



S O F T W A R E B I S Q U E

TheSky Fusion™ Specifications



\$1,695

- ✓ Intelligently combines power, communication and control of your entire digital imaging system.
- ✓ TheSky™ astronomy software, fully integrated.
- ✓ Wirelessly control devices with TheSky™ from your iPad, iPhone, Android, laptop or other device.
- ✓ Eight adaptable power ports with configurable voltages and amperages to run even the most complex setups.
- ✓ Four high-speed USB 3.0 ports.
- ✓ Integrated GPS, Wi-Fi and Ethernet.
- ✓ Real-time LCD status display of your imaging run.
- ✓ Dovetail adapter included for easy and flexible telescope mounting.

■ Introduction ■

TheSky Fusion™ marries the world's single-most capable object-acquisition and imaging software with exquisitely designed hardware to connect, power and integrate your imaging devices.

TheSky™ software supports more imaging devices across more platforms than any other software on the market. With TheSky Fusion™ you can connect your mount, camera, autoguider, focuser, filter wheel, rotator, and dew heater to TheSky™ to control them from your tablet, smartphone, laptop, or desktop. Operate using any modern web browser through Wi-Fi or use a remote desktop application (Remote Desktop or VNC). An Ethernet port

Software Bisque, Inc. ■ 862 Brickyard Circle ■ Golden, Colorado 80403-8058 ■ USA

Phone: +1 303 278 4478 ■ Fax: +1 303 278 0045

© 2019 Software Bisque, Inc. **Website: bisque.com**

even permits a hardwired connection for an optimal experience. Though an Internet connection is not required, TheSky Fusion™ takes full advantage of being on-line when connected to the Web.

TheSky Fusion™ attaches to your mount and simplifies system setup, maintenance, and nightly tasks for maximum productivity. TheSky Fusion's™ flexible power-output ports can drive even the most complex hardware configurations. Four high-speed USB 3.0 ports and one legacy serial port can meet most communication needs. If not, one of the configurable 5-volt DC power ports can run a powered USB adaptor so that you can add as many additional USB ports as necessary.



Hardware Specifications

Category	Feature/Specification	Details
External Case	CNC-machined 6061 aluminum housing	<p>The external housing is CNC machined from aluminum and anodized red.</p> <p>Dimensions (W x H x D): 19.7 cm x 7.6 cm x 13 cm (7.8 in. x 3 in. x 5.1 in.)</p> <p>Total weight: 1.9 kg (4.2 lb.), including the dovetail mounting bracket.</p>
Computer	64-bit Hex-Core CPU at 1.8 GHz	<p>Coupled with fast eMMC RAM, and a discrete GPU, the fast CPU offers an ideal image acquisition experience.</p> <ul style="list-style-type: none"> • Smooth Sky Chart updates. • Efficient live stacking. • Fast image archiving.
GPU	Discrete	GPU supports OpenGL graphics hardware acceleration for smooth panning and zooming.
Memory	<ul style="list-style-type: none"> • 4 GB of DDR4 RAM • 128 GB of high-speed eMMC storage • 256 GB of mass non-volatile storage 	<ul style="list-style-type: none"> • <i>TheSky</i> occupies about 5 GB of high-speed access memory. • The complete Gaia stellar database occupies an additional 90 GB of mass storage. • 90 GB free high-speed memory and 165 GB free mass storage. This means you have ample storage for an entire night's worth of full-frame images, even using a large-format CMOS camera: <ul style="list-style-type: none"> ○ About 8500 images at 30 MB each. ○ About 2500 images at 100 MB each.
Computer Power Requirements	ARM-based CPU	<p>Here is the processor's approximate power footprint under varying operating conditions:</p> <ul style="list-style-type: none"> • 2 Watts (processor idle). • 4 Watts (typical workload usage). • 8 Watts (maximum CPU draw). <p>A laptop's power consumption can vary widely, from 30W on the low end to 90W on the higher end. That means <i>TheSky Fusion</i> requires about 4 to 10 times less power than the typical laptop computer.</p>
Wired Communication	Gigabit Ethernet	Allows for a high-speed wired connection giving the best possible responsiveness, data transfer rates and reliability.
Wireless Communication	802.11AC 2.4 or 5.0 GHz Wi-Fi	The fastest widely available Wi-Fi standard and allows for the best possible wireless experience. The built-in Wi-Fi antenna can be upgraded to a Reverse Polarity SMA Wi-Fi antenna.
GPS	Built-in	The GPS gets accurate time and position data. This simplifies nightly setup and eliminates common mistakes, for example,


Software Bisque, Inc. ■ 862 Brickyard Circle ■ Golden, Colorado 80403-8058 ■ USA

Phone: +1 303 278 4478 ■ Fax: +1 303 278 0045

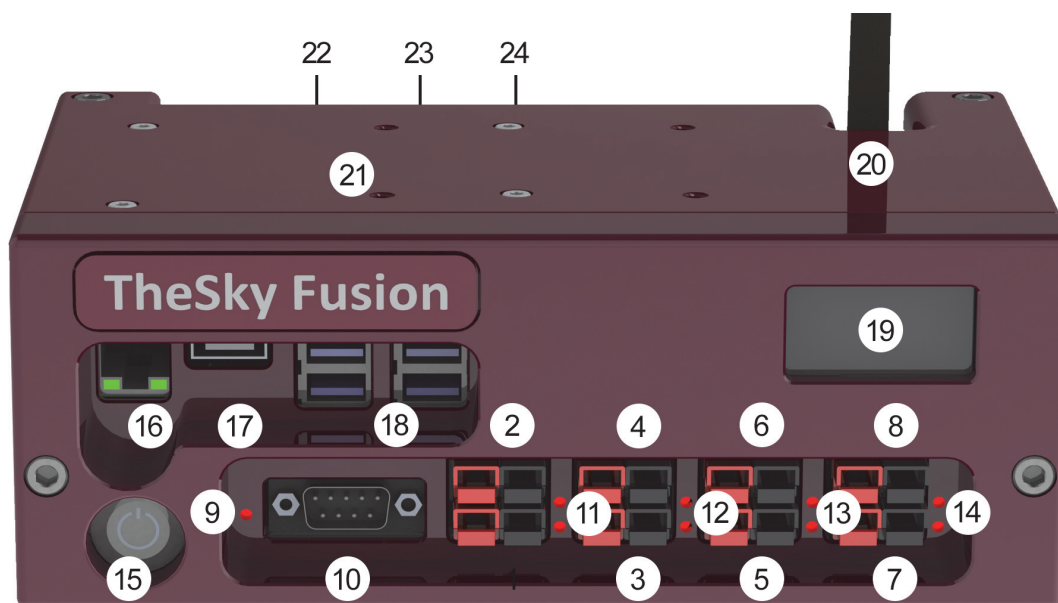
© 2019 Software Bisque, Inc. **Website: bisque.com**

Category	Feature/Specification	Details
		<p>entering the location or time incorrectly or neglecting to update them.</p> <p>Real-time access to the site's precise position and time ensure optimal telescope pointing accuracy with TheSky Imaging's TPoint telescope modeling.</p> <p>The default antenna is mounted internally. An optional external antenna (sold separately) can be attached to the External GPS Antenna port.</p>
External Power Ports	Eight Anderson power pole connectors	<p>Anderson Power Products' Powerpole® connectors and cabling offer:</p> <ul style="list-style-type: none"> • Availability of low cost, off-the-shelf cables. • A variety of amperages and wire gauges (15A/30A/45A contacts supporting 10–20 AWG wires). • Durability. • Easily assemble custom cables with an optional crimping tool (sold separately). <p>The power output port specifications are described in the "External Components" section below.</p>
USB Ports	4 x USB 3.0	<p>Four USB 3.0 ports can drive CMOS high-speed cameras or other astronomical devices. USB 3.0 is essential for planetary imaging or anyone who enjoys fast image downloads.</p> <p>If more than four USB 3.0 ports is required, use one of the ports to connect a 4- or 8-port USB hub and power the hub using one of the power ports configured for 5V output.</p>
Ethernet Port	RJ45 Ethernet port	1000/100/10 Base-T
External Monitor Port	HDMI 2.0 connector	<p>Video out that can be used to view TheSky on any HDMI-compatible monitor. Useful for outreach programs, controlling TheSky Fusion using a mouse and keyboard or troubleshooting.</p> <ul style="list-style-type: none"> • Supports up to 4K @ 60Hz. • Supports audio out.
External LCD Display	16 characters wide, two line red on black LCD	Descriptive messages provide essential real-time status during startup, imaging runs, automated pointing calibration or debugging information if things go wrong.

Software Specifications

Category	Feature/Specification	Details
Operating System	Linux (Ubuntu 18 LTS) 	Efficient, stable 64-bit operating system. Say “goodbye” to Windows updates.
TheSky™ Astronomy Software	<p>Includes TheSky™—the world’s most powerful observatory control software.</p> <p>Enjoy the benefits of increased productivity and ease of use, out of the box. And, all from a singular integrated application software package.</p> <p>TheSky™ takes full advantage of the 64-bit operating system as well as hardware-accelerated graphics. Coupled with the Linux operating system, TheSky Fusion will produce years of reliable, worry-free operation.</p>	<p>Crafted from 35 years of customer feedback, <i>TheSky</i> has the tools you need to plan observing sessions, acquire astronomical images and so much more.</p> <ul style="list-style-type: none"> • Operate your mount, camera, guider, focuser, filter wheel, rotator, etc. from a single application. • Provides power (on/off) switching to the integrated 5V/8V/12V power ports. • Offers graphics acceleration to produce smooth Sky Chart zooming and scrolling. • Comes with the complete Gaia star catalog (1.7 billion stars). • Includes millions of galaxies, clusters, nebulae and other non-stellar objects. • Includes <i>TheSky LTI™</i> interface for Paramount™ mount owners. • Displays comets, satellites, asteroids, planets, Sun, Moon, Saturn’s and Jupiter’s major moons. • Performs Image Link and All Sky Image Link astrometric solutions (a.k.a. “plate solving”). • TPoint™ telescope pointing analysis produces exceptional pointing accuracy. For Paramount™ mount users, TPoint with ProTrack produces exceptional tracking accuracy. • Automated telescope pointing calibration. • Advanced autoguiding with optional guide camera, with features like graphing guider logs, 3D star graphs, and so much more. • Automated focus using either @Focus2 or @Focus3. • Filter wheel support. • Rotator support. • Fully scriptable operation (bisque.com/scripting) using JavaScript or Python. • So much more (see TheSky’s 700-page user guide for details).
\$100 Optional Annual TheSky™ Subscription Fee	Access to downloadable updates.	<p>TheSky’s annual subscription ensures your software is updated with the latest features, fixes, improvements and device support.</p> <ul style="list-style-type: none"> • The first year’s subscription is included. • Downloadable access to newer software versions is permitted with a current subscription. • Subscription renewal is <i>optional</i> and <i>not required</i>. • If the subscription is allowed to expire, TheSky continues operating normally and indefinitely.

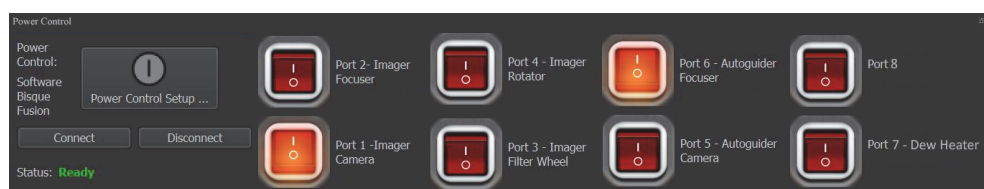
External Components



TheSky Fusion's numbered external components are described in the table below.

Number	Description	Number	Description
1	12V/3A DC or 5V/1.5A DC fused power out port (configurable).	15	System power button.
2	12V/3A DC or 5V/1.5A DC fused power out port (configurable).	16	RJ45 Ethernet port.
3	12V/3A DC fused power out port.	17	HDMI port.
4	12V/5A DC fused power out port.	18	Four USB 3.0 ports.
5	12V/5A DC fused power out port.	19	Four-line OLED status display.
6	12V/7A DC fused power out port (configurable PWM).	20	External Wi-Fi antennae.
7	12V/7A DC fused power out port (configurable PWM).	21	1/4-20-in., 60 mm-spaced dovetail mounting holes.
8	8V/3A DC or 5V/3A DC fused power out port (configurable).	22	GPS antenna (internal).
9	TheSky Fusion's GPS status LED.	23	Optional External GPS antenna port.
10	Male DE9 RS-232 serial port.	24	Power input port (12V/40A DC), specified below.
11-14	Power output port status LEDs.		

Note	Explanation
Power button	<p>The power button does not operate like a traditional on/off switch.</p> <ul style="list-style-type: none"> When external power is initially supplied, the unit is turned on automatically, the power status LED is illuminated, and the system starts up. There is no need to flip a <i>power switch</i>. From there, the startup process takes about one minute before it is ready to use. After the unit is powered on and initialized, pressing and releasing the power button initiates the unit's shut down procedure and then turns the power off. Pressing and releasing the power button restarts the unit.
Power input port	<ul style="list-style-type: none"> A power cable with a keyed Powerpole connector is required for the power input port (24). This prevents accidentally plugging the <i>power supply cable</i> into any of the <i>power output</i> ports (1-8).
Power output ports	<ul style="list-style-type: none"> The power port numbering sequence shown in the diagram matches the order on TheSky's <i>Power Control</i> window (shown below). The power output ports are protected with a replaceable internal regular blade fuse (40V DC). Ports 6 and 7 can be configured to provide power using pulse-width modulation (PWM) for dew heaters.



TheSky's Power Control window.

Software Bisque, Inc. ■ 862 Brickyard Circle ■ Golden, Colorado 80403-8058 ■ USA

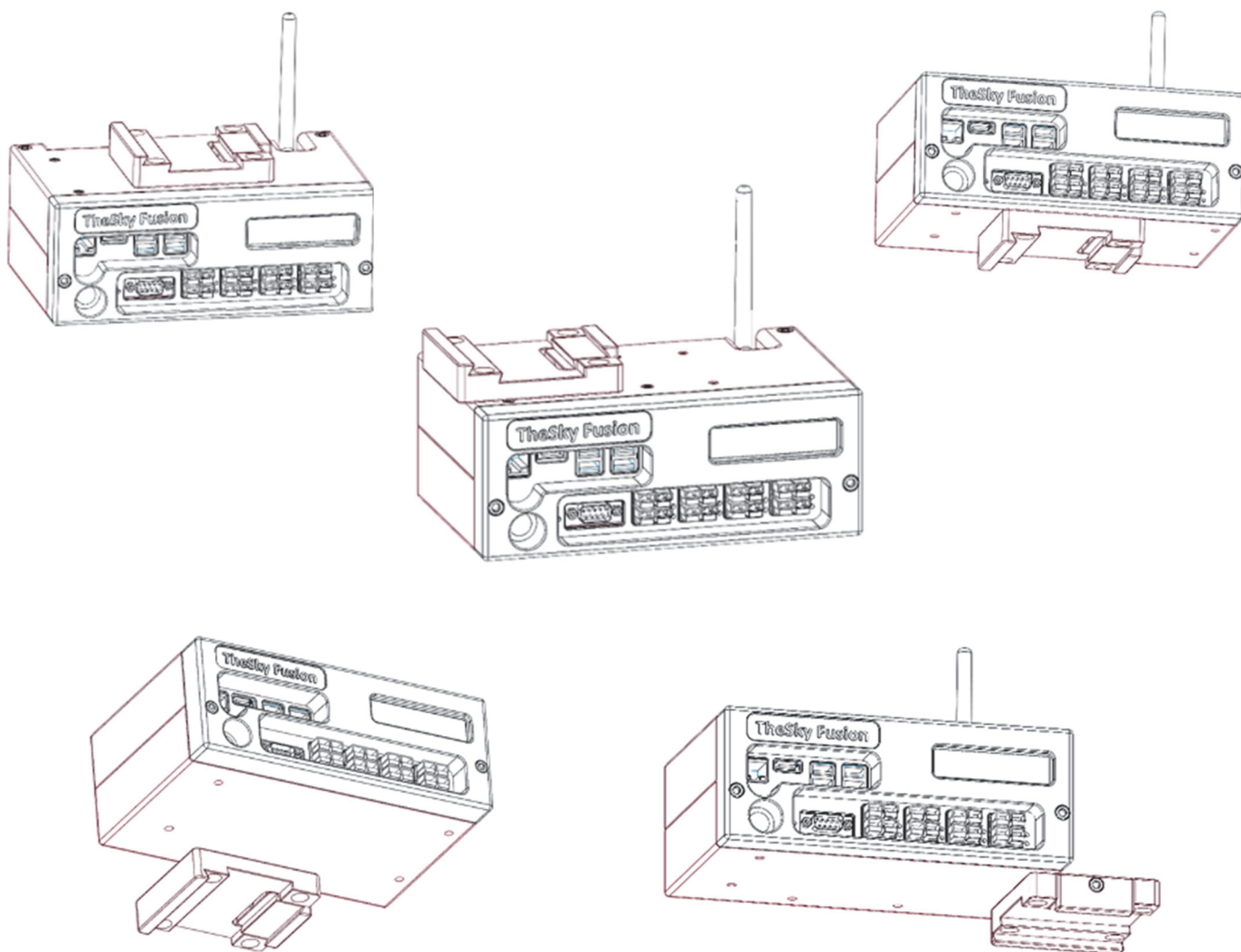
Phone: +1 303 278 4478 ■ Fax: +1 303 278 0045

© 2019 Software Bisque, Inc. **Website: bisque.com**

Mounting Specifications

Category	Feature/Specification	Details
Dovetail	Female Losmandy and Vixen Dovetail (D and V Series respectively) included	<ul style="list-style-type: none"> 60 mm spaced 1/4-20-in. mounting holes. The 60 mm spacing is used by many vendors including ADM dovetail hardware. Mounting holes located on the top and bottom of the aluminum housing so that TheSky Fusion's housing can be attached to most telescope configurations.

The figures below show several possible mounting positions.



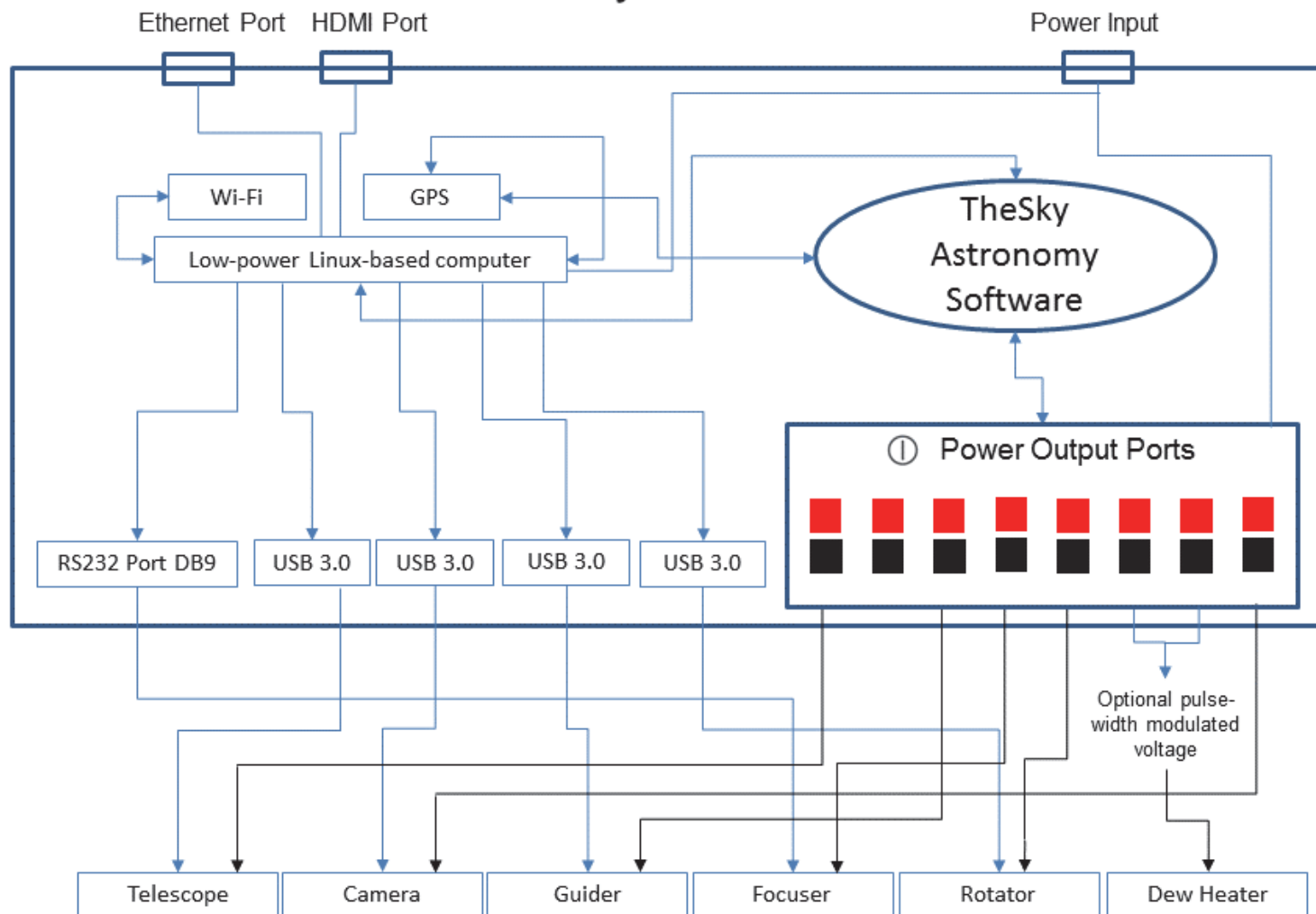
Supported Devices

Mounts	Cameras	Filter Wheels	Focusers	Rotators
<ul style="list-style-type: none"> • Astro-Physics • Celestron • iOptron • Losmandy (using the Gemini control system) • Meade • Sky-Watcher • Software Bisque • Takahashi 	<ul style="list-style-type: none"> • Canon DSLR • Finger Lakes Instruments • QSI • Mallincam • Starlight Xpress • ZWO 	<ul style="list-style-type: none"> • Chuck Faranda's RDC Shutter • Finger Lakes Instruments • QHYCCD • QSI • Starlight Xpress • Xagyl Communications • ZWO 	<ul style="list-style-type: none"> • AAF2 • Arduino Focus • Astro-Physics* • Astromechanics Canon Lens Controller • Baader Planetarium • Celestron • Finger Lakes Instruments • Gemini* • Lake Side • Meade* • MicroFocuser • MoonLite • Officina Stellare • Optec • Pegasus Astro • PrimaLuce • Rigel systems • Starizona • Starlight Instruments • Technical Innovations 	<ul style="list-style-type: none"> • MoonLight • Officina Stellare • Optec • Software Bisque

* Telescope mount's built-in focuser controller.

The above list includes devices supported as of November 2019. We are regularly adding new device support to TheSky™ astronomy software. If your hardware's manufacturer or model is not listed above, please let us know so that we can work with them to add support.

TheSky Fusion



TheSky Fusion hardware and software block diagram.



SOFTWARE BISQUE

Superior imaging solutions for discriminating astronomers.

Software Bisque, Inc. ■ 862 Brickyard Circle ■ Golden, Colorado 80403-8058 ■ USA

Phone: +1 303 278 4478 ■ Fax: +1 303 278 0045

© 2019 Software Bisque, Inc. **Website: bisque.com**