



## SCAD-DIC

**2D & 3D - DIGITAL IMAGE CORRELATION SYSTEM  
FOR NON-CONTACT FULL FIELD DISPLACEMENT,  
STRAIN MEASUREMENT & FREQUENCY ANALYSIS.**

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Facebook:- Pyrodynamics

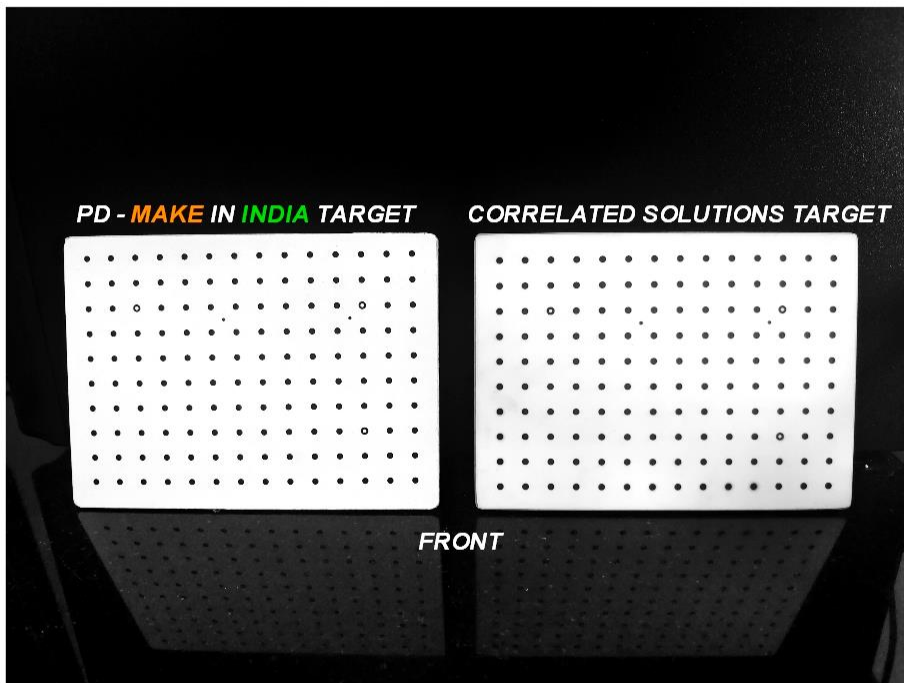
Instagram:- [pyrodynamics\\_india](https://www.instagram.com/pyrodynamics_india)

***VIC-3D Calibration Target Grids – Make in India***



***VIC-3D TEST SETUP***

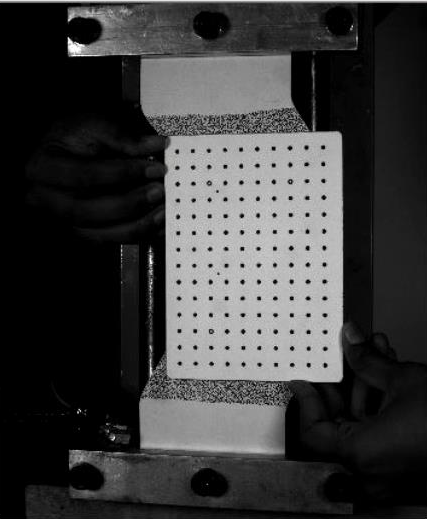
**PYRODYNAMICS NOW HAS ESTABLISHED A FACILITY TO MANUFACTURE THE CALIBRATION TARGET GRIDS IN HOUSE THANKS TO MAKE IN INDIA SCHEME INITIATIVE BY GOVERNMENT OF INDIA**



## VIC-3D - CALIBRATION SCORE COMPARISON :- PD TARGET VS CSI TARGET

Stereo System Calibration

Target: 10mm (H95-00-05)     Automatically recalibrate



|    | 1     | 2     |
|----|-------|-------|
| 51 | 0.031 | 0.032 |
| 52 | 0.045 | 0.043 |
| 53 | 0.048 | 0.045 |
| 54 | 0.032 | 0.036 |
| 55 | 0.015 | 0.023 |
| 56 | 0.030 | 0.035 |

| Value       | Result  | Std  |
|-------------|---------|------|
| Camera 0    |         |      |
| Type        | Pinhole |      |
| Center (X)  | 1196.26 | 1.40 |
| Center (Y)  | 1213.30 | 1.06 |
| Focal Le... | 5127.99 | 0.54 |
| Focal Le... | 5127.76 | 0.54 |
| Avg. ma...  | 8.09692 |      |
| Min. ma...  | 7.91201 |      |
| Max. m...   | 8.48167 |      |
| Camera 1    |         |      |

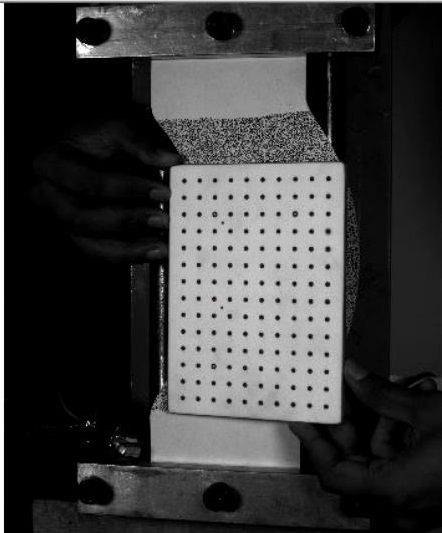
Score: 0.026

Imaging system: Standard, radial 2  Coordinate system: Auto

**PD - MII - TARGET**

Stereo System Calibration

Target: 10mm (H95-00)     Automatically recalibrate



|    | 1     | 2     |
|----|-------|-------|
| 36 | 0.017 | 0.028 |
| 37 | 0.025 | 0.021 |
| 38 | 0.025 | 0.023 |
| 39 | 0.017 | 0.023 |
| 40 | 0.026 | 0.035 |
| 41 | 0.026 | 0.027 |

| Value       | Result  | Std  |
|-------------|---------|------|
| Camera 0    |         |      |
| Type        | Pinhole |      |
| Center (X)  | 1157.35 | 1.68 |
| Center (Y)  | 1261.60 | 1.32 |
| Focal Le... | 5140.32 | 0.76 |
| Focal Le... | 5142.73 | 0.72 |
| Avg. ma...  | 8.03121 |      |
| Min. ma...  | 7.82789 |      |
| Max. m...   | 8.39439 |      |
| Camera 1    |         |      |

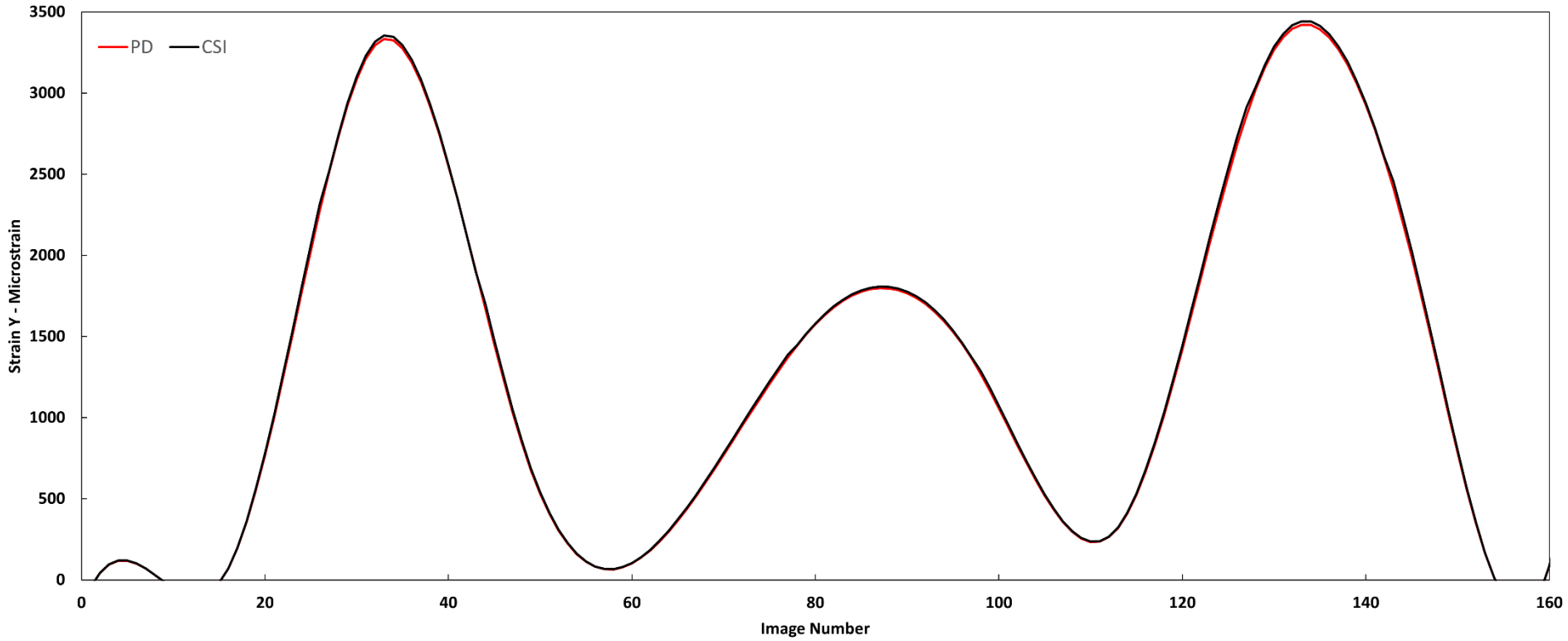
Score: 0.029

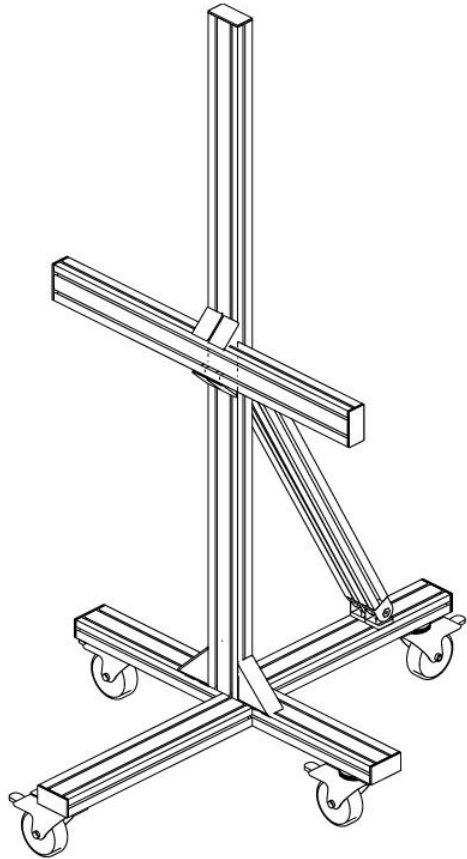
Imaging system: Standard, radial 2  Coordinate system: Auto

**CSI - TARGET**



*VIC-3D RESULTS - PD CAL TARGET V/S CSI CAL TARGET*





***Designed & Manufactured  
by Pyrodynamics***



***Low Speed Camera Mounting***



***High Speed Camera Mounting***

***(Image Courtesy:- Kuwait University – Kuwait)***

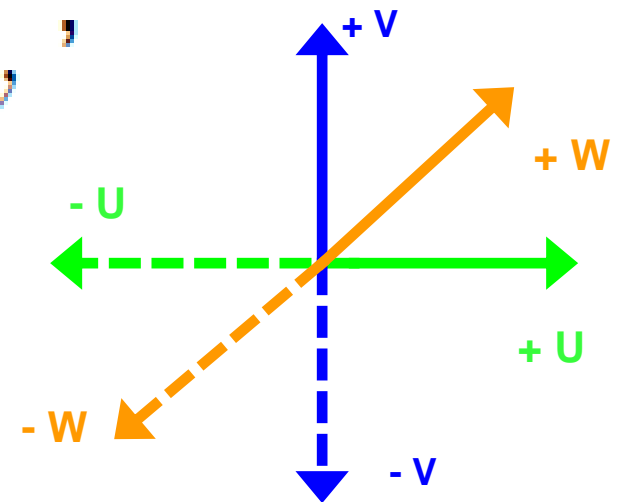
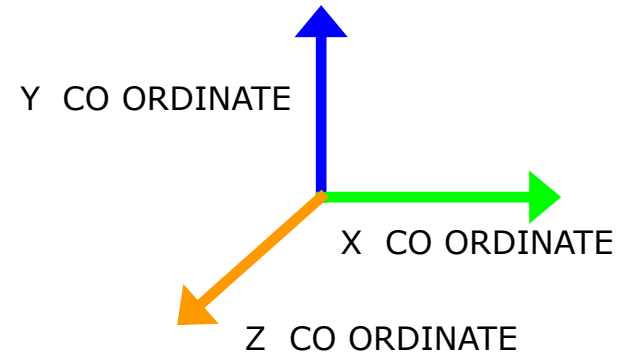
DIC Measures Displacements.

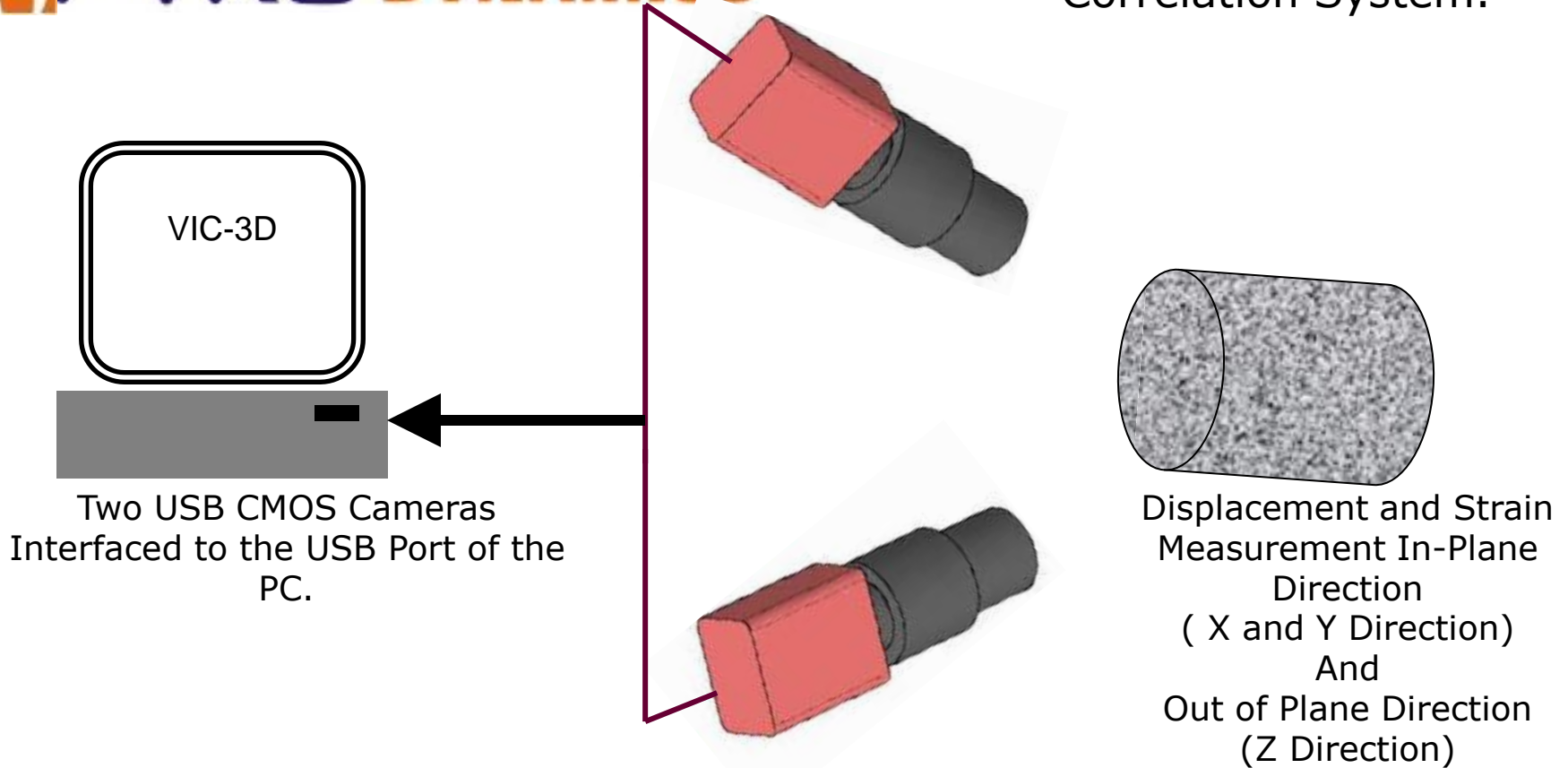
Strain is a Derivative of Displacement. Lagrange Strain tensor is used for calculation of Strains

## Calculation of strains:

$$\epsilon_x = \frac{\partial u}{\partial x}, \quad \epsilon_y = \frac{\partial v}{\partial y},$$

$$\gamma_{xy} = \frac{\partial u}{\partial y} + \frac{\partial v}{\partial x}$$





Results Obtained from 3D Digital Image Correlation

Contour Co Ordinates:- X, Y and Z ; Displacement:- u, v and w.

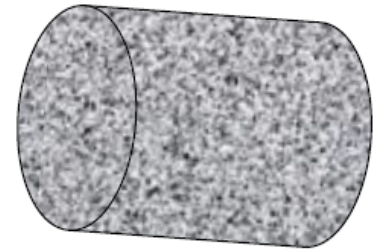
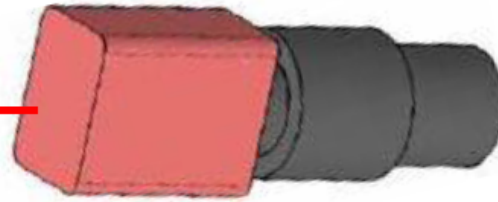
Strains:-  $\epsilon_{xx}$  ,  $\epsilon_{yy}$  ,  $\epsilon_{xy}$  ,  $\epsilon_1$  ,  $\epsilon_2$  , Von Mises, Tresca

and Directions of Principal Strains





Fire Camera interfaced to the  
Fire Wire Port of the PC.



Displacement and Strain Measurement  
In-Plane Direction  
( X and Y Direction).

## Results Obtained from 2D Digital Image Correlation

Contour Co Ordinates :- X and Y

Displacement:- u and v.

Strains:-  $\epsilon_{xx}$ ,  $\epsilon_{yy}$ ,  $\epsilon_{xy}$ ,  $\epsilon_1$ ,  $\epsilon_2$  Von Mises, Tresca and

Directions of Principal Strains

**List of Available CMOS USB 3.0 Cameras**



| <b>Specification</b>                | <b>CSI-04-0200</b>   | <b>CSI-04-0202</b>   | <b>CSI-04-0203</b>   | <b>CSI-04-0204</b>    |
|-------------------------------------|----------------------|----------------------|----------------------|-----------------------|
| Camera Interface                    | USB3.0               | USB3.0               | USB3.0               | USB3.0                |
| Camera Chip                         | CMOS                 | CMOS                 | CMOS                 | CMOS                  |
| Camera Sensor                       | Sony IMX174          | Sony IMX250          | Sony IMX255          | Sony IMX253           |
| Maximum Resolution                  | 2.3 MP - 1920 X 1200 | 5.0 MP - 2448 X 2048 | 8.9 MP - 4096 X 2168 | 12.3 MP - 4096 X 3000 |
| Maximum Frame Rate                  | 164 fps              | 75 fps               | 43 fps               | 30 fps                |
| Pixel size                          | 5.86 $\mu\text{m}$   | 3.45 $\mu\text{m}$   | 3.45 $\mu\text{m}$   | 3.45 $\mu\text{m}$    |
| Sensor size                         | 1/1.2"               | 2/3"                 | 1"                   | 1.1"                  |
| Lens Mount                          | C                    | C                    | C                    | C                     |
| Compatible with Active Optic Cables | Yes                  | Yes                  | Yes                  | Yes                   |



**Correlated Solutions Inc GigE Cameras for VIC-3D, 3D DIC System.**

**These Cameras operate only with Desktop PC's and a 2 Port GigE PCIe Interface Card needs to be installed in the PC.**

| <b>Specification</b> | <b>CSI-04-0235</b>    | <b>CSI-04-0236</b>      | <b>CSI-04-0237</b>       | <b>CSI-04-0238</b>     |
|----------------------|-----------------------|-------------------------|--------------------------|------------------------|
| Camera Interface     | GigE                  | GigE                    | GigE                     | GigE                   |
| Camera Chip          | CMOS                  | CMOS                    | CMOS                     | CMOS                   |
| Camera Sensor        | Sony IMX250           | Sony IMX255             | Sony IMX254              | Sony IMX342            |
| Maximum Resolution   | 2448 x 2048<br>(5 MP) | 4096 X 2160<br>(8.9 MP) | 4096 X 3000<br>(12.3 MP) | 6464 X 4852<br>(31 MP) |
| Maximum Frame Rate   | 162 fps               | 93 fps                  | 68 fps                   | 26 fps                 |
| Pixel Size           | 3.45 $\mu\text{m}$    | 3.45 $\mu\text{m}$      | 3.45 $\mu\text{m}$       | 3.45 $\mu\text{m}$     |
| Sensor Size          | 2/3"                  | 1"                      | 1.1"                     | APS-C                  |
| Lens Mount           | C                     | C                       | C                        | F                      |



**Correlated Solutions Inc High Speed Cameras for 2D/3D DIC Systems.**

| <b>Specification</b>                | <b>CSI-04-0188</b><br><b>Photron AX50</b><br><b>170K-M-16GB</b> | <b>CSI-04-0178</b><br><b>Photron AX100</b><br><b>540K-M-16GB</b> | <b>CSI-04-0061</b><br><b>Photron UX50</b><br><b>160K-M-16GB</b> | <b>CSI-04-0064</b><br><b>Photron UX100</b><br><b>800K-M-16GB</b> |
|-------------------------------------|---|--|---|--|
| Camera Interface                    | Ethernet  | Ethernet   | Ethernet  | Ethernet   |
| Camera Chip                         | CMOS  | CMOS   | CMOS  | CMOS   |
| Maximum Resolution                  | 1024 x 1024   | 1024 x 1024  | 1280 x 1024   | 1280 x 1024  |
| Maximum Frame Rate                  | 2000 fps  | 4000 fps   | 2000 fps  | 4000 fps   |
| Lens Mount                          | F   | F  | F   | F  |
| Compatible with Active Optic Cables | No  | No   | No  | No   |

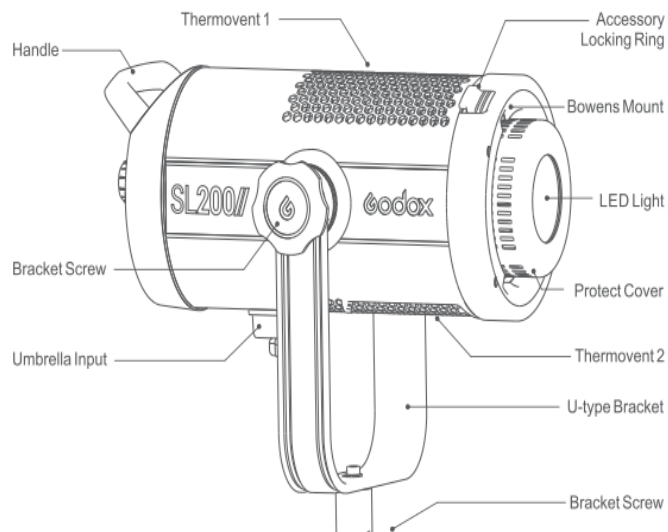




### Technical Data

| LED Video Light                               | SL150II                   | SL200II      |
|---|---------------------------|--------------|
| Power Supply                                  | AC100V-240V (50/60Hz)     |              |
| Max Power                                     | 150W                      | 200W         |
| Color Temperature                             | 5600±200K                 |              |
| 100% Light Brightness(LUX,1M)                 | ≈58000                    | ≈74000       |
| CRI ≈   | 96                        |              |
| TLCI ≈  | 97                        |              |
| Light Brightness Range                        | 10%-100%                  |              |
| Operation Temperature                         | -10°C ~ 40°C              |              |
| Channel                                       | 32                        |              |
| Group   | 16(A, B, C, D, E, F, 0-9) |              |
| Dimension (not included a standard reflector) | 34x20x16cm                | 36.7x20x16cm |
| Net Weight                                    | 2.95Kg                    | 3.33Kg       |

| Remote Control        | RC-A6                    |
|-----------------------|--------------------------|
| Power Supply          | 3.0V(AAA*2)(not include) |
| Wireless Frequency    | 2.4GHz                   |
| Distance (emptiness)  | 50m                      |
| Channel               | 32                       |
| Group                 | 16 groups(A-F, 0-9)      |
| Standby Time          | Over one year            |
| Operation Temperature | -10°C ~ 40°C             |
| Dimension             | 120*38*15mm              |
| Net Weight            | 30g                      |





**50mm Lens**



**85mm Lens**



**100mm Lens**



**C to F Mount Adapter**



**135mm Lens**



**Lets Think Collectively**

**Thank You**

**Moto of  
Pyrodynamics**

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**“A Company of  
Value Rather  
than a Company  
of Success”**

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