



SBIG STXL Camera Series



The Popular “Eleven Thousand” CCD

A worthy successor to the venerable STL-I 1000 and STL-6303.

The New SBIG STXL Camera System:

- Camera, Autoguider, and Filter Wheel now fully integrated with tracking sensor in front of filters! No separate guider required!
- New Micron-Precision 2” filter wheel provides unmatched flat field accuracy for high end imaging and high precision photometry!
- USB 2.0 and Ethernet connectivity for remote observatories!
- Superior Two-stage Cooling -60 degrees C below ambient with air only!
- Water Cooling Ready
- Uses STX Electronics with Full Frame Image Buffer

STXL Camera System – The Next Generation

To meet the demands of the next generation astroimaging, SBIG introduces the next generation STXL Camera System with self-guiding integrated into a Micron-Precision Filter Wheel. The STXL Series is new a high-end model that will fit a moderate budget.

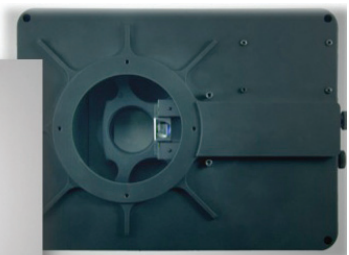
The STXL is the logical successor to SBIG’s venerable dual sensor STL Series Cameras with the with all of the features and latest electronics of the STX series cameras. The first two models to be released are the STXL-I 1002M and STXL-6303E. The STXL makes some cost savings changes to the STX design specifically to suit the 35mm format I 1002 CCD along with an innovative self-guiding filter wheel design that improves the self-guiding capabilities of the camera system by placing the guiding CCD in front of the filters.

STXL Camera Series Highlights

- Self-Guiding in Front of filters
- Lowest Noise 1.8Mhz Readout ~ 6 sec
- High Precision 8-position Filter Wheel
- User Selectable Internal Image Processing
- 2-Stage TE Cooling -60C delta T with air
- Built-in Web Server
- Full Frame Image Buffer
- Even-illumination (photometric) shutter
- Ethernet and USB 2.0
- Built-in RBI Pre-flash
- Liquid Cooling Capability Standard
- Uses lower cost 50mm round filters
- Accepts unmounted and mounted filters
- User Rechargeable Desiccant Plug
- Status, Power and Relay Indicators
- Windows 32-bit and 64-bit (and Mac) Software
- Optional Remote Guide Head
- Power Management System
- 12VDC Operation

The Products

STXL Series Camera System

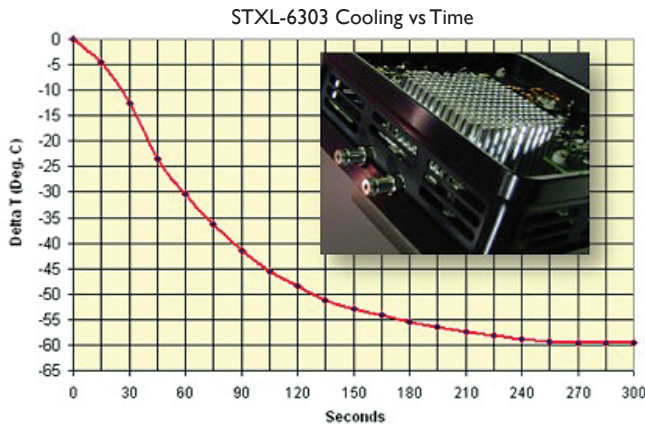


Micron-Precision Filter Wheel with Built-in Self-Guiding CCD

The Camera: Next Generation STX

The STXL camera is the latest version of the flagship STX series. The STXL is essentially the same camera design as the STX with three exceptions:

- The Self-Guiding CCD is moved from the main camera body to the new STXL filter wheel for guiding in front of the filters.
- A highly reliable rotating type even-illumination shutter provides a shorter back focus to accommodate camera lenses.
- The STXL uses a new remote guide head. Same size as the ST-i Autoguider, but plugs directly into the remote guide head port of the STXL camera body and operates as an integrated self-guiding CCD.

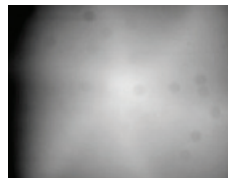


The Camera: No Compromises

The STXL uses the same efficient pin fin heat sink design as the STX series cameras to achieve the most efficient use of space and weight while maximizing the cooling capability of the camera. This type of heat sink is more expensive than typical parallel fin heat sinks, but the results speak for themselves. The STXL achieves a temperature delta of -60C in 5 minutes.

The Camera: Even-Illumination Shutter

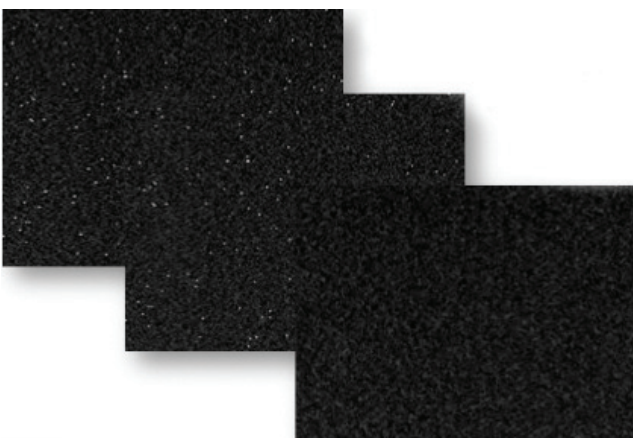
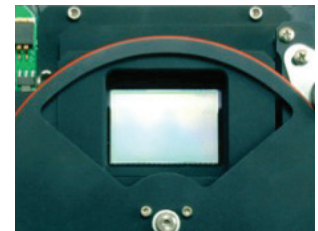
- Since its founding, SBIG's mechanical shutters have been designed for highly reliable, even-illumination, of the sensor even at short exposures.
- Even-illumination is especially critical when taking flat fields with exposures of less than a second or even several seconds.
- Very common when taking sky flats.



Twilight Flat from Iris/
Leaf shutter



Twilight Flat from SBIG
Even-Illumination
Shutter



The Camera: Internal Image Processing

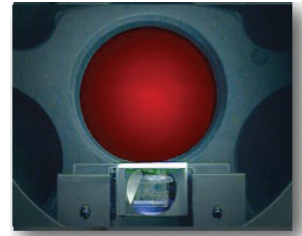
SBIG's new STXL is the first large format camera with user-selectable automatic image processing! These 30 second dark frames were taken at room temperature to accentuate the number of warm pixels. The first frame is unprocessed, the second frame has a medium filter, and the third frame the most aggressive filter.

Each shows fewer bright pixels and each has correspondingly lower noise in the image. The user can select from eight levels of filter strength to suit his needs.

The Filter Wheel: Self-Guiding Up Front

Self-Guiding in Front of the Filters:

Self-guiding has long been acknowledged as the best, most accurate way to guide long exposure astrophotos, particularly with commercial SCTs. The single most common complaint however is finding bright stars when guiding through dark or narrowband filters. The STXL filter wheel incorporates the self-guiding CCD inside the front cover of the filter wheel so that the guider picks off light from the guide stars before passing through the filters. There are two adjustment knobs on the filter wheel base: one for focus and one for moving the pick-off mirror. Problem solved.



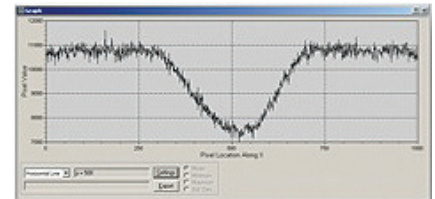
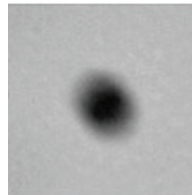
The Filter Wheel: Precise Flats Solved

Micron-Precision Filter Positioning:

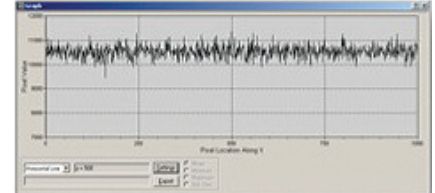
When taking flat field frames of filtered images, the flat field frame must show exactly the same optical characteristics to be the most effective. If there is dust on the filter, or uneven illumination caused by the filter, this must be represented precisely as seen in the light image to be corrected by the flat field frame. The STXL filter wheel is designed to provide a new level of accuracy when taking flats through filters by repositioning filters to within a few

microns every time. This allows the imager to take extremely accurate flat field frames even after rotating the filter wheel several times, or even after a loss of power.

The light frame at top left, taken with an STT and new filter wheel, shows a large opaque spot caused by debris intentionally stuck on a clear filter (the STXL uses the same precise positioning design).



The filter wheel was rotated several times, then the clear filter was re-positioned, and a flat field image was taken through the same dirty filter.



The image at bottom left shows the result after applying the flat field image to the original light frame. We measured this positional accuracy to be better than 5.4 microns, or better than a single pixel using the STT-8300.

Filter Compatibility

The STXL Filter Wheels are designed to hold up to 50.8 mm round, un-mounted filters.

The carousel will also accept 50.0 mm round un-mounted filters as well as filters mounted in 2" O.D. cells with 48mm threads (e.g., commonly available 2" photometric filters).



50.8 mm round unmounted



50 mm round unmounted



2" filter cells with 48mm threads

STXL-11002 Typical Specifications

CCD	Kodak KAI-11002M
Pixel Array	4008 x 2672 pixels @ 9u
CCD Size	36 x 24.7 mm
Total Pixels	11 million
Full Well Capacity	60,000 e-
Dark Current	0.5e-/pixel/sec at -15C
Antiblooming	Yes
Shutter	Mechanical, Even-illumination
Exposure	0.001 to 3600 seconds, 10ms
Correlated Double Sampling	Yes
A/D Converter	16 bits
Gain	0.87e-/ADU
Read Noise	11 e- rms
Binning Modes	1x1, 2x2, 3x3, 9x9, x n
Digitization Rate	1.8 Megapixels per second
Full Frame Download	6.3 seconds
Max Cooling Delta	-60°C with air only
Temp. Regulation	±0.1°C
Power	12VDC at 6 amps
Interface	USB 2.0 and Ethernet
Computer Compatibility	• Windows 32 / 64 bit • Mac OSX • 3rd party Linux
Camera Body Size	6 x 6 x 3 in. (excluding fan) 152 x 152 x 76 mm
Mounting	3" threaded accessory plate
Weight	4.5 pounds / 2 kg
Backfocus	0.98 inches / 24.8 mm

STXL-6303 Typical Specifications

CCD	Kodak KAF-6303E
Pixel Array	3072 x 2048 pixels @ 9u
CCD Size	27.65 x 18.48 mm
Total Pixels	6.3 million
Full Well Capacity	100,000 e-
Dark Current	0.3e-/pixel/sec at 0C
Antiblooming	NABG only
Shutter	Mechanical, Even-illumination
Exposure	0.12 to 3600 seconds, 10ms
Correlated Double Sampling	Yes
A/D Converter	16 bits
Gain	1.47e-/ADU
Read Noise	11 e- rms
Binning Modes	1x1, 2x2, 3x3, 9x9, x n
Digitization Rate	1.8 Megapixels per second
Full Frame Download	4 seconds
Max Cooling Delta	-60°C with air only
Temp. Regulation	±0.1°C
Power	12VDC at 6 amps
Interface	USB 2.0 and Ethernet
Computer Compatibility	• Windows 32 / 64 bit • Mac OSX • 3rd party Linux
Camera Body Size	6 x 6 x 3 in. (excluding fan) 152 x 152 x 76 mm
Mounting	3" threaded accessory plate
Weight	4.5 pounds / 2 kg
Backfocus	0.98 inches / 24.8 mm



Product Components

All STXL-11002 cameras include: Rugged, aluminum body with Ethernet and USB 2.0 electronics, Even-illumination shutter, -60 degree TE cooling delta, water cooling ready, USB and Tracking Cables, Power supply, CCDOPS.

Standard filter wheel adds FW8-STXL filter wheel without self-guiding.

Self-Guiding Filter wheel adds the Self-guiding FW8-STXL precise positioning filter wheel.

STXL-I 1002 Camera Components

Every STXL-I 1002 and STXL-6303, whether sold separately or as part of a kit, includes:

- Class 2 CCD (Class 1 or Class 0 are optional)
- Rugged machined camera body with rack handles and 3" threaded accessory plate
- Internal, even-illumination, mechanical shutter
- 15 foot USB cable (third party USB extenders available)
- Telescope interface cable (for guiding)
- Universal 100-240VAC Power supply
- SBIG's CCDOPS version 5 camera control software
- Two Year Warranty Parts and Labor on the camera other than the CCD
- One Year Warranty Parts and Labor on the CCD
- Demo CD-ROM with sample images and software
- Custom case with pre-cut foam for camera and small accessories

STXL Autoguiding Filter Wheel Options

Every STXL Standard Filter Wheel includes:

- FW8-STXL Precise Positioning Filter Wheel with standard cover plate
- 8-Position, 50mm carousel (accepts 50mm round un-mounted and 2" mounted filters)
- Two Year Warranty Parts and Labor

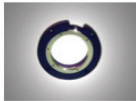
Every STXL Self-Guiding Filter Wheel includes:

- FW8-STXL Precise Positioning Filter Wheel with Self-Guiding cover plate
- Built-in KAI-0340 Guiding CCD with adjustable pick-off mirror and focus
- 8-Position, 50mm carousel (accepts 50mm round un-mounted and 2" mounted filters)
- Two Year Warranty Parts and Labor



Optional Accessories for STXL-I 1002

- STXL Remote Guide Head
- LRGB Filters
- Narrowband filters
- Photometric filters
- Nikon lens adapter
- Canon EOS lens adapter
- Carrying / Storage Case



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