized mounting system)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Aperture</td>
<td>F 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shutter</td>
<td>Electro-mechanical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distortion</td>
<td>Nominally zero</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coupling</td>
<td>CCD to MCP via FO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vignetting</td>
<td>&lt;3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity variation</td>
<td>Better than 5% across the image</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical Viewfinder</td>
<td>Optional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TIMING PARAMETERS

- **System Clock**: 200MHz quartz crystal controlled
- **Inherent Delay**: <130ns
- **Imaging Mode**: Single or Double image
- **Exposure Modes (each image)**: Single exposure or multiple exposures (Max. 16 - subject to imaging conditions)
- **Exposure Times**: 10ns – 10ms in 5ns steps independently variable
- **Flash output**: 20ns to 1ms in 5ns steps independently variable
- **Delay to 2nd exposure**: 100µs – 10ms in 5ns steps.

### INTENSIFIER / SENSOR

<table>
<thead>
<tr>
<th></th>
<th>SIR3-18D</th>
<th>SIR3-25D</th>
<th>SIR3-40D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Sensor</td>
<td>ICX285AL</td>
<td>KAI4021M</td>
<td>KAI11002M</td>
</tr>
<tr>
<td>Active CCD Pixel</td>
<td>1360 (H) x 1024 (V)</td>
<td>2048 (H) x 2048 (V)</td>
<td>4096 (H) x 2688 (V)</td>
</tr>
<tr>
<td>Pixel Size</td>
<td>6.45 µm (H) x 6.45 µm (V)</td>
<td>7.4 µm (H) x 7.4 µm (V)</td>
<td>9 µm (H) x 9 µm (V)</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>12 bits</td>
<td>12 bits</td>
<td>12 bits</td>
</tr>
<tr>
<td>Intensifier diameter</td>
<td>18mm MCP</td>
<td>25mm MCP</td>
<td>40mm MCP</td>
</tr>
<tr>
<td>Photocathode</td>
<td>All models: S25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphor / decay</td>
<td>P46/300ns</td>
<td>FS/10µs</td>
<td>FS/10µs</td>
</tr>
<tr>
<td>Input / Output windows</td>
<td>All models: Glass / Fibre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain</td>
<td>Variable up to 10,000 all models</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MECHANICAL

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (w/d/h)</td>
<td>17.0cm x 48.5cm x 19.3cm (without lens)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mount</td>
<td>1/4 - 20 UNC and 3/8 - 16 UNC female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>15Kg (33lbs) without lens</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage temperature</td>
<td>-10°C to +50°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-5°C to +40°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>10—90% RH non condensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration shock</td>
<td>10—40 Hz Max. 10g in any direction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonised standards</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ballistic Velocity Measurement System

3,330 measurements / second
Up to 15,000 measurements storage
5ns Resolution
3 independent input channels
4 independent output channels

The Specialised Imaging VT system performs time of flight and/or velocity measurements using 3 input channels.

Capture rates up to 3,330 measurements per second (200,000 rounds per minute) can be measured and up to 15,000 measurements can be stored locally in the Unit head.

The four independent Output channels can be used as a trigger adjustment unit for ballistic events to ensure correct triggering of framing, ultra high-speed and high speed video cameras.

FEATURES

- Velocity measurement
- Time of flight measurement
- Ethernet communication
### OPERATING PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurements</td>
<td>Time of flight or Velocity</td>
</tr>
<tr>
<td>Max. rate of capture/fire</td>
<td>200,000 measurements/minute (3,330 Hz)</td>
</tr>
<tr>
<td>Max. storage</td>
<td>15,000 measurements (velocity or time of flight)</td>
</tr>
</tbody>
</table>

### TIMING PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Clock</td>
<td>200MHz, quartz crystal controlled</td>
</tr>
<tr>
<td>Inherent Delay</td>
<td>50ns</td>
</tr>
<tr>
<td>Range</td>
<td>5ns to 1s in 5ns steps independently</td>
</tr>
<tr>
<td>Jitter (trigger)</td>
<td>&lt;=5ns</td>
</tr>
<tr>
<td>Jitter (channel to channel)</td>
<td>0ns</td>
</tr>
</tbody>
</table>

### INPUT / OUTPUT SIGNALS

<table>
<thead>
<tr>
<th>Channels</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input/trigger channels</td>
<td>3 (independent) Electrical signal (BNC connector) Threshold variable from ±25V Positive or Negative polarity, Make/Break 50Ω or 1KΩ termination</td>
</tr>
<tr>
<td>Output channels</td>
<td>4 (independent) +ve TTL (BNC connector) Pulse width user programmable 50Ω termination</td>
</tr>
<tr>
<td>Control interface</td>
<td>100Mbps Ethernet</td>
</tr>
<tr>
<td>Software</td>
<td>Custom software compatible with Microsoft Windows Operating Systems for Control and data archiving.</td>
</tr>
<tr>
<td>Electrical power</td>
<td>AC: 110–240V/AC 50/60Hz or DC: 24V DC – Battery power</td>
</tr>
</tbody>
</table>

### MECHANICAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (w/d/h) Inc. handles</td>
<td>23cm x 23 cm x 17cm (9.1” x 9.1” x 6.7”)</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP65</td>
</tr>
<tr>
<td>Weight</td>
<td>4Kg (8.8lbs)</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage temperature</td>
<td>-10°C to +50°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-5°C to +40°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>10 – 90% RH non condensing</td>
</tr>
<tr>
<td>Vibration shock</td>
<td>10 – 40 Hz Max. 10g in any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonized standards</td>
</tr>
</tbody>
</table>

As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
Laser illumination system

Up to 400W lighting power
640nm wavelength
Flexible triggering/synchronisation

The Specialised Imaging LUX640 laser illumination system provides up to 400W of lighting power at pulse frequencies up to 10MHz or single pulses up to 30µS.

Simple triggering allows the SI-LUX640 to interface with most high-speed cameras ranging from High-speed video to Ultra highspeed framing cameras.

The 2m laser output light guide includes user interchangeable low coherence beam expanders.

FEATURES

- Low coherence
- Pulse width from 10ns – 30µs
- Pulse frequency range from single to 10MHz
- Compact design
## OPTICAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam Expanders</td>
<td>φ25mm and φ50mm versions</td>
</tr>
<tr>
<td>Wavelength</td>
<td>640nm ± 6nm</td>
</tr>
<tr>
<td>Output power</td>
<td>200W (-10%/+ 30%) or 400W (-10%/+ 20%)</td>
</tr>
<tr>
<td>Power drop</td>
<td>~ 0.2% / μS for pulses less than 5μS</td>
</tr>
</tbody>
</table>

## TIMING PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max pulse rate</td>
<td>10MHz</td>
</tr>
<tr>
<td>Min. single pulse duration</td>
<td>~10ns</td>
</tr>
<tr>
<td>Max. single pulse duration</td>
<td>30μS (max. power drop 20%)</td>
</tr>
<tr>
<td>Rise time</td>
<td>~10ns (10%...90%)</td>
</tr>
<tr>
<td>Fall time</td>
<td>~5ns</td>
</tr>
<tr>
<td>Delay</td>
<td>70ns between input to start of light pulse (incl. control cable delay)</td>
</tr>
<tr>
<td>Jitter</td>
<td>&lt;5ns</td>
</tr>
<tr>
<td>Operating limits</td>
<td>Max. 0.03% duty cycle for unlimited operation</td>
</tr>
<tr>
<td></td>
<td>Max. 100% duty cycle for 30μS laser operation</td>
</tr>
</tbody>
</table>

## INPUT / OUTPUT SIGNALS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sync. Input</td>
<td>5V TTL (BNC socket connector)</td>
</tr>
<tr>
<td></td>
<td>(laser pulse duration = duration of +5V state)</td>
</tr>
<tr>
<td>Indicators</td>
<td>Green LED – Laser is powered &amp; ready</td>
</tr>
<tr>
<td>Software</td>
<td>Custom software compatible with Microsoft Windows Operating Systems for Control.</td>
</tr>
<tr>
<td>Electrical Power</td>
<td>100-240V AC 2A 50-60Hz</td>
</tr>
</tbody>
</table>

## HEALTH & SAFETY

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser rating</td>
<td>Class 3b</td>
</tr>
<tr>
<td>Safety features</td>
<td>Key operated master control power on/off Connector for remote Interlock</td>
</tr>
<tr>
<td>Visual indicator</td>
<td>Green LED = Laser is powered &amp; ready Red LED = interlock indicator Health &amp; Safety on laser body</td>
</tr>
</tbody>
</table>

## ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage temperature</td>
<td>-10°C to +50°C</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-5°C to +40°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>10—90% RH non condensing</td>
</tr>
<tr>
<td>Vibration shock</td>
<td>10—40 Hz Max. 10g in any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonised standards</td>
</tr>
</tbody>
</table>

## MECHANICAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension (w/d/h)</td>
<td>Laser: 6.2cm x 15cm x 3.6cm (6” x 2.4” x 1.4”) Master control box: 12cm x 6cm x 12cm (4.7” x 2.4” x 4.7”)</td>
</tr>
<tr>
<td>Weight</td>
<td>Laser: 0.5Kg (1.1lbs) Master control box: 0.5Kg (1.1lbs)</td>
</tr>
<tr>
<td>Light guide</td>
<td>2m</td>
</tr>
<tr>
<td>Control cable</td>
<td>2m between control/safety box &amp; laser</td>
</tr>
</tbody>
</table>
SI-OT3

Optical Trigger Unit

Rugged Design
Battery Powered
Shadow and IR Flash Detector
High / Low pass filtering

The Specialised Imaging OT3 provides a reliable optical trigger for either projectile “shadow” detection or IR flash detection.

Battery powered, with a rugged enclosure allow the OT3 to be used outside in all weathers and independent of mains power.

Battery unit includes mains charger and can power the OT3 for up to 8 hours.

FEATURES

- Small and lightweight
- Battery powered for up to 8 hours
- Nikon lens mount fitting
- User adjustable sensitivity
## Optical Trigger Unit

### Optical
- **Lenses**: Nikon F-Mount
- **Alignment**: Optical viewport

### Intensifier / Sensor
- **Sensor**: Multi-Segment Photodiode array, 300nm – 700nm range (Non-intensified)

### Input / Output Signals
- **Output**: Positive 5V TTL (BNC socket connector) 50Ω termination
- **Trigger indicator**: LED
- **Software**: Custom software compatible with Microsoft Windows Operating Systems for Control and data archiving.
- **Electrical Power**: DC: 18-34V DC
  - Battery powered: Sealed lead acid
  - Built in battery charger

### Mechanical
- **Dimension mm (w/d/h)**
  - **Sensor head (without lens)**: 9cm x 17cm x 9cm (3.5” x 6.7” x 3.5”)
  - **Battery**: 15cm x 9.5cm x 17cm (6” x 3.7” x 6.7”)
- **Weights**
  - **Sensor head**: 1Kg (2.2lbs)
  - **Battery**: 4Kg (8.8lbs)
  - **Sensor head mounting**: 1/4 – 20 UNC UNC Tripod Female in base & top

### Environmental
- **Storage temperature**: -10°C to +50°C
- **Operating temperature**: -5°C to +40°C
- **Humidity**: 10—90% RH non condensing
- **Vibration shock**: 10—40 Hz Max. 10g in any direction
- **EMC**: Meets all EC harmonised standards

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As part of our on-going commitment to improvement we reserve the right to alter specifications, designs or figures, without prior notice. All dimensions and weights are approximate.
The Specialised Imaging SI-AT1 provides a reliable acoustic trigger for blast or shockwave detection.

Built in battery power within a compact, rugged enclosure allows the AT1 to be used outside in all weathers and independent of mains power for up to 8 hours.

FEATURES
- Small and rugged
- Battery powered for up to 8 hours
- User adjustable sensitivity
- Standard tripod mounting threads
# Acoustic trigger unit

## SENSOR

| Sensor          | Piezoelectric acoustic sensor |

## INPUT / OUTPUT SIGNALS

<table>
<thead>
<tr>
<th>Output</th>
<th>Positive 5V TTL (BNC socket connector) 50Ω termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse width</td>
<td>10mS</td>
</tr>
<tr>
<td>Trigger indicator</td>
<td>LED</td>
</tr>
<tr>
<td>Electrical power</td>
<td>Battery powered</td>
</tr>
<tr>
<td></td>
<td>Built in battery charger</td>
</tr>
<tr>
<td></td>
<td>12VDC - 500mA (from charger)</td>
</tr>
<tr>
<td>Lower power indicator</td>
<td>LED</td>
</tr>
</tbody>
</table>

## MECHANICAL

<table>
<thead>
<tr>
<th>Dimension mm (w/d/h)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI-AT1</td>
<td>152mm x 88mm (5.9” x 3.46”)</td>
</tr>
<tr>
<td></td>
<td>Tripod mount block</td>
</tr>
<tr>
<td></td>
<td>16mm high (0.62”)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>1Kg (2.2lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tripod mount</td>
<td>1 x 1/4-20UNC</td>
</tr>
<tr>
<td></td>
<td>1 x 3/8-16UNC</td>
</tr>
</tbody>
</table>

## ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Storage temperature</th>
<th>-20°C to +50°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-15°C to +50°C</td>
</tr>
<tr>
<td>Charging temperature</td>
<td>0°C to +40°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>10—90% RH non condensing</td>
</tr>
<tr>
<td>Vibration shock</td>
<td>10—40 Hz Max. 10g in any direction</td>
</tr>
<tr>
<td>EMC</td>
<td>Meets all EC harmonised standards</td>
</tr>
</tbody>
</table>

## MECHANICAL

<table>
<thead>
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<tbody>
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<tr>
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<td>16mm high (0.62”)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Weight</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tripod mount</td>
<td>1 x 1/4-20UNC</td>
</tr>
<tr>
<td></td>
<td>1 x 3/8-16UNC</td>
</tr>
</tbody>
</table>
**AD-500**

Single or multiple head high intensity flash system

500J Flash head with 2ms duration
Up to four independent flash heads
40s recycle time
Standard trigger

The Specialised Imaging AD500 Flash system offers the flexibility of four controllable high intensity flash light for use in scientific and industrial environments.

### CONTROL UNIT

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Input</td>
<td>Four independent Channels</td>
</tr>
</tbody>
</table>
| Trigger Mode             | 1. Independently  
                           2. Simultaneous - all four channels triggered via channel 1 |
| Trigger Source           | Short Circuit  
                           5-100V positive edge |
| Input Impedance          | 500 per channel |
| Mains Input              | IEC socket |
| Input Voltage            | 90-240V 50-50Hz AC |
| Dimensions mm            | (LxWxH) 220mm x 110mm x 128mm |
| Weight                   | 3.7kg |
| Lamp cable length        | 2.5m |

### FLASH HEAD

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Duration (Typ)</td>
<td>2ms measured to 50% of peak output</td>
</tr>
<tr>
<td>Stored Charge (max)</td>
<td>500J</td>
</tr>
<tr>
<td>Charge Voltage</td>
<td>340V</td>
</tr>
<tr>
<td>Light Source</td>
<td>U-Shape Xenon flashtube</td>
</tr>
<tr>
<td>Rise Time</td>
<td>50µs</td>
</tr>
<tr>
<td>Delay (typ)</td>
<td>30µs</td>
</tr>
<tr>
<td>Recycling Time (typ)</td>
<td>40 seconds</td>
</tr>
<tr>
<td>Dimensions (LxDia)</td>
<td>(270mm x 170mm)</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td>5.25kg</td>
</tr>
</tbody>
</table>
MSFH-370

High intensity flash with dedicated fibre optic output

370J Flash head with 750μs duration
Up to four independent flash heads
40s recycle time
Standard trigger

The Specialised Imaging MSFH-370 Flash system offers the flexibility of four controllable high intensity flash light for use in scientific and industrial environments. 5mm diameter FO output.

<table>
<thead>
<tr>
<th>CONTROL UNIT</th>
<th>FLASH HEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Input</td>
<td>Four independent Channels</td>
</tr>
</tbody>
</table>
| Trigger Mode  | 1. Independently  
2. Simultaneous - all four channels triggered via channel 1 |
| Trigger Source | Short Circuit  
5-100V positive edge |
| Input Impedance | 500 per channel |
| Mains Input | IEC socket |
| Input Voltage | 90-240V 50-50Hz AC |
| Dimensions mm | (LxWxH) 220 x 120 x 90 mm |
| Weight | 4.5 kg |
| Light Duration (Typ) | 750μs measured to 50% of peak output |
| Stored Charge (max) | 370J |
| Charge Voltage | 340V |
| Light Source | Linear spark source flashtube |
| Rise Time | 50μs |
| Delay (typ) | 30μs |
| Recycling Time (typ) | 40 seconds |
| Dimensions | (LxDia) 270 x 170 mm |
| Weight (Kg) | 5.25 kg (without handle, legs, FO mounting) |
Ballistics
Detonics
Plasma
Impact studies
Combustion research
Spray and particle analysis
Medical testing and research
Low light machine vision system
Nanotechnology and micro-machines
Elasticity, crack propagation and shock resistance

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