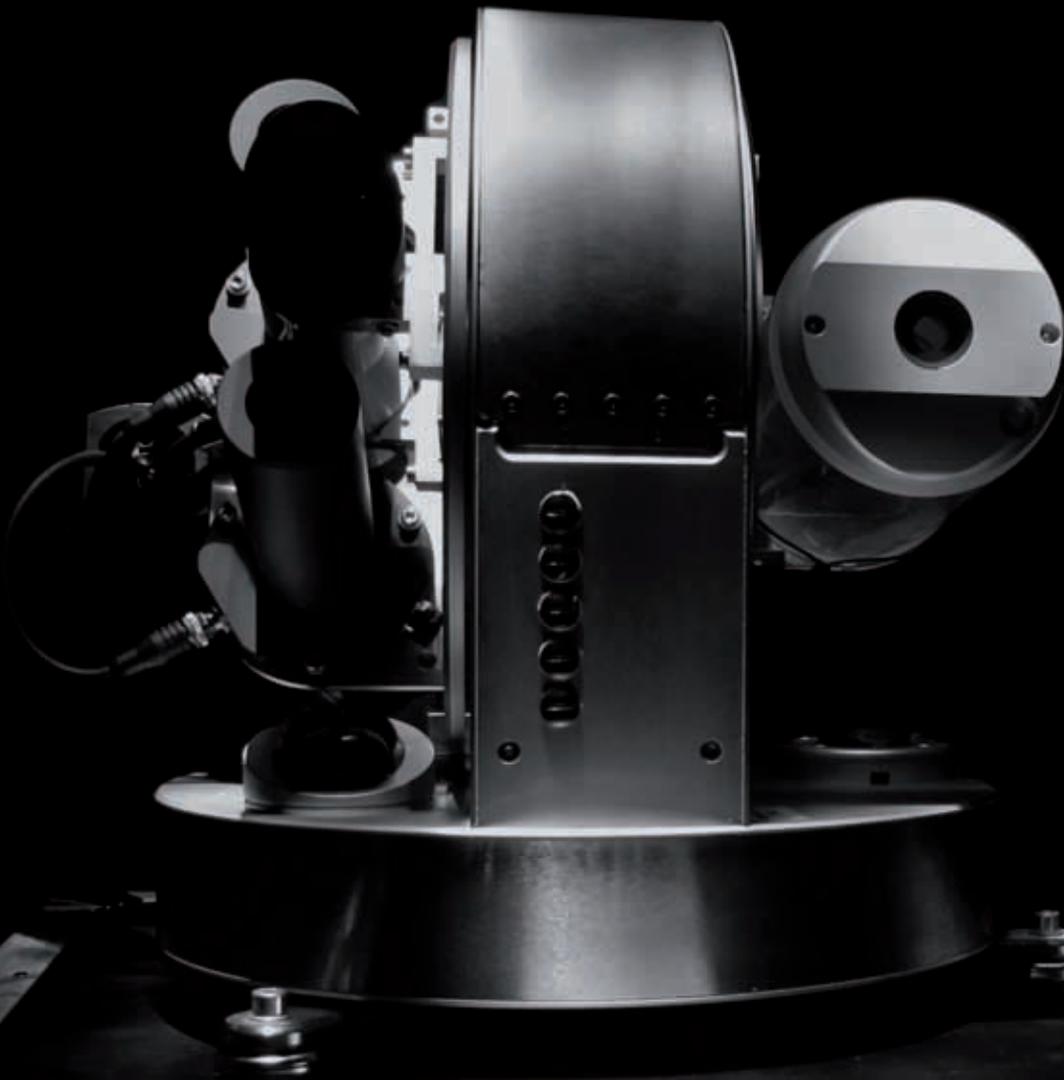




Black Photon
Instruments

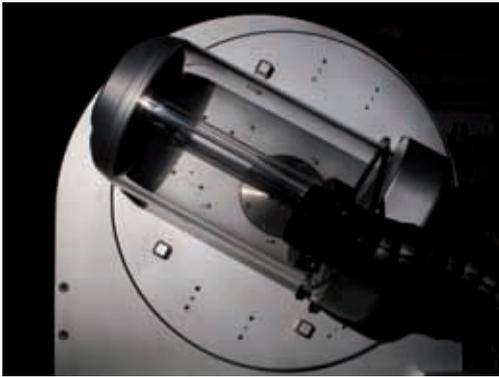
Sunscanner SC1

The Next Generation Sun Tracking Platform



Black Photon Instruments' sunscanner SC1 is a fully automated platform for measurement of solar radiation as well as atmospheric properties. This two-axis sun tracker introduces a large number of innovative concepts that make sun measurements more precise and reliable.

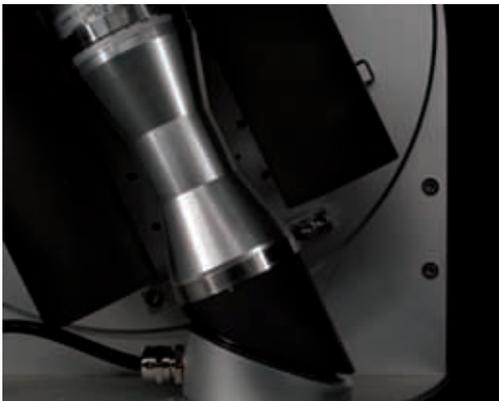
BPI.PMOsafe



BPI.PMOsafe: Operation of an active cavity pyrhelometer in outdoor conditions

Active cavity pyrhelometers, such as the PMO6-cc from the world radiation center in Davos, Switzerland, are the most accurate instruments for measurement of direct solar radiation. The PMOsafe technology from Black Photon Instruments allows to operate this instrument outdoors all around the year by supplying clean purge air, controlling the humidity, and providing complete protection against heavy rain and wind.

BPI.park

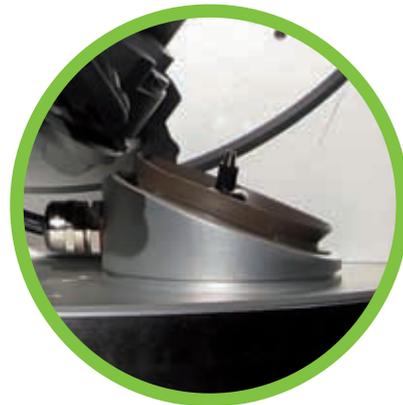
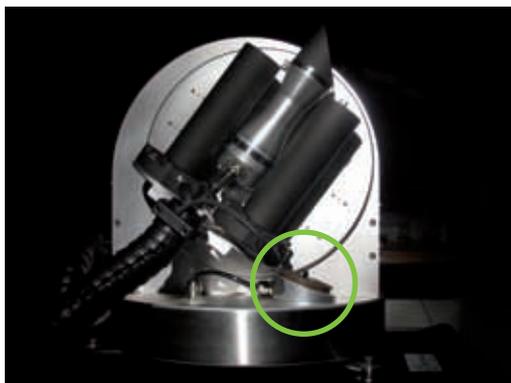


BPI.park, a parking garage for sensors

The Sunscanner SC1 from Black Photon Instruments features high performance elevation drives that can move sun measurement instrumentation (e.g. a pyrhelometer) to any desired position within less than two seconds. This means, that the sun measurement instrumentation needs to face the sun only during the time of measurement. While not measuring (which is during 75 % of the time in most applications) the instrumentation can remain in a parking position where it is well guarded from dust and dirt. Especially at night sun sensors can now truly sleep well even in a sandstorm.

Technology Highlights

BPI.blast



BPI.blast, a high-pressure cleaner for solar instrumentation

While facing the sun, dirt and dust settle on the entry window of solar instruments such as a pyrheliometer. This reduces the measurement accuracy to an unknown degree until the next manual cleaning. With Black Photon Instruments' BPI.blast, a high pressure air pulse blows away the dirt particles from the instrument every time it returns to the parking position.

BPI.autocalib



BPI.autocalib, an integrated calibration lab

The Sunscanner SC1 can be equipped with two high-performance elevation drives that are controlled independently. So one drive can be equipped with a calibration instrument, e.g. a high precision pyrheliometer such as the EKO MS-56 or the PMO6-cc absolute cavity pyrheliometer. On the second elevation drive the standard working instrument is installed. While the calibration instrument remains well protected in a parking position most of the time, the working instrument is used to perform the all-day measurements. In a user-defined interval, e.g. every 2 hours, the calibration instrument automatically moves into the measurement position and delivers a precise reference reading. This reading is used to automatically recalibrate the working instrument. It's like having a little private calibration lab on your site!



BPI.email



BPI.email: The tracker information system for your inbox

The Sunscanner can generate each day (or each week, or each month...) a small report that summarizes all events and data measured by the tracker. So now the information whether all measurements on a remote location are going well or whether there is a problem that needs attention is just one click away.

BPI.rapidscan



BPI.rapidscan: Precise high-precision movement patterns

The high-performance electric actuators of the Sunscanner SC1 are driven by advanced motion controllers. Sub-millisecond control loops for the motor current as well as closed loop operation using optical encoders on all axes with a precision of $<0.002^\circ$ allow for quick and precise movements. Even the most complex movements like scanning the sky according to custom defined patterns are no problem with the advanced motion control technology.

BPI.accuracy



BPI.accuracy: Verified tracking accuracy

The sunscanner uses a combination of sun position calculation algorithms and active sun tracking to achieve a tracking accuracy error below 0.03° . Based on the Black Photon Instruments TA1 sensor technology, the system can document the tracking accuracy reached during active tracking mode and include this data in the daily measurement report email.

BPI.maincontrol



BPI.maincontrol: Control your sunscanner from everywhere in the world

The main control of the Sunscanner SC1 is based on an embedded linux PC with Intel® Atom™ core. This provides the power of a complete Linux environment e.g. to store Gigabytes of raw data on industrial grade solid state drives (RAID optional), do a first processing of raw data so only the most important data gets transmitted, or integrate your own instruments using the USB, RS232 or Ethernet connections. The main control can be conveniently and securely accessed from everywhere in the world using a SSH internet connection, building on all the standard safety features of the Linux environment.

BPI.interface



BPI.interface: Your direct connection to the system

The sunscanner SC1 offers endless possibilities of interfacing. It works well as a stand-alone system or it can be operated together with a data logger. Internal events, such as the reaching of a defined position, can be indicated on up to 4 digital outputs, or the tracker can be controlled using up to 4 digital inputs. Using the advanced option BPI.openinterface, you can even generate your own programs to perform specific tasks. This software solution allows you to program the Sunscanner in Python code making use of the extensive Python motion libraries from Black Photon that do the lower level control of the drives and data IO.

Specification Sunscanner SC1

Drives:

- Optical absolute encoders with 0.002° resolution on all axes
- Closed-loop control for precise movements
- High-speed ramp generation in hardware for smooth movements without vibration
- CANopen® protocol communication with main controller for high reliability and fault tolerance
- Maximum load (balanced): 5 kg on each side

Tracking:

- Passive tracking based on optical absolute encoders
- Active sun tracking with BPI TA1 sensor based accuracy measurement technology
- Accuracy of active sun tracking: < 0.03°
- Rapsidscan technology for quick scanning in custom defined movement patterns

Housing:

- Main body frame made from CNC-machined aluminium for fast and homogeneous heat distribution
- Stainless steel cover sheets for high durability and corrosion resistance

Instrumentation Platform:

- Instrumentation platform on each elevation axis with over 30 M4 threaded holes for easy installation of sun sensors such as pyrheliometers
- Azimuth tracked platform with shading balls for diffuse irradiation measurement optional

BPI.PMOsafe:

- Protection system for absolute cavity pyrheliometer PMO6-cc, with PMMA/anodized aluminium protection housing, high-flow medium pressure continuous operation air pump, heating elements, humidity control sensors, 3-way particle air filter

BPI.blast:

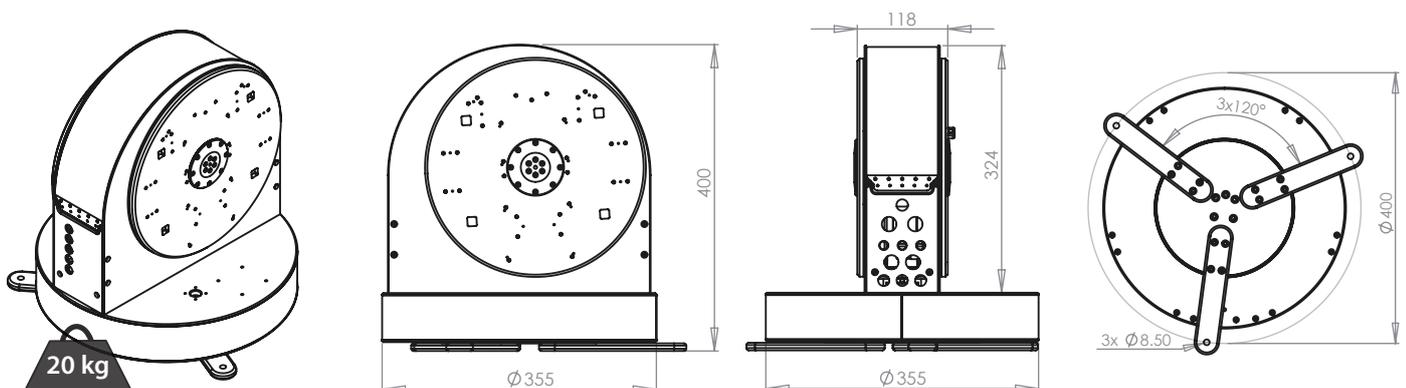
- High pressure air sensor cleaning system with high pressure air pump, 3-way particle air filter, electric valve, pressurized air reservoir, blast nozzle

Support cabinet:

- Optional electrical cabinet (400x300x200 mm) containing power supplies, main control PC
- Mandatory with BPI.PMOsafe or BPI.blast option

Power:

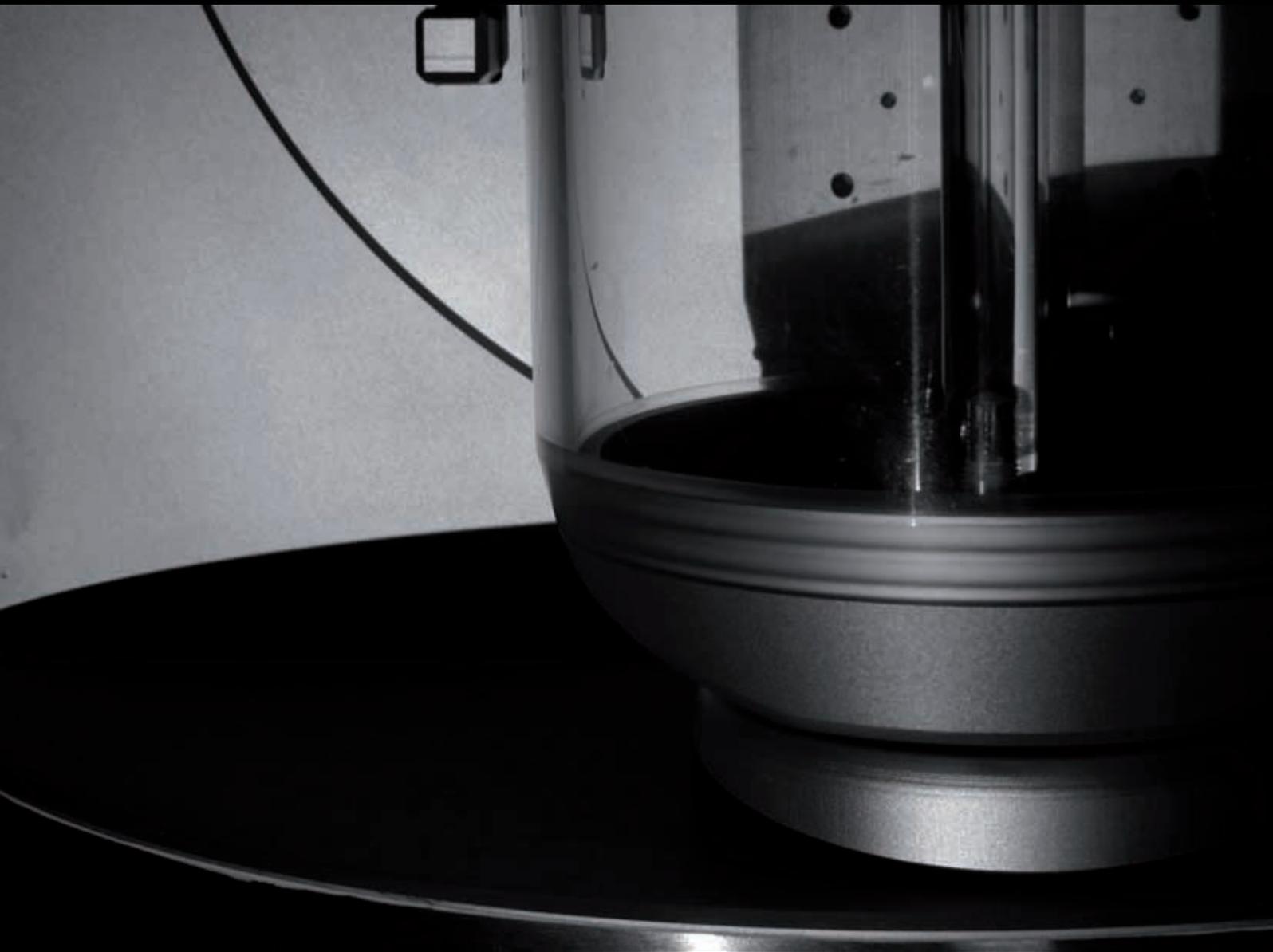
- Power requirement:
 - 24 V, 2 A, 50 W (hot climate configuration)
 - 24 V, 5 A, 120 W (cold climate configuration with heating)



All product, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.



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Instruments



Specification Version 1.3

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