

*... more precise, more robust, more safe.*

## ***New All Sky Imaging Solutions***

*2020/07 - New Options - New Features - As Perfect As Ever*



NEW: Improved external T/RH Sensor  
NEW: Fast 1-second Pyranometer Data  
HDR 6MP outdoor qualified imager head  
180/360° fisheye lens, coated quartz dome  
Fully secure http/s based web user interface

NEW: Safe file transfer protocols (FTPS, SFTP)  
NEW: Improved dual-side Surge Protection  
Temp  $-40^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ , Ventilation, Heating  
Data Logger - Hardware and Software  
OPTION: Pyranometer Interface

# ASI-16/5n/1n

All Sky Imaging Solutions - Rel. 2020/07

## ASI-16/52 Hardware - Components - Options - Models



### **Simple Mount**

External sensor without optional Radiation Shield.

### **ASI-16/5n - Advanced (Rel. 2020/02)**

Forced Ventilation and up to 60W Airflow Heating  
 CMS-HPoE Power Supply, 80W, 48VDC, 110/240VAC  
 External Precision Sensor, Temperature and Humidity  
 Integrated Data Logger (Hardware & Software)

### **./5n Options (not included):**

Pyranometer Modbus Interface  
 Pyranometer Mounting Arm  
 T/RH Sensor Radiation Shield  
 ...

Pyranometer Modbus Interface: Available as option, implementation via software update.  
 Note: Digital sensors require vendor-specific protocols. Today's firmware supports EKO-brand protocol. Other protocols will be added subject to demand and vendor technical support.

Hardware Maintenance: The fully modular mechanical and electrical design, and just 3 screws to access the interior ensures most easy maintenance and allows later optional upgrades.

### **Pyranometer Mounting Arm:**

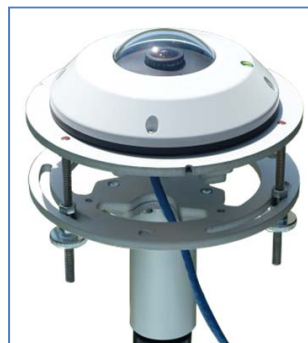
To mount a Pyranometer directly to an ASI.  
 Flexible adjustments for GHI or GTI setups.



Allows very easy mounting of one Pyrano to an ASI-16 body without special additional (mechanical) tools and components.

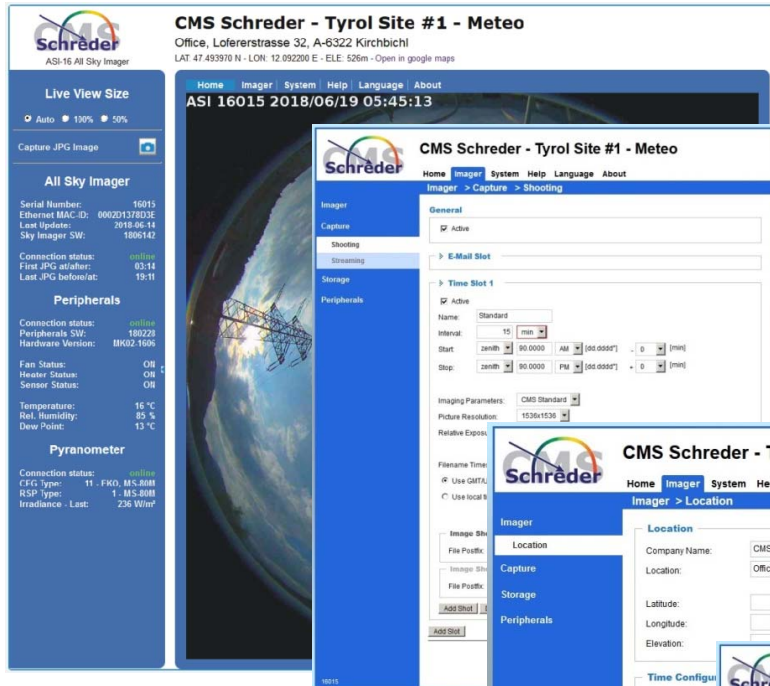
### **ASI-16/1n - BASIC (on request):**

Lower-cost ASI-16 model, limited functions.  
 NOT recommended for harsh environments.



**VERY IMPORTANT:**  
 Request and check deviating functions, specs and limits of use and operation. NOT recommended for hot/cold/harsh/and/or remote sites.

## ASI-16/5n Software - User Interface - Data Storage

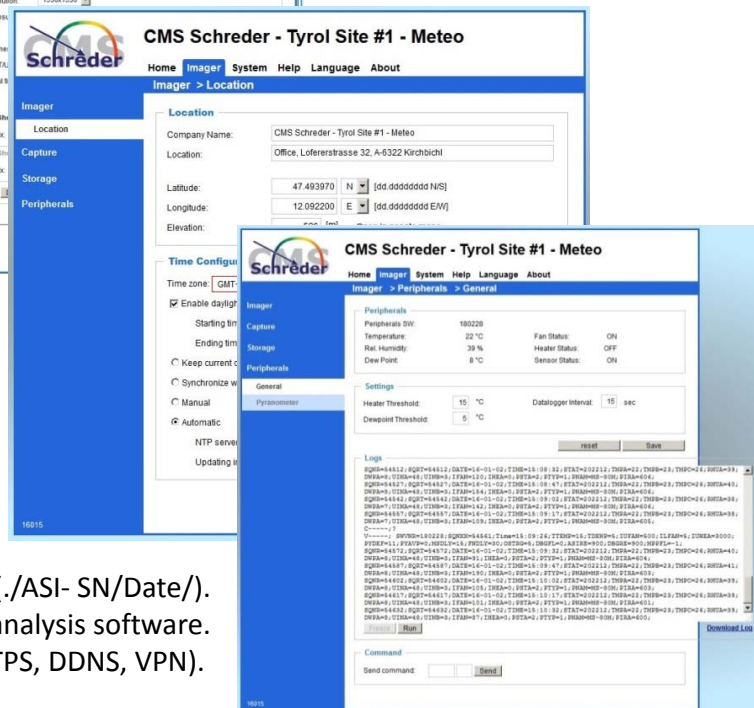


Web-browser based user interface. Settings & monitoring via Web-GUI. Online / offline software updating. Secured settings on CMS servers.

Advanced shooting scheduler. Zenith-angle- and time-controlled. Multiple pictures per time slot. Multiple exposures per slot. Multiple sets of time slots. Timestamps: UTC or Local Time.

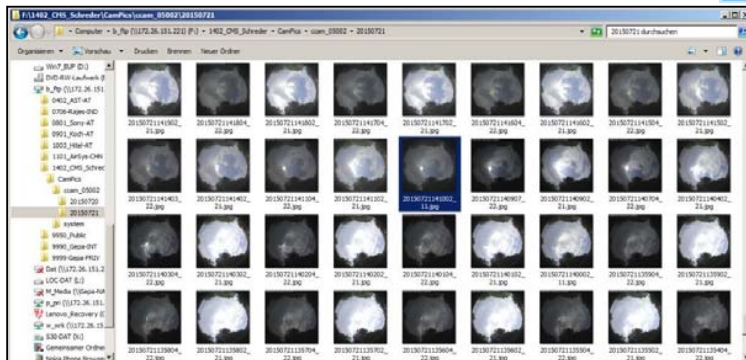
Client Site Location (Lat/Lon/Ele), stored into each JPG EXIF dataset. JPGs upload to (S)FTP(S) storage. Temporary local storage in case of FTP server or network problems. JAVA-based maintenance tools.

Auto-created file server directories (./ASI- SN/Date/). Prepared also for future CMS cloud analysis software. Multiple remote access options (HTTPS, DDNS, VPN).



Above: Data Logger Screen. See life data , set parameters. Sensor and system data also stored into JPG EXIF dataset. Available on ASI-16/5n only.

Left: Series of pictures with variations in exposure level, stored onto (S)FTP(S) server.





# ASI-16/nn

All Sky Imaging Solutions - Rel. 2020/07

CMS ASI-16 System, General Data, applicable for BOTH ASI-16/5n-Advanced and ASI-16/1n-Basic			
Imaging Sensor Chip	1/1.8" Progressive CMOS	LAN Network Type	100 BaseTX Ethernet (RJ-45) -
Imaging Sensor Resolution	3096x2094, 5 Megapixel	Network Protocols	IPv4, IPv6, TCP/IP, HTTP, (HTTPS), FTP, FTPS, SFTP, DHCP, NTP, DNS, DDNS, VPN, RTSP/ RTCP, SMTP, PPPoE, SNMP, SSL,
Useable Resolution	1920x1920 (Fisheye)		
Field of View (useable View)	180° / 360° (150° / 360°)		
Lens, Focal Length, Aperture	Fixed-focal, f=1.47mm, F2.2		
Optical Dome	Strong Quartz Glass, coated	Software Updater, Tools	Management software, Java
Imager Spectral Range	Visible Spectrum	Data file network upload	FTP/S server, file share server
Minimal Illumination	0.18 Lux @ F2.2 (Color)	Realtime life stream	MJPEG (standard), H.265
WDR Techn., Dynamic Range	WDR PRO (Enh.), 100 dB	Graphic User Interface	Web Browser, WIN-7/.../10
Ventilation, heating (./5n only)	80 m3/h, 60W heating power	Power supply system	HPoE (Power over Ethernet)
Environmental Sensor (./5n only)	Temp/RH, Sensirion SHT85	Power supply input	CMS-HPoE, 100V - 240V AC
Pyranometer Interface (./5n only)	digital, ModBus (RS-485)	Power consumption	./51: 15W/80W; ./10: 15W;
Internal data backup memory	Industrial MicroSD CF, 4GB	Operating temperature	-40°C (-25°C) to +80°C (limited)
Mounting rod dimensions:	DM: 37mm to 40mm (max)	Environmental Protection	IP66K (Fan: IP66K, others: IP67)

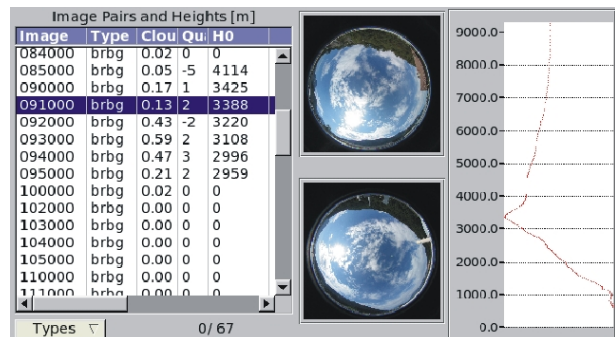
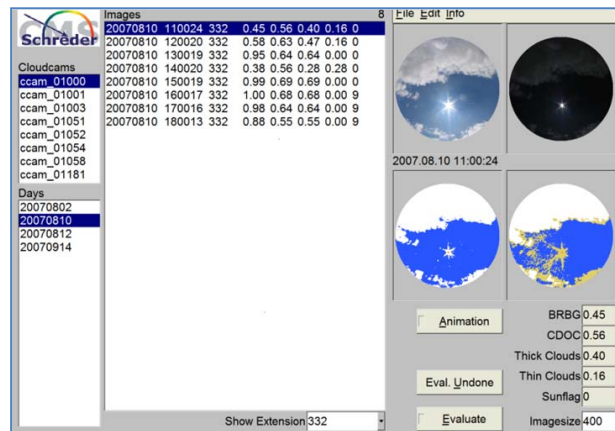
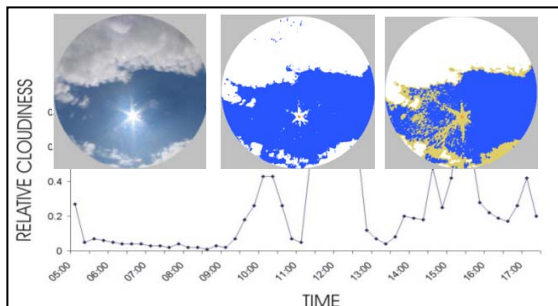
## "FindClouds Trinity" - Cloud Analysis Software

WIN-PC-based software, to analyze ASI images at a (network) file storage place.

Not part of ASI-16 scope of delivery. Please request specific detailed documents.

### FCB Cloud Detection / Coverage

Detection of clouds as "Cloud Objects".  
Therefrom generate "false colour" images.  
Calculate numeric "Cloud Coverage Ratio".



### CMV Cloud Motion (optional)

"Average Cloud Motion Vector" (direction, virtual speed in pixel/sec) is calculated by comparing two immediately (about 15-30 seconds delay) consecutive ASI images.

### CBH Cloud Base Height (optional)

"Average Cloud Base Height" is calculated by using stereoscopic algorithms, combining two (2) time synchronized images from two (2) ASI-16 imagers mounted at a distance about 1500m.

### Pyranometer Modbus Option Pyranometer Mounting Arm External Temp/RH-Sensor



Pyranometer Option: To connect and operate a Modbus Pyranometer with any new ASI-16/5n, for logging of real-time irradiance data (Act, AvP, AvM, Min, Max). Subject to purchase of ASI Pyranometer Option. - Activation after Purchase.

Pyrano Mounting Arm: To mount a Pyranometer directly onto the ASI-16/5n base plate, avoiding any additional third-party mechanical mounting tools. - Allows mechanical sensor adjustments for qualified measurement of GHI or GTI.



## **ASI-16/5n All Sky Imagers - Options**

### **Pyranometer Modbus Option - Introduction**

CMS ASI-16/5n "Pyranometer Modbus Option" allows to connect selected types of Pyranometers (with digital Modbus output) directly to an ASI imager. (This option DOES NOT support Pyranometers with analogue-only output.)

Currently implemented vendor Modbus protocols:  
EKO Instruments: MS-80M, MS-60M, MS-40M, ML-01M.

Other vendor's Modbus protocols: Not implemented, yet.  
Maybe can be implemented upon request, likely at additional costs.  
Implementation subject to clarification and tech support of vendor.

### **External High Precision Temperature/Humidity Sensor:**

The new high-precision Temp/RH sensor (Sensirion SHT85) now comes with a cable and a stainless steel metal tube, ready to be mounted into a professional "Radiation Shield", to ensure high quality Meteo-standard Temp/RH data.

NOTICE: The Temp/RH sensor MUST be connected IN ANY CASE, as it is MANDATORY for operation and control of heating and ventilation functions.

### **Irradiance Data - Retrieval and Storage (in W/m<sup>2</sup>):**

Internally, ASI PeriCon (Peripheral Controller) retrieves one value per second. Latest 1-second Irradiance data are stored into each JPG image, in the EXIF data set, and are recorded into ASI PeriCon "...PeriData-yymmdd.csv" datalogger files. Maximum logging speed can be configured up to 1 dataset per second.

### **ASI Software - Installation, Setup, Configuration**

Upon purchase of the "Pyrano Option", please indicate the type of Pyrano. So, at activation, CMS can already pre-define the Pyrano type in CMS-CRM. If you did NOT indicate a Pyrano Type, then set it up in CMS-CRM yourself. We recommend to set the Pyrano-Type in CMS-CRM, before "FULL RESET" Of course, you also can set your Pyrano-Type later on, in the ASI-GUI. BUT, on later "FULL-RESET's", local ASI-GUI settings are reset to CMS-CRM.

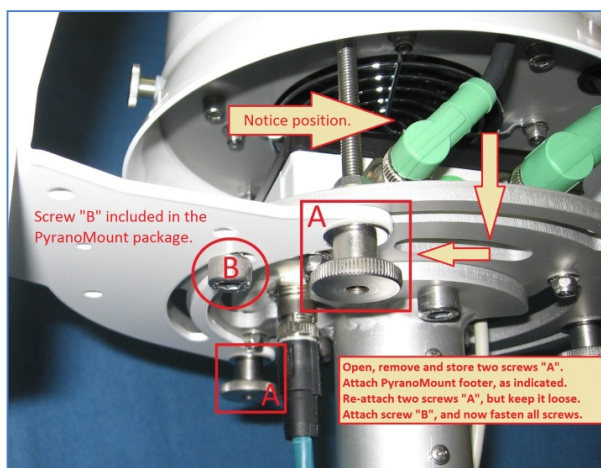
ASI PeriCon Firmware Upgrade (for recently added new Pyrano vendors, only):  
Requires a special UART/USB cable and software. - Please contact your agent.



### Pyranometer Option - Hardware Delivery and Mounting



CMS ASI-16/5n "Pyranometer Mounting Arm" comes with two non-pre-assembled arm components, and small additional parts (screws, washers) for assembly and mounting. - Screws to mount the Pyranometer itself are NOT included. Usual those screws are a part of the Pyranometer supplier scope of supply.



For proper mounting of the "Pyranometer Mounting Arm", follow instructions within the picture. - NOTICE: There are three possible ways of mounting. Only ONE ensures the correct North-South arm orientation, necessary for non 90° tilt angle adjustments, required for GTI.



When mounting the Pyranometer, consider Northern or Southern hemisphere. The plug and cable always shall face "away from sun", to avoid heat by exposure to direct sun radiation, therefore likely corrupt Pyrano irradiance data.

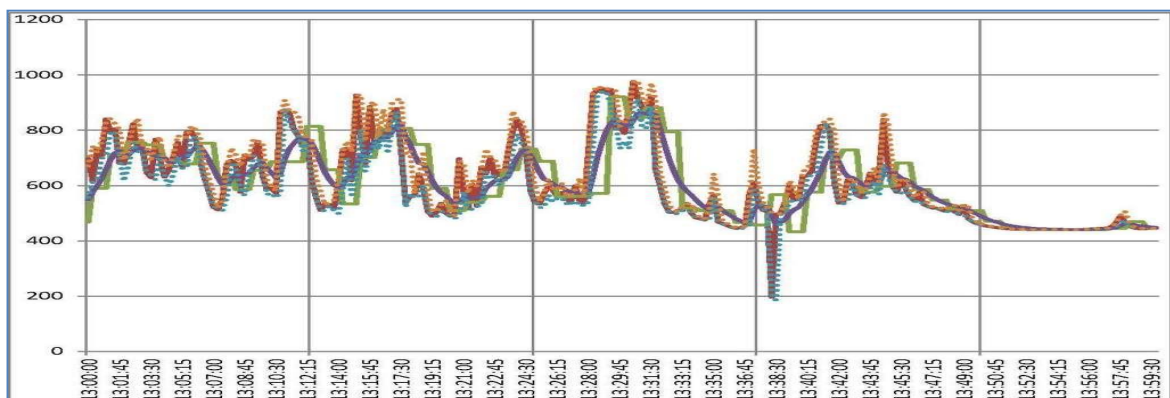
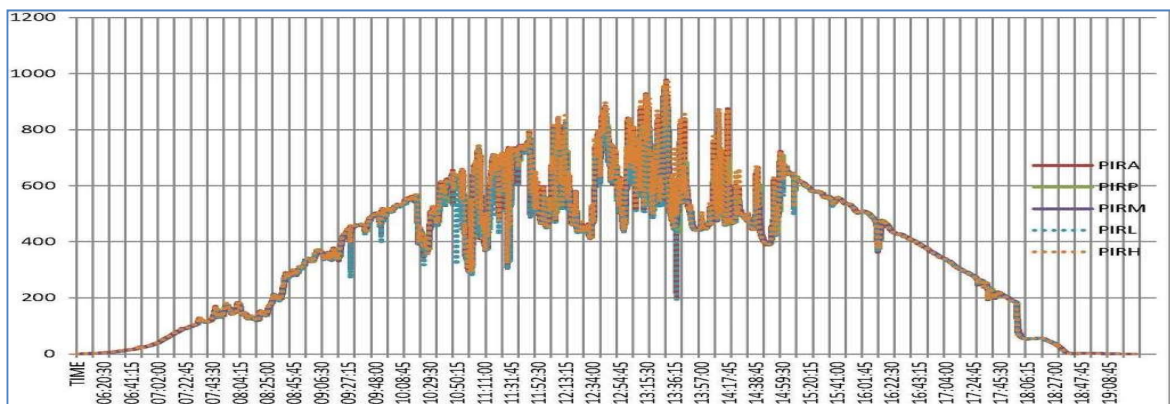
### Pyranometer Option - Software Functions

ASI-16/5n "Pyranometer Option" is an OPTION, not part of standard delivery. It supports specified Pyranometer with a digital Modbus output interface, only.

To activate this option, you must purchase and pay the applicable option fee. After CMS-Schreder confirmation, you must run an ASI-Manager "FULL RESET". And, you must purchase and mount an ASI-compatible Modbus Pyranometer. At the moment, CMS ASI-16/5n supports EKO Modbus Pyranometers, only.

### Pyranometer Option - Datalogger CSV-File - Irradiance Data

PIRA: Last Second Value                      "PIR\_": Irradiance Values in [W/m<sup>2</sup>]  
 PIRP: Packaged Average                      PIRM: Moving Average  
 PIRH: Last Interval Maximum              PIRL: Last Interval Minimum  
 Average time period and PIRM weighting to be customized, via parameters.  
 ASI Datalogger captures 1/sec raw values, and calculates others there from.



Specifications and designs in this paper are preliminary and for general information purpose, only.