ASI-16 V24 R2610 - All Sky Imager

Advanced Sky Imaging System - R 2026-10 r11



Software & Hardware Manual

Release Version R 2026-10-01 (including FCS-26 "FindClouds Simple")

Including "Release Notes" for SW v2610010 (Date: 2026-10-01)

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Change Notes / Release Notes:

2026-10-01: ASI16 V24 Imager SW & CMS-CRM GUI & ASI16-Installer-V24 MAJOR FEATURE RELEASE and MAINTENANCE RELEASE.

I**MPORTANT:** This release requires the new latest "asi16-installer-v24_2610010.exe".
IMPORTANT: Before (!) installing, carefully check and eventually change CMS-CRM.
NOTICE: New CMS-CRM design requires CAREFUL re-check of all parameters!
NOTICE: Transfer from old to new CRM may have erroneously changed settings!

NEW: CMS-CRM: New layout with tabs (Overview/General, Imagers, Network, Software, Parameters, FCS-26, Logs); "Template Use" per group; FCS-26 mask editor. New CRM-internal database engine and new DB structure, to improve overall performance, response time, and ease future upgrades for new features to come.

NEW: ASI GUI: "FCS-26 FindClouds Simple" cloudiness evaluation on the imager.
NEW: ASI GUI: Home page shows "FCS-26 Cloudiness" live evaluation data.
NEW: ASI GUI + CRM: Modbus-TCP interface, numeric sensor data for PLC/SCADA.
IMP: ASI GUI: System > Service split into Maintenance / Imaging / Network / Others.

NEW: ASI16-Installer: "PeriCont/Com Interface Status" + "Re-enable PeriCont/Com IF".
NEW: ASI16-Installer: Check for mistakenly "Fixed IP" setting, and allow to keep.

FIX: CRM, ASI, Installer: Multiple minor stability fixes and performance improvements.

2026-02-06: ASI16 V24 Imager Software - FEATURE & MAINTENANCE RELEASE.

NEW: ASI GUI: Camera Calibration; Added Exposure-Level and WDR param. settings.
IMP: ASI SW: Improved recovery after client S/FTP server connectivity issues.
IMP: ASI SW: Automated re-boot after as sequence of multiple (3) snapshot failures.
FIX: ASI SW: Issues when using special versions of SFTP SSH key authorization.
IMP: ASI16-Installer_V24:Minor improvements for work in non-stable environments.
IMP: ASI16-Installer_V24: Added set of additional ASI-SN identifiers
IMP: CMS-CRM: Improved configuration options for newly added parameters.
FIX: CMS-CRM: Database issues when adding or transferring clients or imagers.

2025-07-07: ASI16 V24 Imager Software - FEATURE & MAINTENANCE RELEASE.

I**MPORTANT:** This release requires the new latest "asi16-installer-v24_2507070.exe".
IMPORTANT: This release includes changes and new added functions in CMS-CRM

NEW: Multiple additional features for "Automated System Maintenance" (CRM/ASI).
NEW: Watchdog to trigger automated power-off/on cycle upon ASI firmware hang-up.
NEW: Support for add. customized "Imaging Parameter" configuration set (CRM/ASI).
NEW: "WDR processing" parameters now allowed to be modified by clients (CRM).
NEW: JPG EXIF data: Additional new data fields and update of existing fields (ASI).

IMP: Check and - if needed - update "PeriCont" parameters after each V-string (ASI).
IMP: PeriCont parameter request ("?" command) now sent out more regularly (ASI),

IMP: Forced ad-hoc "PeriData.cvs" upload before Auto-Power-Off/On sequence (ASI).
IMP: Peripheral "Advanced Settings" available with any PeriCont firmware version.

FIX: Issue when setting/using 2nd FTP as SFTP server with SSH key encryption.
FIX: Wrong permissions when setting a new defined ASI user as "Viewer only"
FIX: Sometimes irregular PeriCont reboots caused by non-defined TTY output.

IMP ASI-Installer: Now blocks any attempt to install on V16/V20 version cameras.
IMP ASI-Installer: Blocks attempts to install a non-valid (non-authorized) package.
IMP ASI-Installer: Tries to detect irregularities in advance, to stop installation asap.

2025-05-01: ASI16 V24 Imager Software - Maintenance Release - IMPORTANT.

COMMENT: All fixed issues did NOT affect primary functions with standard settings.
Issues where related secondary functions and/or special settings, only.

NEW: Peripheral: Button to instantly requests PeriCont parameter download/check.
NEW: Peripheral: Timer config for automated PeriCont parameter download/check.
NEW: Peripheral: “Save” function now can be triggered without making any changes.
NEW: Non-public access to extended system log. - For use by CMS-Support, only!

IMP: Service: ETH Adapter check/log supports all combinations of “Dual-FTP” feature.
IMP: Service: ETH Adapter log records permanently, independent of any other setting.
IMP: Service: Life-Data config changed from "Interval" to "Status: enabled/disabled".
IMP: ASI16-Installer: Upon "Full Rest" CF-status check, and run CF-format if needed.

FIX: Site/Time-Config: Sometimes, some local time sync changes could not be stored.
FIX: Capture/Shooting: Sometimes, shooting local config changes could not be stored.
FIX: Storage/Server: Sometimes, changes related to “Dual-FTP” could not be stored.
FIX: Backup Mem: Sometimes, when using Dual-FTP, auto-backup never got activated.
FIX: Backup Mem: Sometimes, backup of 1st JPG of a new day delayed by indef. time.
FIX: Backup Mem: Sometimes, auto-delete was triggered without real and urgent need.

2025-02-24: ASI16-Installer_250224, to replace previous versions. >>>

IMP: New "Full Reset" technology, to increase update speed and update stability.
IMP: New maintenance functions for "Backup Memory" and "Fixed-IP" issues.
IMP: Web-GUI update/re-install now also possible via "Config/Data Update".

FIX: Sometimes random hang-up during multiple "Full-Reset" runs.

2024-11-08: ASI SW "v241108n", ASI16-Installer_241108. >>>

!!!-!!! New "ASI16-Installer_v24" replaces previous "ASI-Manager" and "Support.exe".
New "ASI-Software" can be installed by using latest "ASI16-Installer_V24", only!
Previous "ASI-Managers" will NOT work to update any newer "ASI Software"!
New "ASI16-Installer_v24" also replaces previous "ASI_DHCP_Fix-It.jar" tool.

IMP: Live data cloudiness values displayed with one decimal place only.

FIX: Sometimes login to ASI GUI has required multiple (>5) tries to enter password.
FIX: Time configuration, interval setting lost after having switched to "Manual Time".
FIX: Time configuration, time was synchronized with NTP server even if deactivated.
FIX: Old "life date" remain displayed in GUI even if "life data" function was disabled.
FIX: Sometimes shooting hang-up or GUI block after running for multiple (5-30) days.

FIX: Wrong internal link for CMS/Agent logo in Web-GUI.
FIX: Manuel reset of FTP connection did not work as should.

FIX: Sometime changes in local ASI settings (capture, locale, ...) cannot be stored.
Sometimes shooting and FTP upload did not run, esp. after parameter change.

2024-05-31: ASI SW "v240531n". >>>

NEW: GUI-Home: Cloud Analysis (CMS FCT) – Display of real-time analysis data.
See § 7.5, page 39.

NEW: Additional Capture/Shooting Template - Intervals: A= 5 Min., and B= 1 Min.
See § 7.9.2, page 44.

NEW: Remote access for ASI-16 V24 via CMS "REM" (VPN) encrypted tunnel.
See § 7.13, page 48.

IMP: Improved Peripheral Controller support for EKO MS-40S Pyranometers.
ASI SW, ASI16-Installer, CRM: Multiple minor improvements and fixes.

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1 Introduction

1.1 Overview

The CMS-Schreder sky imaging system combines the "ASI-16 V24" all-sky imagers, the web-based "CMS-CRM" imager management platform, and the "FCT-22" cloud analysis software. It is used for scientific and operational meteorology, atmospheric and climate research, and solar energy operations.

Key features:

- Camera head: coated quartz glass dome, 180° fisheye optics, 6-megapixel sensor (3096 x 2094 pixel), IR-cut filter against sensor degradation by direct sun.
- ASI-16/55 ADVANCED: ventilation and up to 60 W airflow heating against condensation, raindrops and snow; double cover against strong direct sun; air temperature -40 °C to +50 °C (up to +80 °C for a limited time).
- One cable for power and data ("High Power over Ethernet", HPoE); rugged outdoor housing.
- Integrated datalogger: temperature/humidity sensor, optional pyranometer (Modbus); data stored in JPG EXIF data and CSV files.
- Scheduled all-sky JPG capture, automatic transfer to network storage (FTP, FTPS, SFTP); 4 GB backup memory bridges network or server outages; live video stream in the web GUI.
- NEW 2026-10: On-board "FCS-26" cloudiness evaluation (software option): cloud cover ratio (%, okta) and binary cloud images in real time.
- NEW 2026-10: On-board "Modbus-TCP" interface: sensor data (temperature, humidity, irradiance, ...) and cloudiness ratios for dataloggers and SCADA systems.
- CMS-CRM: central imager configuration, software updates and restores via ASI16-Installer, remote access (DDNS, VPN/REM).
- With "FCT-22" (FindClouds Trinity): cloud cover and cloud density ratios; cloud base height (CBH, two ASI-16 combined) and cloud movement vector (CMV) as options. For details and limitations see the FCT-22 documentation.

1.2 Intended Use, Qualified Installation

ASI-16 is intended to be used for capturing all-sky images in the visible spectrum, for online or later visual display, inspection and analysis of clouds during daytime. It shall be mounted at an elevated location with a best-possible 180° field of view to the sky and the horizon, and with a minimum of disturbing obstacles (trees, buildings, masts ...).

1.3 Read This First - Part A - Before start working with an ASI

==========

1.3.1 Your "ALL-IN-ONE" login name and password, for all CMS services:

Your agent (distributor, integrator) has provided your personal "Login-Data".
If you have NOT received your LI/PW data, please contact your agent or CMS.
You NEED your LI/PW to access ASI-16 imagers and all CMS online services.

EXAMPLE, how the login-information from your dealer may look like:

Company Name:	Institute for Climate Research, xyz.	
Login-Name:	20123_3	to log-in to CMS-CRM and CMS-FTP services.
ASI LI-Name:	LI20123_3	to log-in to the ASI-16 imager browser web-gui.
Password:	AB23xy95!	for ASI-16 Web-GUI, CMS-CRM and CMS-FTP.

The "LI" prefix in the "username" must be used for ASI Web-GUI login only!
Login to CMS-CRM and CMS-FTP requires username WITHOUT "LI" prefix.
This LI/PW shall be used for CRM, FTP and (LI...) for all your ASI imager systems.
Please carefully note above data. - You need it all time to access CRM and ASI-16.

==========

1.3.2 (A) - Step-by-Step Procedures for Initial Client (End-User) Setup:

a) Read "1.3.3 CMS-CRM - Management Platform" on next pages.
You MUST use and MUST properly configure your CMS-CRM accounts!
Not or bad configured CRM accounts later lead to multiple problems!

Login to CMS-CRM, with your all-in-one Client-ID / Password:
URL: https://service.schreder-cms.com/crm/

b) In ./Download/ download, unzip, store and read latest ZIP/RAR, including ...
- ASI-16_V24 software- and hardware-manuals and support documents;
- ASI-16_V24 software installer and tools (ASI16-Installer_V24, Support);

READ this "Operator Manual" to understand **ALL** pre-installation procedures!

ASI-16 is a "network device", requiring a LAN with qualified router & firewall.
Your LAN Router/FW must run a DHCP service to automatically allocate IP's.
Your LAN must have access to a stable NTP time server (e.g. pool.ntp.org).
Your LAN Firewall must allow access to one (or more) S/FTP server(s).
Your LAN Firewall must allow Internet access via some specified ports.
Contact your company IT department for preparation and support!

c) **Log-in to "CMS-CRM", check and/or update/add all pre-set data.**
Read "1.3.3 CMS-CRM - Management Platform" on next pages!
Start with data in ./MyData (=Client), continue with data in ./Imager.

Check and update Imager Location(s) data (Name, GPS, Email).
GPS coordinated (LAT/LON/ELE) MUST be as precise as possible.
GPS data are used for shooting control and for analysis software.
When operating multiple ASI, data must be set for/in each imager.

Check and change time zone setting to your local time zone.
Check and eventually change the "NTP Timeserver" configuration.

ASI-16 MUST have 24/7 access TO A QUALIFIED "NTP-TIME SERVER".
"Time Configuration" MUST be set "Automatic"! - Other options not allowed!

Check and - later, after testing - change "Default Data Storage".
We recommend to first keep "CMS Default" and test with CMS-FTP.
When testing was OK, you may change to your own S/FTP server.
Set server data in "MyData", and set Imager to "Client default data storage".
Consider to use two S/FTP servers, the second FTP as "mirror".

Check and select a "Shooting Template" which matches to intended use.
Notice: "Cloud Motion Analysis" requires fast pic intervals (15 seconds)!
Select your Template in "MyData", and set Imager to ... "Client Default".

Check and eventually select/change some "Auto-Maintenance Parameters".
Check and eventually change other imager parameters, if really needed only.

TAKE YOUR TIME! - Some CMS-CRM data are critical for ASI operation!

1.3.3 (B) - CMS-CRM - Management Platform for Client Data and ASI Config Data:

CMS-CRM is the central and main tool to manage your CMS hardware and software. - It allows to manage, pre-set and safely store all ASI configuration data, to lock and unlock hardware options, to retrieve FCT-22 cloud analysis software license keys, and to download all latest software, tools, manuals and (technical & scientific) side documents.

CRM URL: https://service.schreder-cms.com/crm/ ...
Login: Your (all-in-one) Client-ID and Password.

CMS-CRM structure (since 2026-10):

Top bar (client login): "My Data" - "Imagers" - "Downloads". Agents additionally see "Clients" (their client accounts).

My Data (= client data, tabs):

Overview:	Company / contact data, "Imager Default Data (ASI GUI)": default site name, address, GPS (LAT/LON/ELE), time zone, NTP server, technical e-mail.
Imagers:	List of all imagers assigned to the client (serial, site name, last online).
Network:	Default data storage (S/FTP), mirror / fall-back server, VPN/REM default, Modbus via TCP.
Parameters:	Shooting template, image quality, FCT live evaluation data, Auto-Maintenance & Recovery, WDR / static exposure, imaging sensor settings.
FCS-26:	Default FCS-26 licence / evaluation / segmentation / output parameters.
Logs:	Activity log.

Imagers > [serial number] (tabs):

General:	Main type, MAC-ID, firmware, PeriCont version, notes, ASI hardware options (pyranometer), imager access accounts (LI/PW), mount-site location.
Network:	DDNS / VPN-REM access, data storage, mirror server, Modbus via TCP.
Software:	Offline package, FCT-22 licence keys.
Parameters:	As in My Data, plus fisheye and G-sensor (tilt/roll) calibration.
FCS-26:	FCS-26 parameters and evaluation mask.
Logs:	Activity log (installer runs, manual remarks).

"Template Use": Each parameter group of an imager has a selector "- Client Default -" (values are taken from My Data) or "- Imager Setting -" (individual values for this imager only). Set common values once in My Data; use "Imager Setting" only where an imager must differ (e.g. GPS location, mask).

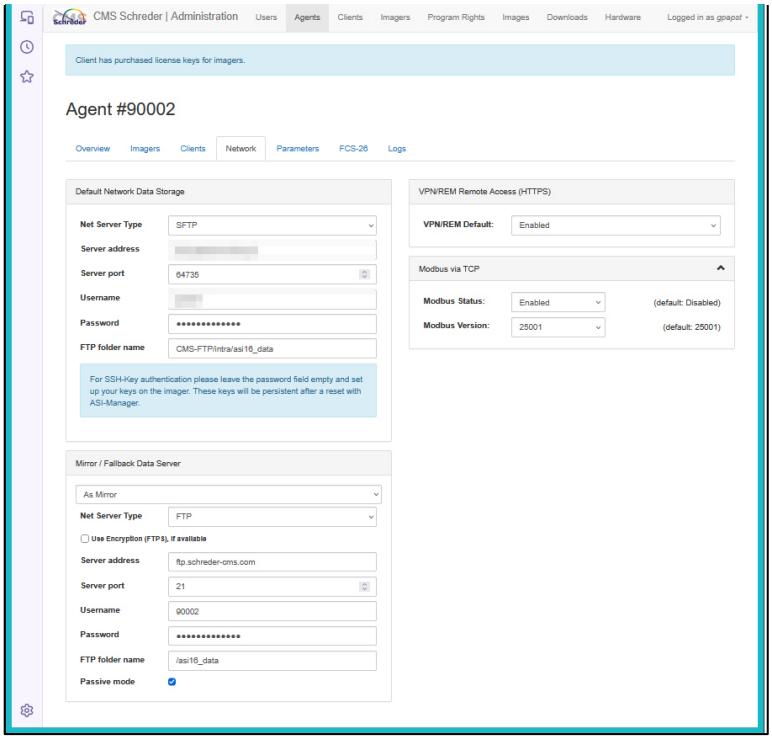
IMPORTANT: After any change in CMS-CRM run ASI16-Installer "Configuration Data Update" (or "Full Reset") - only then the new settings are transferred to the imager.

DOWNLOAD ZIP includes latest IMPORTANT SOFTWARE-TOOLS :

ASI16-Installer: To locate ASI-16 IP's and to update data and software.
To find ASI via "Alias IP" when connected peer-to-peer.
To check camera IP (... DHCP ...) configuration status.
To reset IP status to "Get IP automatically" if required.
For disaster recovery: Access ASI "backup memory".

1.3.4 (C) - CMS-CRM > Client DATA STORAGE (S/FTP):

FTP URL: ftp.schreder-cms.com ...
Login: Your (all-in-one) Client-ID and Password.
Later on: To be customized to a client S/FTP server



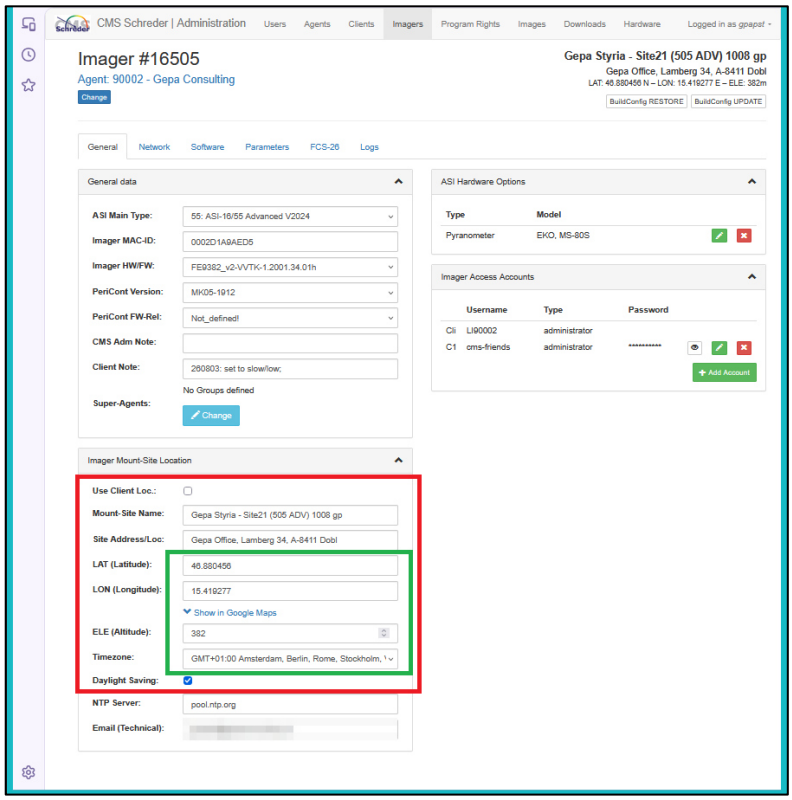
Upon delivery, your ASI will send JPG images to a CMS provided FTP server.
This CMS FTP service is free of charge, within the limits stated in § 4.3 (capacity, storage period). After having setup your own S/FTP please change settings in CMS-CRM.

For initial temporary tests, please install a professional FTP client, like FileZilla.
Create a local data directory for your CMS-FTP data down-loads and up-loads.
For example: C:\CMS-ASI-FTP\ ... or [YourServer]:\CMS-ASI-FTP\.

/asi16_data: JPG images sent by all "your" ASI-16 imager(s).
To be used before setting up your own FTP/NAS.

1.3.5 (D) - CMS-CRM > Imager - Site Name, LOCATION (GPS), Time Zone:

Enter it for each imager individually (Imagers > General > Imager Mount-Site Location), unless the imager uses the client default location ("Use Client Loc." checked, see § 4.2.8). GPS data (LAT/LON) must be entered with HIGHEST POSSIBLE precision!

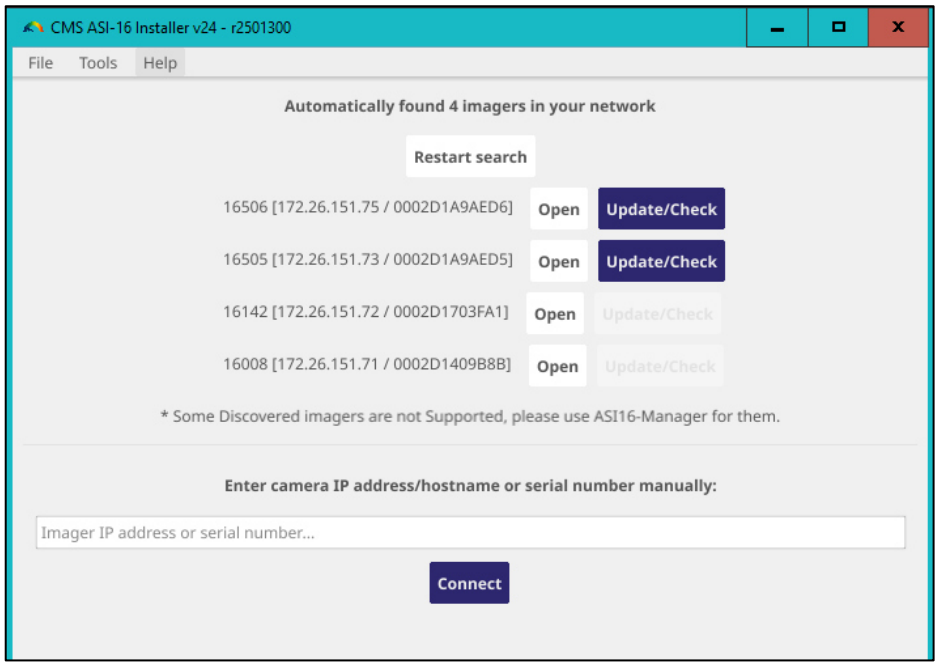


1.3.6 (E) - Steps after in CMS-CRM having checked and updated ALL data:

d) LAN Connection: ASI-16 imager requires its IP to be set by a DHCP service.
ASI-16 and your PC shall be connected via a router/FW running DHCP.
Through this router, ASI-16 and the PC must have access to Internet!
DO NOT try to connect an ASI-16 directly to your PC (peer-to-peer)!
DO NOT set a "fixed IP" on/via the ASI-16 web-GUI user interface!

e) Connect ASI camera to CMS-HPoE-Box (ADV) or PoE-Injector (BAS).
Connect power to CMS-HPoE injector. - Power-On. -
WAIT >3 minutes!

f) Start the latest "ASI16-Installer_V24" and wait till ASI(s) are listed.
If not displayed after max. 1 minute, close ASI16-Installer and re-start.
If still not displayed, find the ASI's IP by using an IP scanner tool.

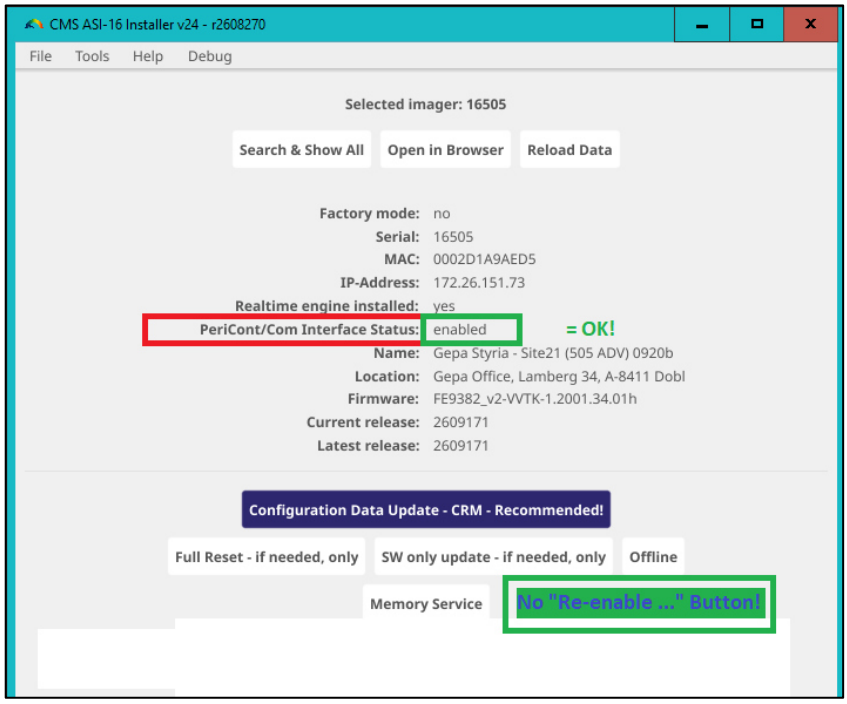


g) Click on "Update/Check" for the ASI-16 you now want to update.
OR (if not automatically found) enter ASI's IP or SN and click "Connect".
Wait 15-30 seconds, till you see a list of ASI data and parameters.

In case of problems refer to detailed explanation later within this manual!

h) Click **"Full Reset - if needed only"**. - Notice and agree to security questions.
This initial setup will, within one run, update ASI to the very latest software and will update all settings to the customized configuration as defined in CMS-CRM.

IMPORTANT: If the Installer shows the button "Re-enable PeriCont/Com IF" (Interface Status "disabled"), click it and confirm BEFORE starting "Full Reset"! A Full Reset started while this button is visible will fail.



i) Wait up to 15 minutes, till the Installer reports "Installation ... Completed".

>>> If installation ends with an error message, immediately re-run for 2-3 times!
>>> In such case DO NOT try to open ASI-16 Web-GUI in your Web-Browser!
>>> If opened in Web-Browser by mistake, DO NOT try to enter any password

j) Power-off ASI. - Wait >15 seconds. - Power-on ASI. -
WAIT >3 minutes!

k) On ASI16-Installer_V24, click on "Open", to open ASI Web-GUI.
OR ... : Open Web-Browser and enter IP of the ASI you just updated.

>>> If requested to enter JUST a password WITHOUT username, immediately close!
>>> In such case, immediately re-start "ASI16-installer_V24" and re-run "Full Reset".

l) Login with "All-in-one" Login Username/Password, as in CMS-CRM.
ASI-Imager Username starts with "LI" followed by your Client ID.

m) After Login to ASI Web-GUI, press <CTRL-F5> about 2-3 times.
<CTRL-F5> refreshes browser cache to download new pages/frames.
Navigate through all ASI-GUI sites, and check all settings.

>>> In case of any issues, re-start "ASI16-installer_V24" and re-run "Full Reset".

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1.4 Read This First - Part B - Network & Electric Setup

After receiving your ASI-16, at very first you shall set it up indoor in an office place!

Usually in most larger organisations / institutes / companies an "IT department" must register the ASI imager MAC-IDs, configure firewall and router rules, maybe has to open ports if you want to use some CMS web-services (CMS DDNS, CMS FTP, online updates, etc.), and (if later on you do not want to use CMS-FTP) setup an internal S/FTP server.

You should setup and test your internal IT/NET infrastructure with your ASI imager running indoor in your office. Move the ASI to its final outdoor location only after IT network setup is completed and all ASI functions are tested to work as expected.

2 Important General Remarks

2.1 This "ASI-16 Operator Manual"

This Manual is an essential and integrated part of the equipment. The information herein will help to you to maintain the equipment in safe and stable working conditions.

Before starting to work with the equipment you must read and understand this manual.

Keep this manual close to the equipment, during the entire life cycle of the equipment. Any person which intends to works on the equipment, must first read and confirm having understood this manual. In case of that this manual has got lost or damaged, please contact your CMS sales representative or CMS in Austria for receiving a new copy.

Modifications on the equipment and on this manual are subjected to the manufacturer or his authorized representative, only. You shall use original spare parts as supplied or approved by the manufacturer. - What so ever non-authorized modifications and use of what so ever non-qualified spare parts will lead into loss of warranty.

2.2 Scope of Delivery: Check of Packaging and Content

Upon receiving the delivery, immediately check the packaging and the content for any visible damages. If so, make pictures for evidence and document in writing, and send your damage claim to your forwarder, to your CMS agent and to CMS in Austria, for qualified damage insurance claims. - Also check completeness of the scope of delivery, and immediately report any eventually missing or damaged components.



The "External T/RH Sensor" comes in a separate box, and MUST (!!!) be connected to the matching 4-pin connector at the bottom side of the "Peripheral Controller" module!
If the sensor is not connected, the pins of the open socket at the Peripheral Controller are exposed to the environment: they will corrode, and after some months the corrosion will

creep into the Peripheral Controller box. In addition, no T/RH data are available (value 9999 = sensor not connected), which causes critical software malfunctions.

NEVER operate an ASI-16 ADVANCED without the T/RH sensor being connected!

2.3 Identification, Name-Plate, Technical Data

The ASI-16 imager is marked with a "Name-Plate Sticker", indicating the equipment name and model code (ASI-16/55 ADVANCED or ASI-16/15 BASIC), year and month of manufacturing, serial number (16nnn) and the LAN adapter MAC-ID. This name plate sticker is applied inside the cover hood, and smaller stickers on the "Peripherals Controller Box" and at the bottom of the imager head.

CMS ASI-16_V24 Imager System || Technical Data & Specifications || ASI-16/55-Advanced & ASI-16/15-Basic			
Imaging Sensor Chip	1/1.8" Progressive CMOS	LAN Network Type Network Protocols	100 BaseTX Ethernet (RJ-45) - IPv4, IPv6, TCP/IP, HTTP, (HTTPS), FTP, FTPS, SFTP, DHCP, NTP, DNS, DDNS, RTSP/ RTCP, (SMTP, PPPoE, SNMP, SSL)-
Imaging Sensor Resolution	3096 x 2094, approx. 6 Megapixel		
Useable Resolution	1920x1920 (Fisheye)		
Field of View (useable view)	180° / 360° (150° / 360°)		
Lens, Focal Length, Aperture	Fixed-focal, f=1.47mm, F2.2		
CMS ASI Optical Dome	Strong Quartz Glass, coated	Software Updater, Tools	CMS ASI installer, CMS toolkits
Imager Spectral Range	Visible Spectrum	Data file network upload	S/FTP/S server (file server)
Minimal Illumination	0.18 Lux @ F2.2 (Color)	Realtime video stream	MJPEG, H.265, H.264
WDR Techn., Dynamic Range	WDR PRO (Enh.), 100 dB	Graphic User Interface	Web Browser, WIN-10/.../11
Ventilation, heating (./5n only)	80 m3/h, 60W heating power	Power supply system	[H]PoE (Power over Ethernet)
Environmental Sensor (./5n only) Pyranometer Interface (./5n only)	Temp/RH, Sensirion SHT85 digital, ModBus (RS-485)	Power supply input Power consumption	[CMS-H]PoE, 100V - 240V AC ./5n: 15W/80W; ./1n: 15W;
Internal data backup memory	Industrial SD/CF, 4 GB	Operating Temperatures	-40 °C (BASIC: -25 °C) to +50 °C; +80 °C limited, short-time
Mounting rod dimensions:	DM: 37mm to 40mm (max)	Environmental Protection	IP66, IP65, EN50155,

2.4 Use of Packaging, Waste Disposal, Recycling

Packaging material should be stored and used for later safe transportation and shipping.

Upon end-of-life of whatsoever materials, equipment, components, accessories and wear parts, all such parts must be recycled and/or disposed according to applicable local laws and regulations at the country of operations. - During warranty time, defective spare parts must be returned to CMS, or must be recycled/disposed as above, subject to corresponding notice and advise by CMS or your local CMS agent in advance.

2.5 User/Client Network Requirements - LAN - Network Data Storage

For continuous stable operation, you MUST connect ASI-16 via a LAN/WAN router with DHCP service enabled, and send data to a network attached (S/)FTP(/S) network storage. ASI imager shall be set to "Get IP automatically", getting the IP from LAN DHCP service. Setting ASI to "Fixed IP" will cause problems, especially after each software update!

CMS does NOT warrant stable operation, when connecting ASI without a router and without DHCP service enabled. - Except for temporary maintenance, do NOT connect "peer to peer", especially not to a standard office- PC running a standard MS-Win OS.

Network data storage via S/FTP server:
Initial testing and low data load use: Access to free-of-charge CMS FTP account.
Long-term operation, high data load: Corporate file server or dedicated RAID-5 NAS.

- In most cases such (NAS-) servers already include and/or run a "S/FTP server " app.
- ASI will upload data via FTP. Client apps can access data via "file share" in real-time.
- In such setup there is no need to regularly download/sync data via a FTP client.

3 Safety Warnings - Safe Installation

3.1 Qualified and Trained Personnel

This equipment must be installed, configured operated and maintained by such personnel ONLY, which has/have all necessary theoretical and practical knowledge, education and training to perform such tasks, especially sensitive and potentially risky or dangerous tasks related to mechanical, electrical and IT-related works.

Before starting to work with the equipment the operator or engineer must fully read and understand this manual. Knowledge of the technology and works involved, and detailed knowledge and understanding of the entire content of this manual is a fundamental requirement for safe and stable long-lasting performance of this equipment.

3.2 Critical Out-Door / In-Door Installation

A part of ASI-16 components (Imager Head) is prepared to be installed in harsh out-door environment. - But another part of the components (HPoE Injector, DC Power Supply, network router cable) MUST be installed in a dry indoor-like environment.

Check the below description to identify outdoor-prepared and indoor-only components:



OUT-DOOR PREPARED:

- ASI-16 All Sky Imager
- Rod mounting footer
- 3 screws and rings, M8
- External T/RH Sensor (a)

OUTDOOR <-> INDOOR:

Data/Power Cable (HPoE & CAT5)
Standard cable length: 20m
Extension cables: Upon request

IN-DOOR - ONLY !!!

- Special CMS HPoE Injector
- Power Adapter (48VDC / 90W)
- AC Power Cord (100V-240V)



WARNING: Must be installed at dry and safe place with an indoor-like environment.



(a) External T/RH (Temperature - Humidity) Sensor:

ASI-16/n5 comes with an external high precision T/RH sensor. Shall be mounted into a meteorological "Radiation Shield".

NOTE: The T/RH sensor "TRH47-CEP" (ASI standard since 2024-06) has an enhanced protection against corrosive environments (e.g. salty sea air, see § 3.3).

3.3 Specific Safety Risks and Warnings

3.3.1 WARNING! - RISK OF INJURY OR DAMAGE BY ELECTRICITY

Before starting any works, have the DC power adapter disconnected from main power!

3.3.2 WARNING! - RISK OF INJURY DURING MECHANICAL MOUNTING

When working on an elevated platform or a ladder, you must wear qualified personal safety equipment (safety shoes, safety helmet, safety rope, roof railings) and tools.

3.3.3 WARNING! - RISK OF ELECTRICAL DAMAGES AND PERSONAL INJURIES

The components above marked as "INDOOR-ONLY" (special CMS HPoE Injector, Power Adapter, AC Power Cord) must be installed at indoor at a dry and safe place, or inside a water- and humidity-tight electrical cabinet. It MUST NOT be installed at an open outdoor place with the risk of exposure to water (rain, snow, ...) or high (condensing) humidity. - Water or high humidity may cause direct and indirect damage to the equipment and the network, and may lead to injury and even death by electrical shocks.

3.3.4 WARNING! - RISK OF PERSONAL INJURY BY COMPONENTS FALLING DOWN

Mechanical installation of the ASI-16 imager (mounting on an instrumentation mast or an instrumentation platform) must be performed by personnel experienced and trained in such work, and with qualified knowledge about the situation at the installation site. Personnel must ensure to mount the equipment at a stable and safe site, must properly fix and secure the equipment from falling down, even in the case of special environmental conditions (strong winds, tornados, earthquakes, ...). The equipment falling down may cause severe injury and even death.

3.3.5 WARNING! - RISK OF DAMAGE THROUGH LIGHTNING STROKE

Typically, the ASI-16 will be installed at an elevated outdoor location, which increases the probability of a direct or indirect lightning stroke. It is technically impossible to protect the equipment from receiving or forwarding the lightning stroke pulse. The equipment DOES NOT INCLUDE any counter measures. - It is subject to the customer's decision to implement qualified measures at the point-of-entry (LAN connection, AC power connection), to protect his own internal or peripheral equipment, and to connect or not-connect the mounting rod/platform to earthing / ground.

3.3.6 WARNING! - RISK OF DATA LOSS - NO "ZERO-TOLERANCE" USE

The equipment is NOT qualified for zero-tolerance applications. Although thoroughly tested, CMS cannot exclude residual risks of short term or long-term data losses and/or system down. The equipment MUST NOT be used for super-critical applications.

Automated internal maintenance processes may, under some special conditions, AUTOMATICALLY delete data from "Backup Memory". - Therefore, to avoid loss of huge amount of data, regularly check FTP server connection and status of "Backup Memory".

3.3.7 ADVISE! - TAKE SPECIAL CARE WITH THE GLASS DOME

The "glass dome" is a critical sensitive optical component. Do not touch the dome with any tool, do not let it drop down, and use multiple soft wet tissues without any pressure when cleaning, to avoid scratches. A scratched dome is not subject to warranty replacement!

3.3.8 ADVISE! - Special preparation for use near salty seawater air environment.

When installed near salty sea water, like on a vessel or close to a seawater shore or a salt desert/lake, after some weeks or months some (outer) parts of the ASI-16 Imager will start to show corrosion. - To avoid later **severe damage**, especially on all outer electrical connectors, the CLIENT must ensure regular qualified protection treatment and regular check and maintenance. - Later damages because of lack of protection treatment and/or lack of maintenance are NOT covered by warranty!

ADVISE: To reduce the risk of corrosion damages, especially on and inside electrical connectors, IMMEDIATELY after receiving and installing the ASI-16 imager, the CLIENT shall apply **thick layers** of a marine-use qualified **sticky "dielectric grease"** to all connectors and plugs, outside at the screw areas, BUT ALSO INSIDE - AT THE PINS!

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4 CMS Internet Services: CRM - FTP - VPN

CMS-Schreder provides some Internet-based services, which run on a CMS service-server connected via a powerful and fast hub, providing 24/7 supervised operations.

CRM-service (Customer Relation Management) is IMPORTANT for "daily use", as settings directly influence behaviour of ASI software updates / restores via the ASI16-Installer.

Other CMS services (FTP, DDNS, VPN/REM) are provided for customer convenience, only. Those services may help the customer to speed up installation, or enable more easy access via Internet. Later on the customer may continue to use the CMS server services, or the customer may setup his own services on his own network and IT infrastructure.

4.1 How to connect to "CMS Internet Services"

Before or upon delivery of your imager you should have received an email with your "Personal Username/Password-Set" (LI/PW). - There is ONE individual LI/PW for each CMS agent/client account, or for a client sub-account generated by a CMS agent.

Username:	The CMS account number of the agent/client (for example 20123).
Imager LI Name:	"LI" followed by the same account number (for example LI20123)
Password:	A combination of letters and digits, issued by CMS or by the agent.

This is the "one-for-all" LI/PW to be used for Imagers as well as for Internet Services.

With this LI/PW the customer/agent can access ALL imagers allocated to his account.
NOTICE: An Imager Login Name MUST start with "LI", followed by the account number.

With the same LI/PW you can access CMS-CRM to check and manage imager settings. And you can use it to access your CMS-FTP-storage place through any FTP-Client

4.2 CMS CRM: To check and manage imager and client settings

Open THIS WEB URL: https://service.schreder-cms.com/crm/

To log-on, enter your "one-for-all" LI/PW (Username=Client_ID, and password).

Now, depending on if you are an "AGENT" or a "CLIENT", at the top line you will see a number of "navigation buttons". - When logged-in as "Client" ("End-User"), on the top bar you will see "MyData", "Imagers" with list of your imagers, and "Downloads".

When logged-in as CMS/EKO "Agent" (distributor, integrator) you also will see "Clients" (see § 4.2.3).

All CRM pages are organised in tabs. The Client (Agent) page has the tabs "Overview", "Imagers", ["Clients" - Agent only], "Network", "Parameters", "FCS-26" and "Logs" (§ 4.2.1 - 4.2.7). The Imager page has the tabs "General", "Network", "Software", "Parameters", "FCS-26" and "Logs" (§ 4.2.8 - 4.2.13).

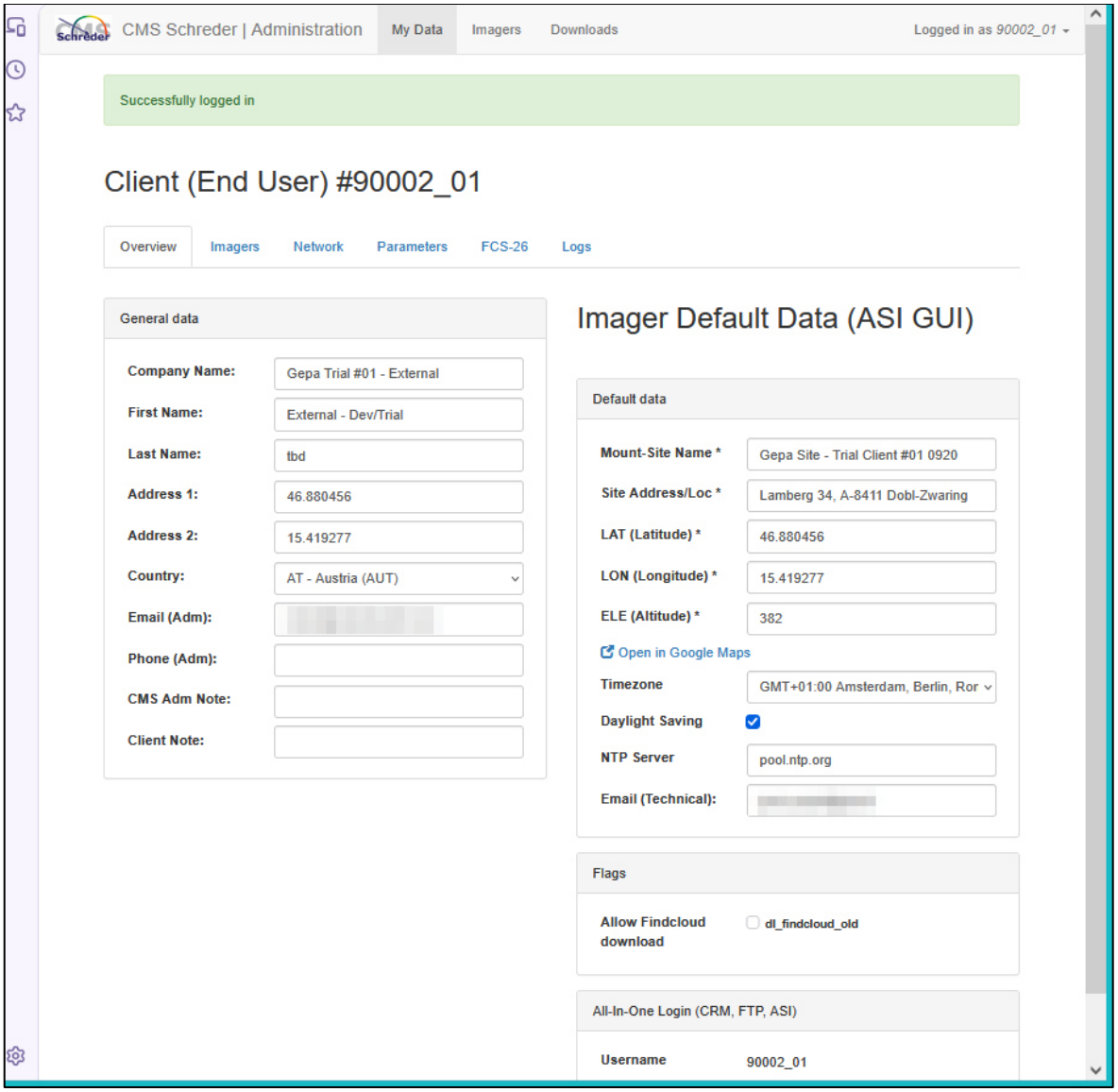
Client settings are the defaults for all imagers of this client. On the imager page, each group has a selector "Template Use": "- Client Default -" = the imager uses the client settings (shown read-only); "- Imager Setting -" = individual values for this imager.

New settings are transferred to the imager at the next "Configuration Data Update" or "Full Reset" by using the ASI16-Installer (see § 6.4). CRM settings will replace all eventual local changes on the imager via the imager Web-GUI! - New LI/PW and other parameters will be transferred also by an ASI16-Installer "Full Reset"!

Press "Save changes" (per group) or "Save all changes" to permanently store your changes. Groups with unsaved changes are marked red.

4.2.1 Client ("My Data") - Overview: Company Data, Imager Default Data

Tab "Overview" shows the data of "your" company / institute / organisation (left side) and the default data for your ASI imagers (right side). Logged in as Agent, the same page is shown as "Agent #nnnnn".

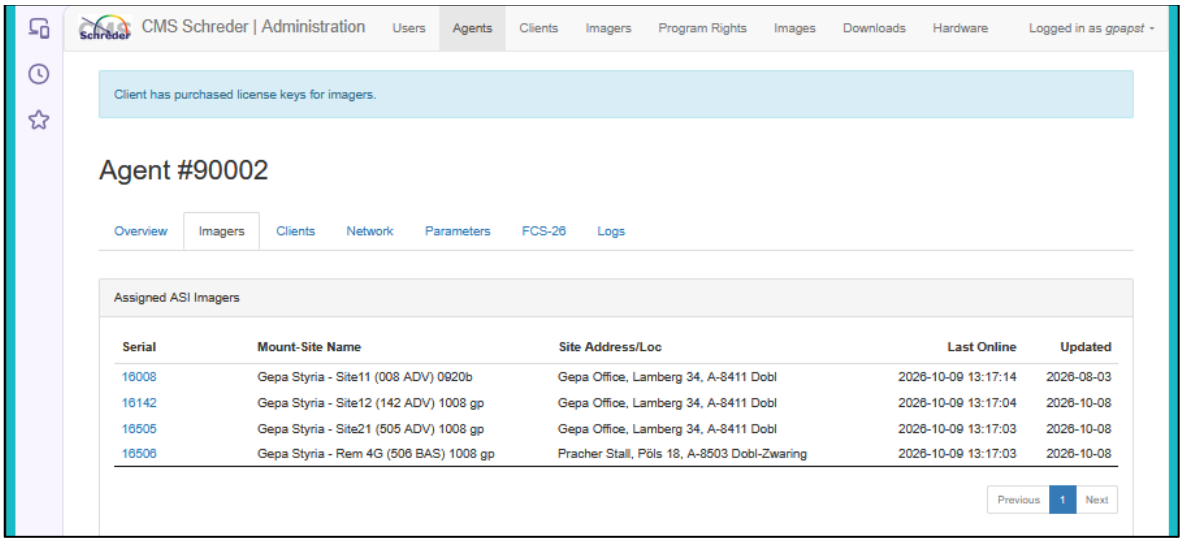


General data:	Company name, first/last name, address, country, e-mail, phone: contact data for after-sales service and support by your agent and/or by CMS.
CMS Adm Note:	Notes entered by the CMS Schreder administrator, only.
Client Note:	Notes entered by the agent or the client.
Imager Default Data:	Mount-site name, site address, GPS position (LAT, LON, ELE [m]), time zone, daylight saving, NTP server, e-mail (technical). Fields marked * are mandatory. "Open in Google Maps" allows to check the GPS position.

	Used by all imagers with "Use Client Loc." checked (see § 4.2.8). Imagers at other sites need their own location on the imager page.
All-In-One Login:	The "one-for-all" username / password for CRM, FTP and ASI imagers of this account (see § 4.1).

4.2.2 Client - Imagers: Assigned ASI Imagers

Tab "Imagers" lists all imagers allocated to your account: serial number, mount-site name, site address, last online, last update.



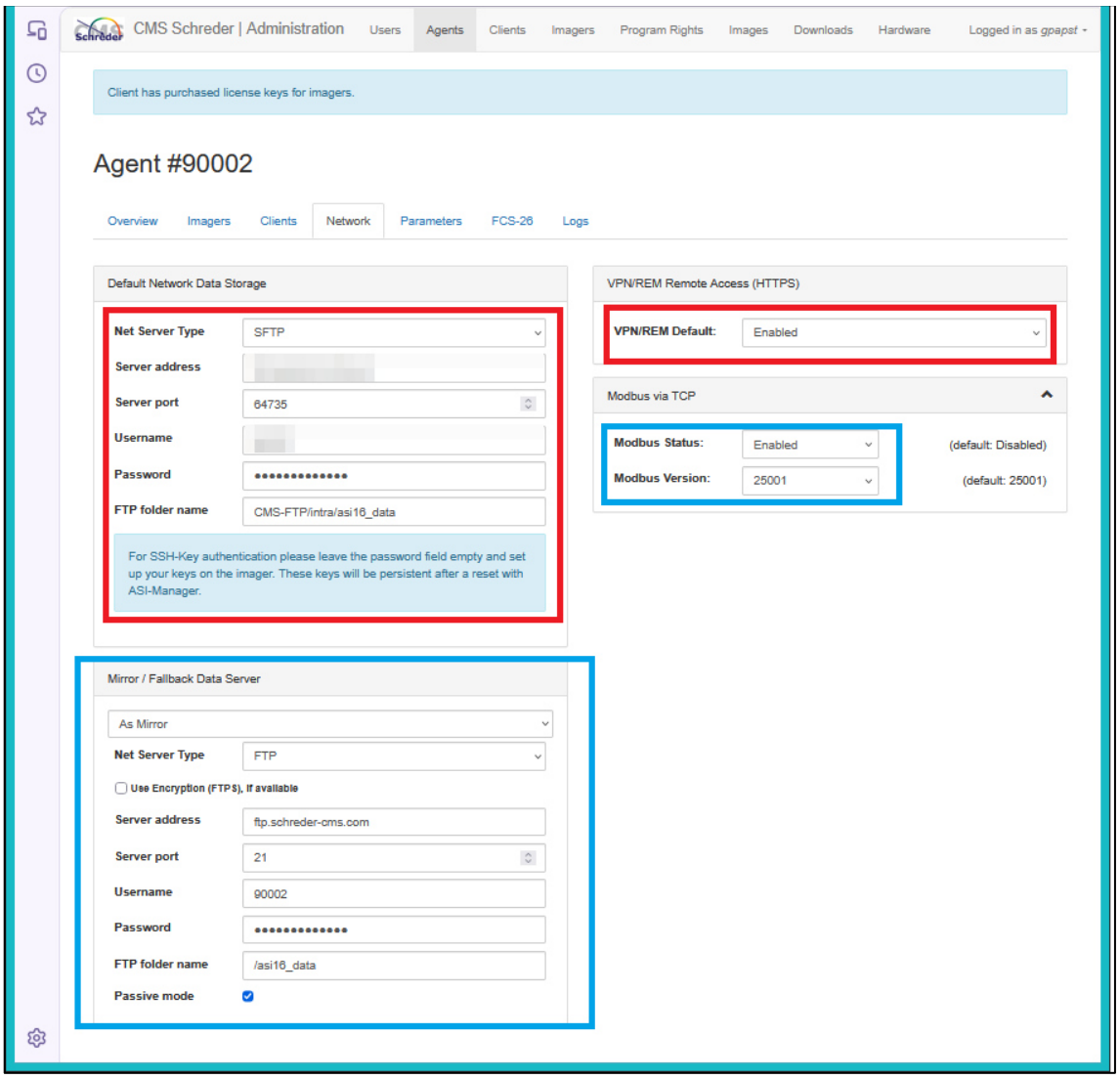
Click on the "Serial" number to immediately open the corresponding imager page (see § 4.2.8).

4.2.3 Client - Clients: Manage Client Accounts (Agent only)

Only when logged in as CMS/EKO "Agent" (distributor, integrator): Tab "Clients" allows you - as Agent - to manage all your client accounts, to add new clients, and to re-locate (set up) client ASI-16 imagers. The Client_ID of a new client is generated automatically when the client is saved for the first time, and cannot be changed or deleted. Other data can be changed or added later on, also by the client himself.

4.2.4 Client - Network: Default Data Storage, VPN/REM, Modbus, Mirror Server

Tab "Network" defines the default network settings for all imagers of this client. An imager uses these values as long as the corresponding group of its own "Network" tab is set to "-Client Default -" (see § 4.2.9). If you run only one FTP server for all imagers, set it here once.



Default Network Data Storage:

Storage server for the JPG images and data files of all imagers.

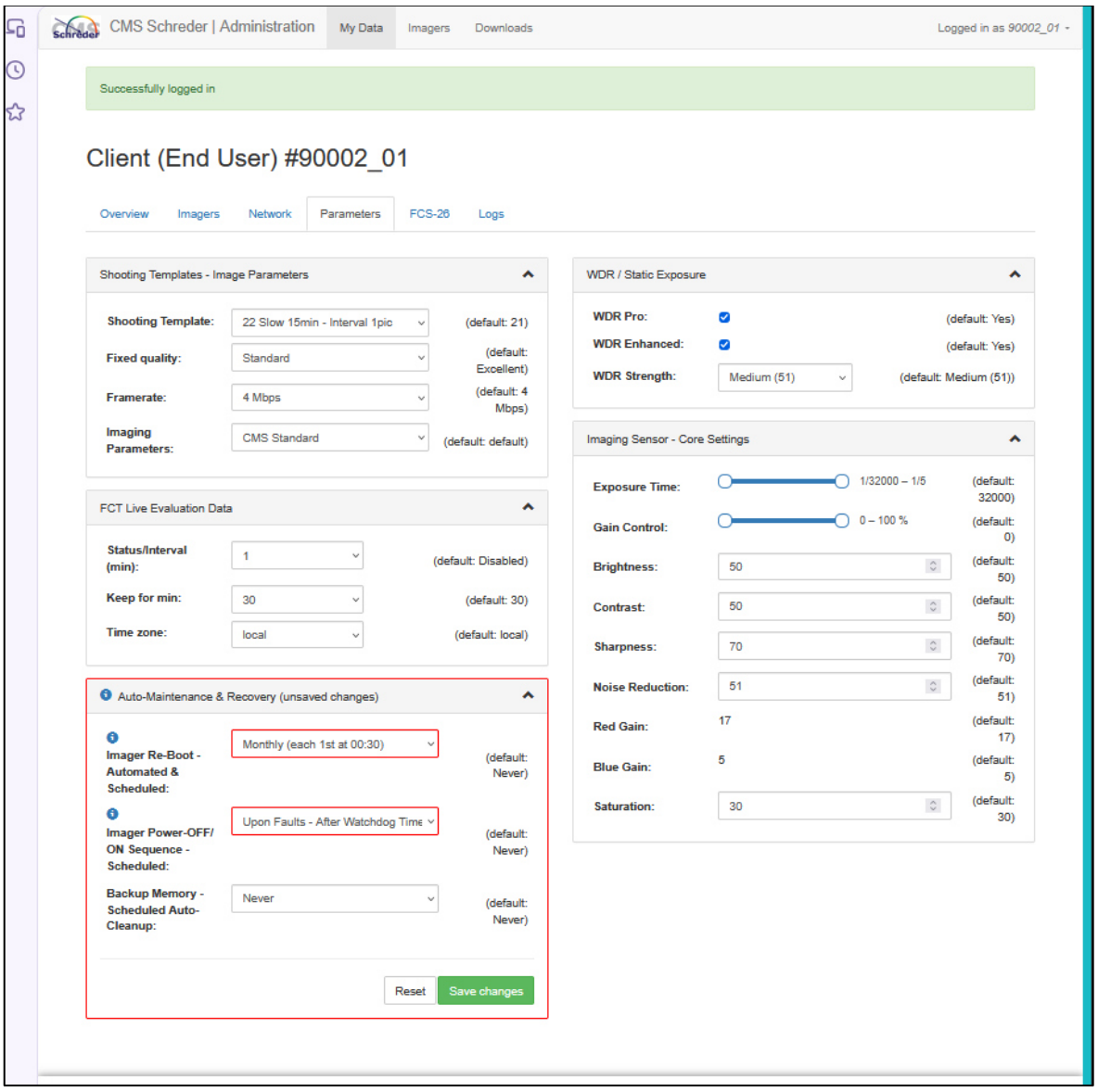
Net Server Type:	FTP, FTPS, SFTP, ... (see § 5.4).
Server address, port:	Host name or IP address, and port of the storage server.
Username, Password:	Login data on the storage server. SFTP with SSH-key authentication: leave the password empty and set up the keys on the imager; the keys are kept after a reset with the ASI16-Installer.
FTP folder name:	Target folder on the server.
VPN/REM Remote Access:	VPN/REM Default: Enabled / Disabled - default for the CMS VPN/REM remote access (HTTPS) of all imagers (see § 4.5).
Modbus via TCP:	On-board Modbus-TCP interface, details see § 8.5.
Modbus Status:	Enabled / Disabled (default: Disabled).
Modbus Version:	Version of Modbus register map (current version: 26001).

Mirror / Fallback Server: Optional second storage server, used "As Mirror" or "As Fallback" (see § 7.10). Parameters as above; for FTP also "Use Encryption (FTPS), if available" and "Passive mode".

4.2.5 Client - Parameters: Shooting, FCT Live Data, Auto-Maintenance, WDR, Imaging Sensor

Tab "Parameters" defines the default imaging and maintenance parameters for all imagers of this client. An imager uses them as long as the corresponding group of its own "Parameters" tab is set to "- Client Default -" (see § 4.2.11). The values "(default: ...)" on the right side show the CMS factory defaults.

IF REALLY NEEDED for a client app ONLY, "Imager Head Core Settings" and "Imaging Parameter" selection MUST be changed and set in CMS-CRM, and THEN transferred to the ASI-16 imager by using ASI16-Installer "Config Data Update" or "Full-Reset"!



Shooting Templates - Image Parameters:

Shooting Template: To select a template which matches best to intended use of data (see § 7.9).

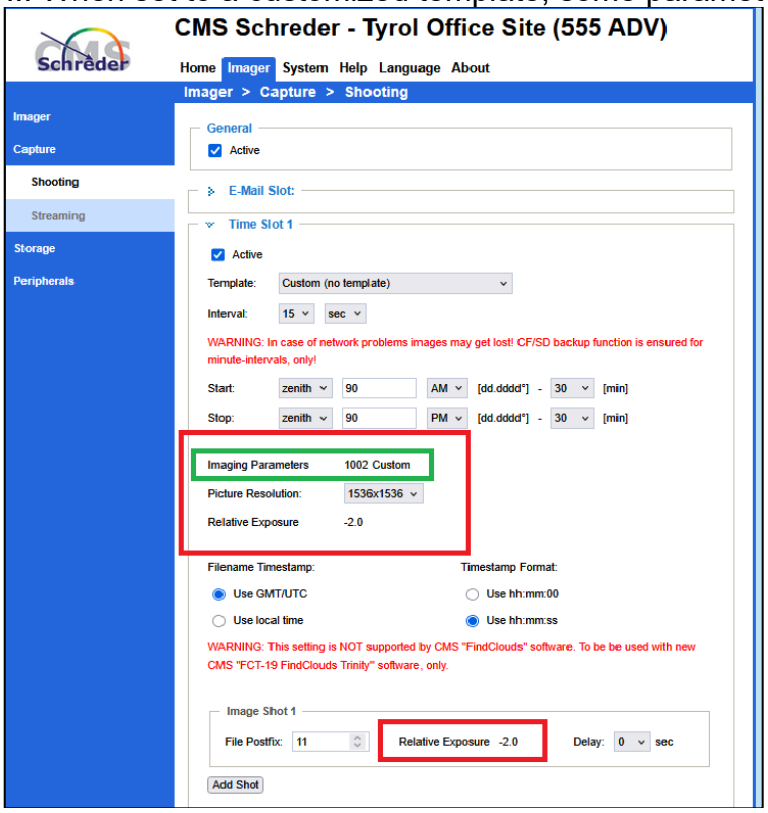
Fixed quality:	JPG compression level: As "better" setting, as better image quality, but as larger file size. For FCT cloud analysis software we recommend "Good".
Framerate:	Network bandwidth limit [Mbps].
Imaging Parameters:	Imaging parameter template, default "CMS Standard":

Imaging Parameters: DO NOT CHANGE WITHOUT NEED! - A set of client-defined low-level imaging parameters (gain range, exposure time range, white balance config, WDR settings, others). The parameter set must be defined and evaluated by the client, and then can be implemented in CMS-CRM via CMS-Schreder technical support team.

Appearance in the ASI-16 (camera system) WEB-GUI:

The screenshot below shows the shooting settings with a customized "Imaging Parameter" template (here "1002 Custom"). Notice, ...

... "Imaging Template" can be changed via CMS-CRM and ASI16-Installer update, ONLY.
... When set to a customized template, some parameters CAN NOT be changed anymore.



FCT Live Evaluation Data: Display of FCT-22 results on the ASI home page (see § 7.5).

Status/Interval (min):	Interval for reading FCT-22 results file; "Disabled" = off.
Keep for min:	Older results are not displayed.
Time zone:	Display time local or UTC.

Auto-Maintenance & Recovery:

Allows to define schedules for automatically running "software maintenance" processes and automatic function to try a recovery of the "ASI-16 Imager Head" in case of a firmware/software hang-up or corrupted configuration data. - Auto-Maintenance functions perform procedures which are also recommended as "manual software maintenance".

Each function can be set to "never", or to a number of pre-defined scheduled intervals.

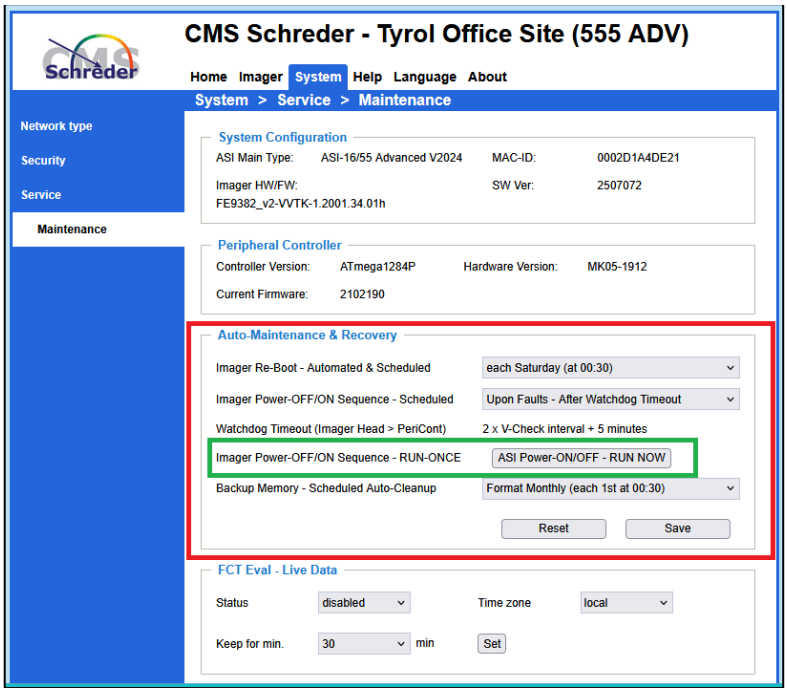
Imager Re-Boot: Automated & scheduled reboot of the imager head.

Power-OFF/ON Sequence: Never, scheduled, or "Upon Faults - After Watchdog Timeout".

Backup Memory: Scheduled auto-cleanup (formatting) of the backup memory (see § 7.11)."Imager Power-OFF/ON Sequence" is available with "ASI-16/55 ADVANCED", only.

"Upon Fault ..." triggers a Power-OFF/ON sequence via the "Peripheral Controller", if the Controller does not receive command from Imager Head for a longer time. Watchdog timeout is set to "2x V-Check Interval + 5 minutes", typ. 15 minutes.

Appearance in the ASI-16 WEB-GUI (System > Service > Maintenance, see § 7.18):



WDR (Wide Dynamic Range): DO NOT CHANGE WITHOUT NEED! - Related parameters can be changed ONLY when using the Imaging Parameter template "CMS Standard". If the Imaging Parameter template is set to any other "Custom template", WDR parameters CAN NOT be changed, but are used/set as pre-defined in the selected "Custom template".

Imaging Sensor - Core Settings:

Exposure time range, gain control range, brightness, contrast, sharpness, noise reduction, red/blue gain, saturation.

DO NOT CHANGE any of these settings! CMS has calibrated the image sensor before delivery! Change of pre-defined settings may reduce image quality!

4.2.6 Client - FCS-26: Default Parameters of the On-Board Cloudiness Evaluation

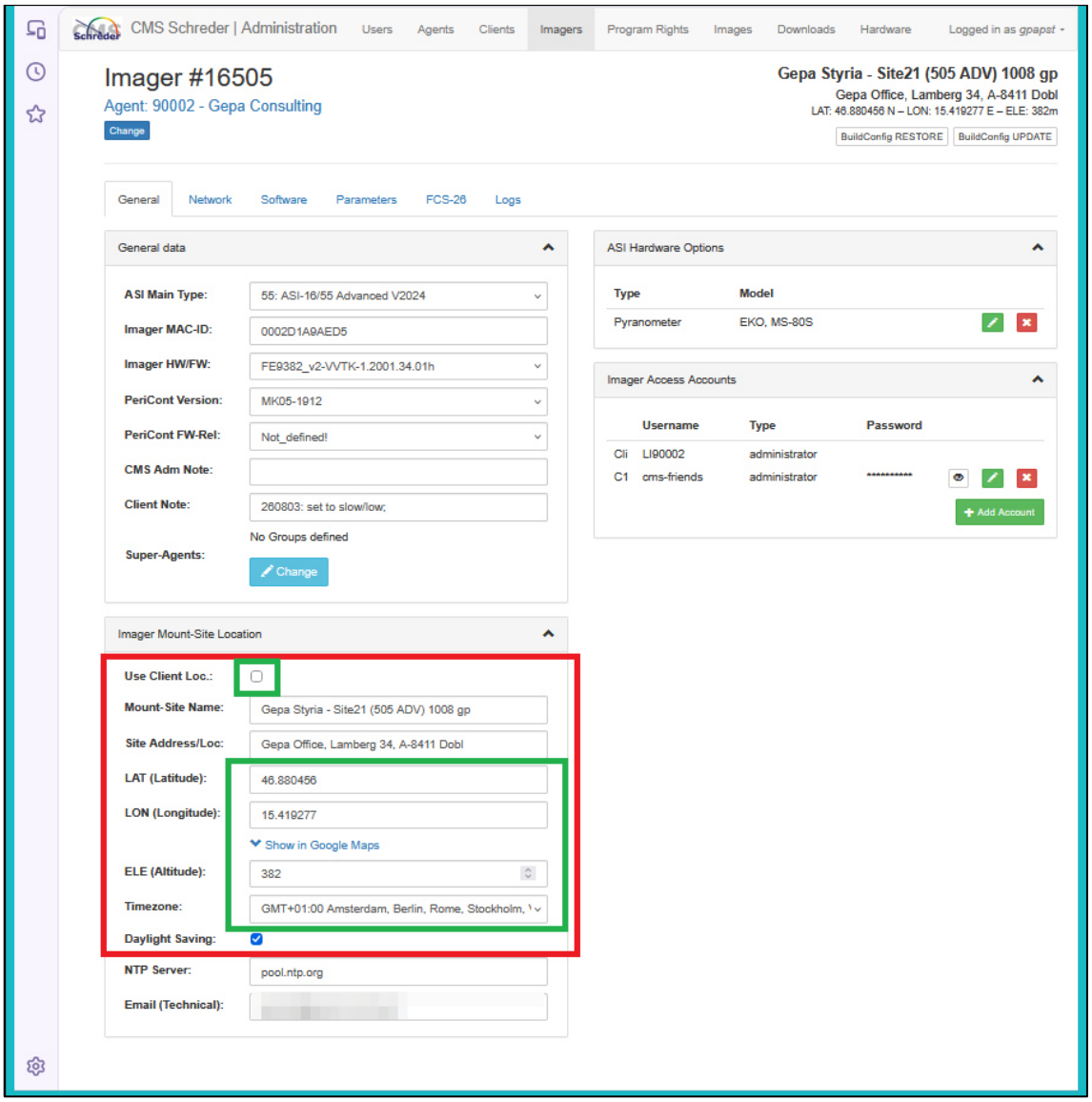
Default FCS-26 parameters for all imagers of this client - details see § 8.2.1.

4.2.7 Client - Logs

Tab "Logs" shows the activity log on client level (see § 4.2.13).

4.2.8 Imager - General: Imager Data, Mount-Site Location, Hardware Options, Access Accounts

Tab "General" shows the basic data of the imager and allows to configure its location, hardware options and additional login accounts. The page header shows serial number, allocated agent/client ("Change"), mount-site name and GPS position.



General data:

ASI Main Type:	Hardware Version of ASI-16 imager head: (11/12/15/ = BASIC, 51/52/55/ = ADVANCED).
Imager MAC-ID:	The MAC-ID of the imager head, important for your firewalls.
Imager HW/FW:	Low level firmware (operating system) of the ASI imager head.
PeriCont Version:	Hardware version of [advanced] "Peripheral Controller" (box).
PeriCont FW-Rel:	Original firmware version of the "Peripheral Controller" (box).
CMS Adm Note:	Notes to be entered by CMS Schreder administrator, only.
Client Note:	Notes to be entered by the agent or the client.

Imager Mount-Site Location: Mount-site name, site address, GPS position, time zone, daylight saving. GPS coordinates and time zone are important for shooting and analysis.

Use Client Loc.: Checked: the imager uses the client "Imager Default Data" (see § 4.2.1). Unchecked: individual location for this imager.

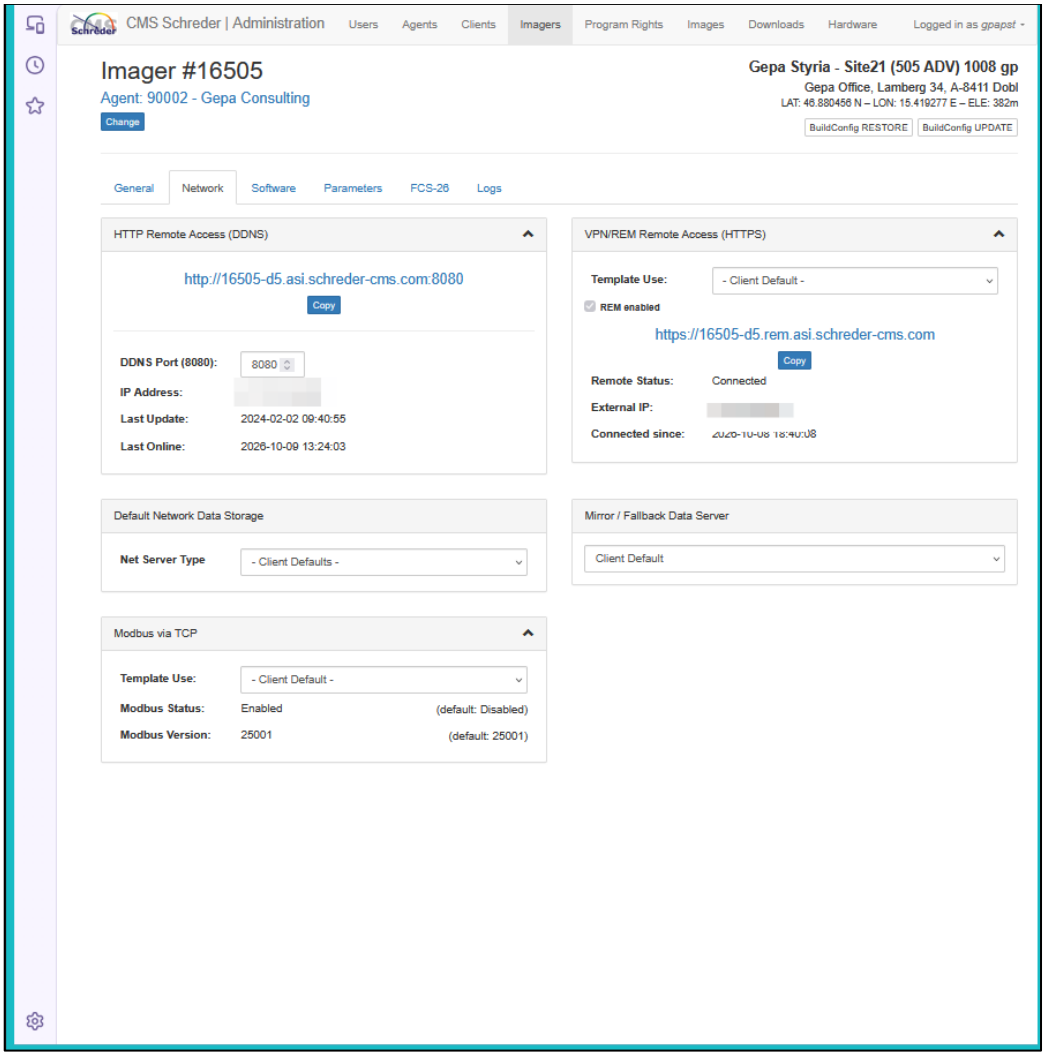
NTP Server, Email: Time server and technical contact e-mail of this imager.

ASI Hardware Options: Only available after purchase of "Pyranometer Option". To select a specific Modbus Pyranometer Model/Version. Necessary for ASI imager to connect to the Pyranometer.

Imager Access Accounts: Enter or change up to two additional LI/PW for this imager. The Username(s) MUST begin with an ALPHA symbol! New or changed LI/PW can be used AFTER next UPDATE or RESTORE of the imager by using the latest ASI16-Installer.

4.2.9 Imager - Network: Remote Access (DDNS, VPN/REM), Data Storage, Modbus

Tab "Network": HTTP remote access (DDNS URL, port 8080, WAN IP, last update/online), VPN/REM remote access (HTTPS URL, status), data storage, mirror / fall-back server, Modbus via TCP. Groups set to "- Client Default -" use the client settings (see § 4.2.4).



HTTP Remote Access (DDNS): For check and copy/paste ("Copy"):

URL:	The CMS provided DDNS domain name (URL) of this imager (see § 4.4).
DDNS Port (8080):	The ASI imager uses the alternate HTTP port 8080. If necessary, set up "port translation" on your firewall / router.
IP Address:	Latest updated WAN IP address of the ASI imager.
Last Update:	Last time the imager has sent an IP update ping with a NEW IP.
Last Online:	Last time the imager has sent any IP ping (indicating "be-alive").

VPN/REM Remote Access: Template Use, "REM enabled"; HTTPS URL for remote access via the CMS VPN/REM service (see § 4.5); Remote Status, External IP, Connected since.

Network Data Storage: "- Client Defaults -" or imager-specific FTP server(s) (parameters see § 4.2.4).

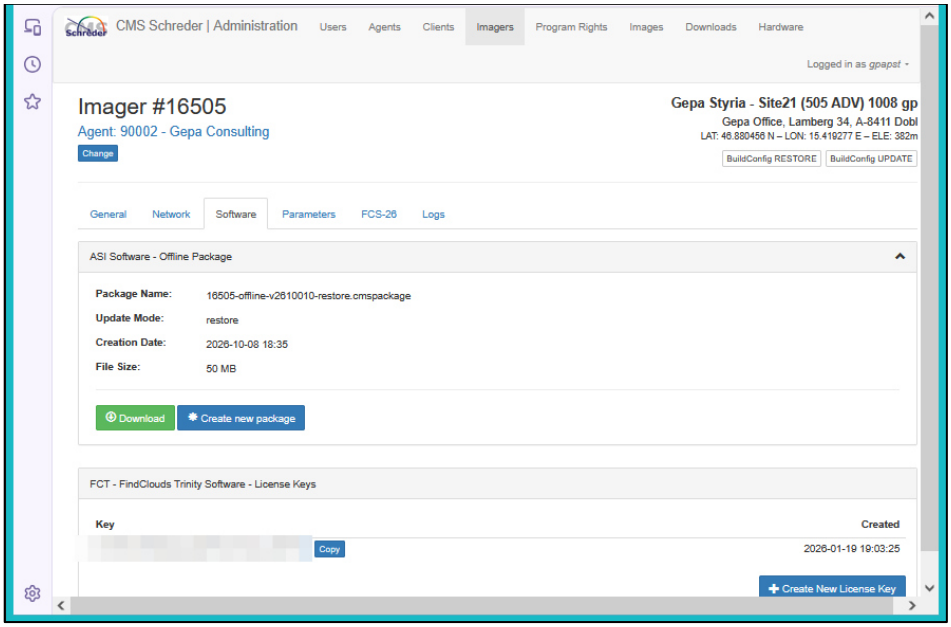
Mirror / Fallback Server:

"Client Default" or imager-specific setting (see § 4.2.4).

Modbus via TCP: Template Use, Modbus Status, Modbus Version (see § 4.2.4 and § 8.5).

4.2.10 Imager - Software: Offline Package, FCT License Keys

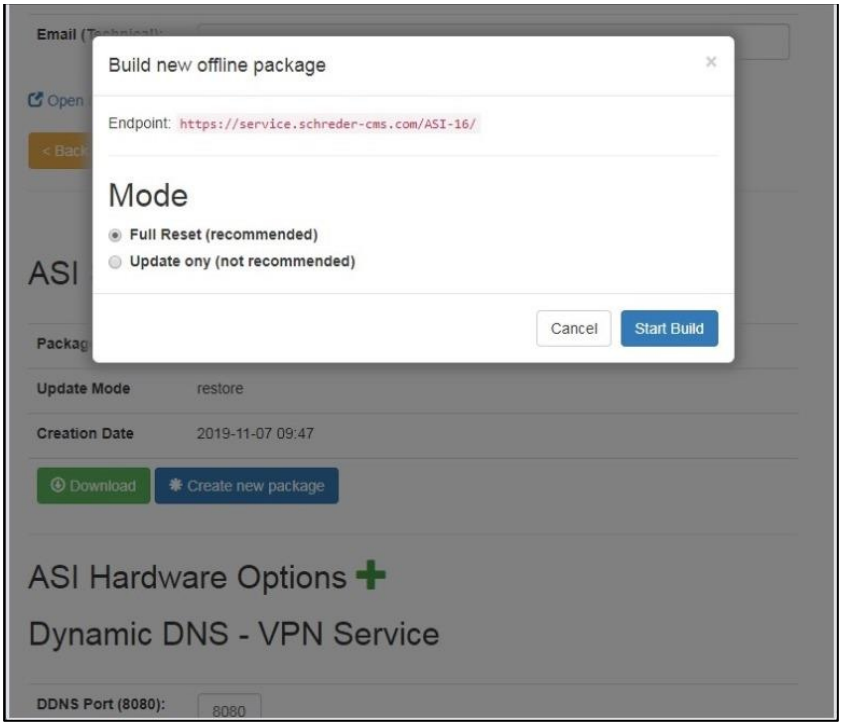
Tab "Software" provides the offline software package and the FCT-22 license keys of this imager.



Offline Package: To generate and download a "software update package".
Only for clients / installations with very strict firewall regulations.
Only for updates, if the ASI16-Installer has no stable internet access.

Step 1: "Create a new package" - Select as needed.
Step 2: "Download" - Download ZIP package to your PC.

In the dialog "Build new offline package" select the mode "Full Reset (recommended)" or "Update only (not recommended)", then click "Start Build".



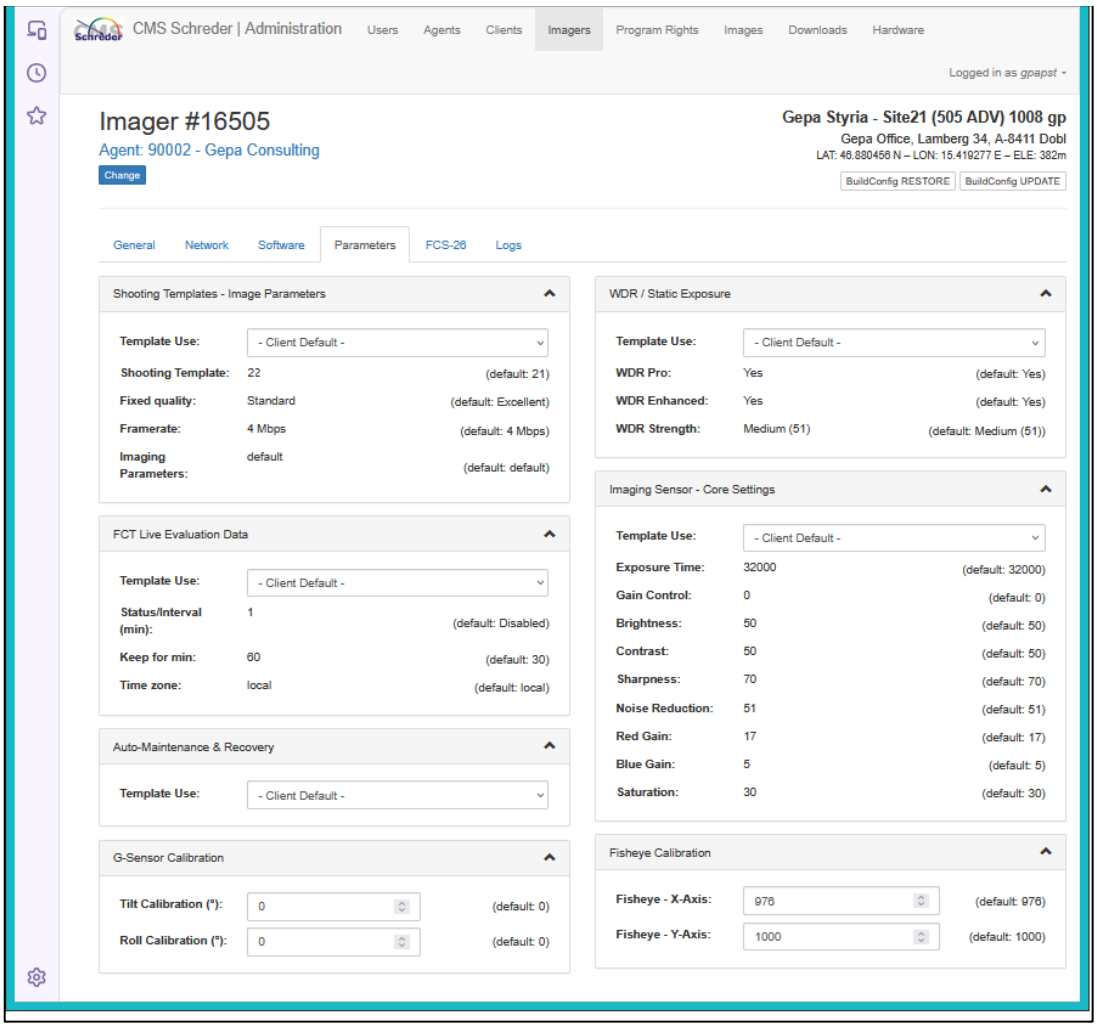
- Move this ZIP-file to a PC (storage) "within the strong firewall".
- Then, run ASI-Installer on this second PC "within the strong firewall".
- Set the ASI16-Installer to "Enable OFFLINE-Mode in any case".
- Select imager via "Update/Check". - Start "Install offline".

CMS FCT - "FindClouds Trinity" Cloud Analysis Software - License Keys:

Available only after purchase of an FCT analysis software license:
To be entered (copy/paste) into the "FCT camera configuration".
Necessary to enable FCT to analyse images from "this" ASI imager.

4.2.11 Imager - Parameters: Template Use, G-Sensor and Fisheye Calibration

Tab "Parameters" shows the same groups as the client "Parameters" tab (see § 4.2.5). For each group, "Template Use" selects "- Client Default -" (client values, shown read-only) or "- Imager Setting -" (individual values for this imager). Two groups exist on the imager page only: "G-Sensor Calibration" and "Fisheye Calibration".



Shooting Templates, FCT Live Evaluation Data, Auto-Maintenance & Recovery, WDR / Static Exposure, Imaging Sensor - Core Settings: see § 4.2.5.

G-Sensor Calibration: Tilt / Roll Calibration [°]: correction of the tilt and roll angles of the imager (default 0). set by CMS. DO NOT CHANGE!

Fisheye Calibration: Fisheye X-Axis / Y-Axis: Fisheye image calibration data, set by CMS. DO NOT CHANGE!

4.2.12 Imager - FCS-26: Parameters and Evaluation Mask

Imager-specific FCS-26 parameters ("Template Use") and evaluation mask - details see § 8.2.2.

4.2.13 Imager - Logs: Activity Log

Activity Log: Show automated (API) activities, like updates and restores.
Also allows to manually enter multiple remarks with time stamps.
For example to log eventual problems, defects and solutions.

4.2.14 "Downloads": One-and-only source for CMS software, tools, and manuals:

The "one-and-only" source to get (download) all latest software, tools, release notes and user manuals for CMS-Schreder cloud imaging (ASI) and cloud analysis (FC) products. Content is explained in detail on " https://service.schreder-cms.com/crm/downloads ".

4.3 CMS FTP: To up/download JPG images, docs and software

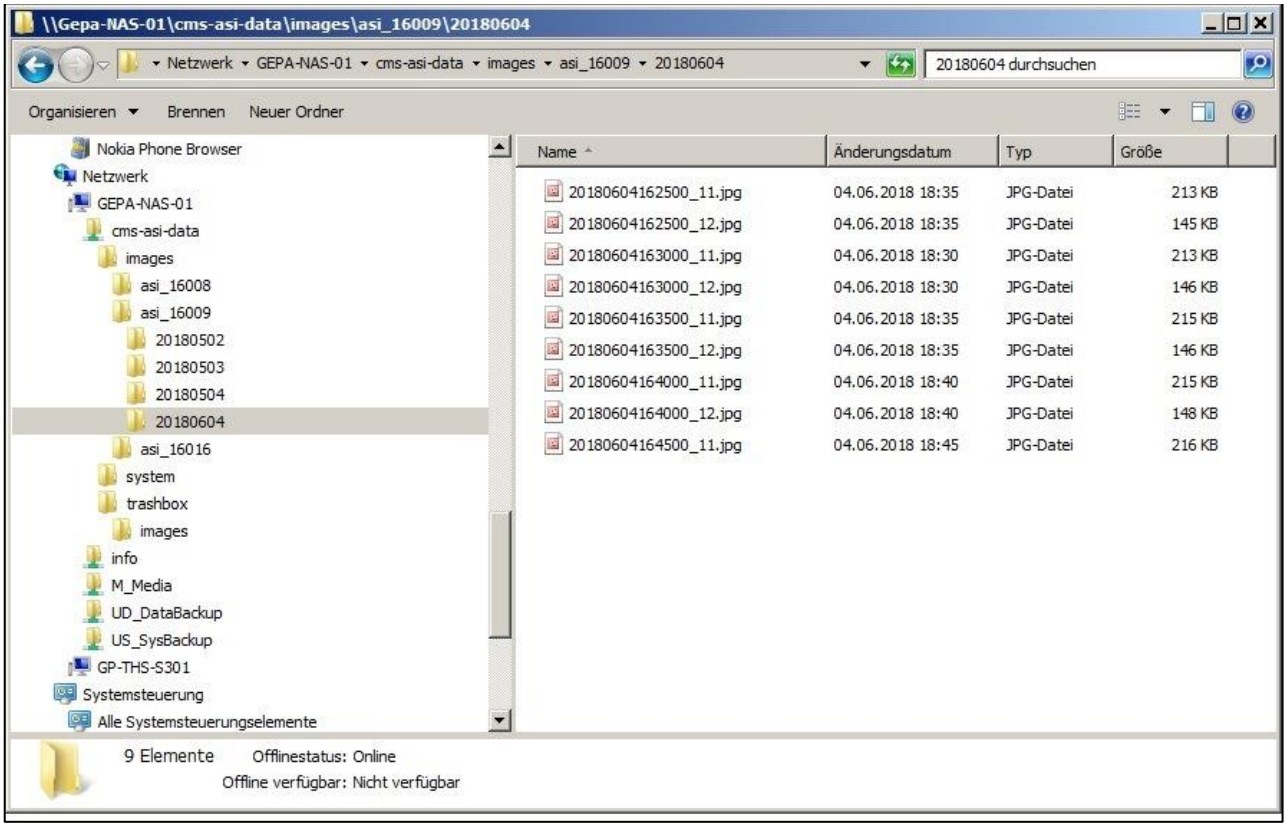
Preparation for using CMS-FTP:

Install and/or use a professional FTP-client, for example FileZilla.

URL: ftp://ftp.schreder-cms.com/
Login: Username/Password: Use your "one-for-all" LI/PW (Client_ID, password).

Your LI/PW will automatically access/open your personal CMS-FTP storage place.

To download JPG images, navigate in the "/asi16_data/" directory structure.
See below a subdirectory for each imager, and below a subdirectory for each day.
For example: .../asi16_data/ asi_16017/ 20161130.



Other directories can be used to store or exchange whatsoever other data.

CMS-FTP must be considered as a "working storage", not as a long time archive.

FTP Data are archived for MAXIMUM 12-18 months, and then relocated or deleted. To avoid data loss, it is YOUR responsibility to download data min. each 8 weeks.

CMS-FTP storage is free of charge for a capacity of up to 10 GB per client account.

If you want to use CMS-FTP as long-time archive, please contact CMS support.

4.4 CMS DDNS: To access ASI Imagers via WAN (Internet)

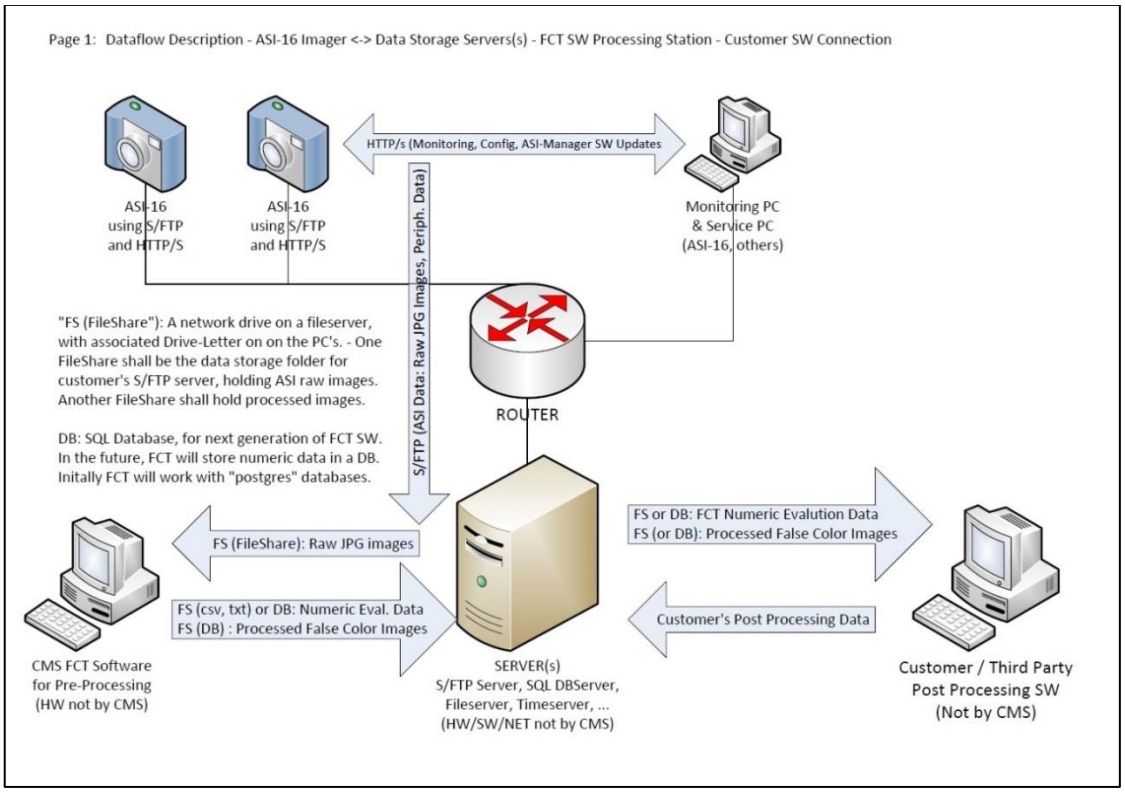
When activated and ports opened in Firewall, CMS-DDNS ("Dynamic DNS") allocates a ASI-unique "Domain Name" (URL) to a static or dynamic WAN-IP. - For example, URL "16008-8b.asi.schreder-cms.com:8080" for ASI SN16008.

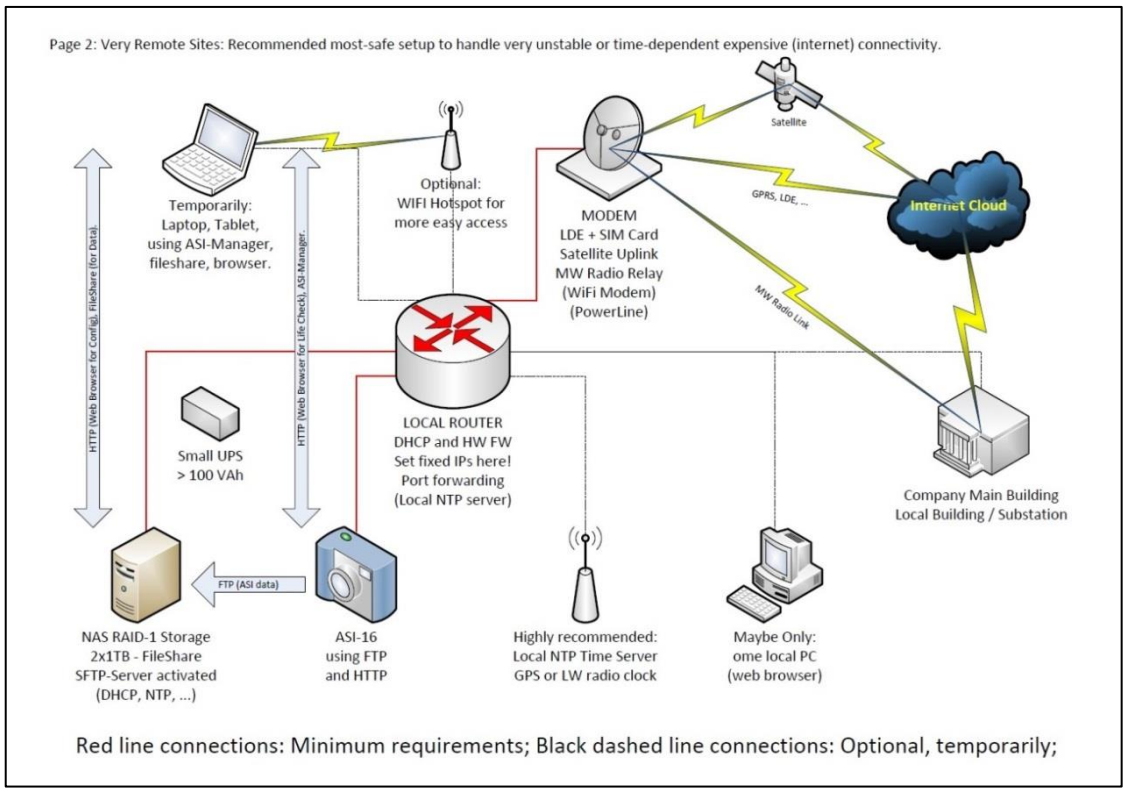
4.5 CMS VPN/REM: To access ASI Imagers without port forwarding

When activated, the ASI establishes an encrypted between ASI-Imager and CMS-Schreder CRM-Server. Then a remote user or CMS support can securely access the ASI via the HTTPS-URL as provided and shown in CMS-CRM.

5 Imager Network and Software - Installation

Before installing a new ASI-16 Imager to an outdoor location, we strongly recommend to run software and LAN network setup, online updates to the latest software, and a pre-test IN-DOOR, in the office! - LAN network configuration and software settings should be tested BEFORE moving the ASI-16 to its final outdoor location.





5.1 IT Administration - LAN (WAN) - Basics (Pre-Requirements)

CMS ASI-16 is a typical "Networking Device", basically comparable to other professional and industrial advanced "IP cameras". All external communication works via TCP/IP, Ethernet LAN/WAN and standard CAT-5 100 MBit (or better) network infrastructure.

ASI required to receive it's IP automatically from a DHCP service running on the LAN

Within the LAN, the imager can be accessed via its (primary and/or alias) IP address.
In the WAN it can be accessed via CMS-DDNS URL, if opened by your IT administrator.

Online configuration, monitoring and online updates work via HTTP (primary port 80, secondary port 8080) or as defined in the Imager Configuration. - We recommend to keep the secondary HTTP port at 8080 and eventually translate this port at the router, as otherwise "online updates" from outside (via WAN and CMS-DDNS-URL) will not work!

5.2 HTTP Access to ASI-16 Imager Homepage

IT Administration should prepare measures, as (a) to open all necessary ports on the firewalls and routers, (b) implement a router rule at the DHCP server to allocate a fixed IP to the imager MAC-ID, (c) implement a router rule for 8080 port forwarding and port translation if the Imager HTTP homepage shall be accessed via WAN / Internet.

5.3 Setup of PC's / LT'S for Monitoring and Configuration

A local PC/LT is necessary for monitoring, configuration and SW updates, ONLY!
Daily operation of an ASI-16 does NOT require any PC with dedicated software.

This PC/LT must be connected to a network router/switch and to the internet. The below standard software (or comparable) must be prepared before working with the ASI-16.

- Install and/or update your web browser (Firefox, Chrome, Edge).
- Install and/or update Oracle JAVA (only needed for the "PeriDatConv" tool): https://www.java.com/en/
- Install a FTP client (e.g. FileZilla, https://filezilla-project.org/download.php). Check for FTP URL and login with your "CMS client account data".
- Copy "ASI16-Installer_V24.exe" to your desktop or any other convenient place.

  All tools and manuals can be downloaded from CMS-CRM/Downloads.

NOTICE: Some Anti-Virus software may block or even delete some ASI-Tools!
In such case add ASI apps to your Antivirus software "Exception List".

5.4 Network Storage (FTP, FTPS, SFTP, others)

The ASI-Imager is designed to automatically send JPG images to a "Network Storage".

To permanently store captures JPG images, ASI must have LAN/WAN access to the (LAN- or WAN-) IP-address or the DNS-URL of a "Network Storage" (FTP or SFTP server).

Upon delivery, every ASI is set up to use the "CMS-FTP-Service", with a customer-specific FTP-Account (ftp://ftp.schreder-cms.com/ - Clients all-in-one Username/Password).

The customer is entitled to use this CMS-provided FTP account free of charge, within the limits stated in § 4.3. - WARNING: CMS cannot guarantee availability and stability of this

service, and cannot be held responsible for eventual loss of data. CMS FTP shall not be used as a long-term safe storage place. The customer shall be fully responsible for regular downloads and for clean-up and delete of old data.

Before switching to a customer-internal "Network Storage", customer's IT Administration, shall allocate such comparable services (FTP, ...) and storage capacity at any internal or external file server or NAS which can be accessed by the ASI imager. - The Network Storage must work with a LI-Name and Password. - The password must consider the "limited character set" for non-alpha/numeric characters used in multi-platform web browser interfaces.

5.5 Live Video Stream (viewing, recording):

Live video streaming uses the RTSP protocol (port 554).

We recommend to use Stream-2 for client's streaming applications.

URL: rtsp://[username]:[password]@[ipaddress]:554/live1s2.sdp



6 CRM >> ASI: Imager Updates - ASI-Installer

IMPORTANT: All imager settings and configurations SHALL BE SET / MUST BE SET in CMS-CRM, and then be transferred to ASI-16 imager by using "ASI16-Installer_V24"! - "ASI-16 Web-GUI" shall be used **to initially TEST settings and configurations** ONLY, just before implementing those settings in CMS-CRM! - All local-only setting via ASI-16 Web-GUI **will be LOST** after each software "Full Reset", or after an eventually corrupted

6.1 ASI-16/5n Imager - Electrical and Network Hardware Connections

Check the below image and description how to electrically connect ASI components:



(1) Connect the external T/RH sensor. T/RH sensor MUST be connected, as otherwise heating will not work!

(2) Connect one end of the CMS HPoE cable to the ASI-16 HPoE jack at the bottom of the imager. - Before inserting the plug you need to remove the "rod mounting footer".

(3) Connect the other end of the CMS HPoE cable to the CMS HPoE injector. CMS HPoE injector design may vary depending on version.

(4) Use a CAT-5 patch cable (not included) to connect the RJ45 jack on the HPoE injector to your LAN (network) router/switch/port.

(5) Connect 48V DC power supply cable to DC plug on the HPoE injector.

(6) Power-on the AC/DC power supply (connect to 110V/240V AC supply).

(7) Now the fan will start, and LEDs will start to blink.

6.2 HELP: Common IP-Access problems after relocation

Sometimes, against CMS clear advice, at "previous installation sites" the ASI IP-settings might have been changed from "Get IP automatically" (from DHCP service) to "Use fixed IP", with the fixed LAN-IP-settings matching to the "previous" network IP range. - As a result, most likely this ASI Imager cannot be identified in the "new" LAN, at least not by the typical most-easy to use tools (ASI16-Installer, NetScan, ...).

If the ASI16-Installer cannot find the Imager-IP after delivery or relocation, please do not waste time and DIRECTLY proceed with RESETTING (!) the ASI-16 locally set "fixed IP" as described under § 6.3.1. - In parallel talk to your IT to register the ASI MAC-ID to your firewall and to your DHCP service running on the LAN.

6.3 ASI16-Installer - The All-In-One Toolset for ASI-16 Maintenance

IMPORTANT NOTICE: Before using the ASI16-Installer, please ALWAYS check for the latest version. The latest V24 ZIP/RAR package can be downloaded from CMS-CRM.

"ASI16-Installer_V24" shall be used to identify one or more ASI-16 imagers (imager IP's) on the LAN (network), to open an ASI-16 in a WIN-10/11web browser (Firefox, Chrome, ...), and to restore or update ASI-16 software and CRM configuration data.

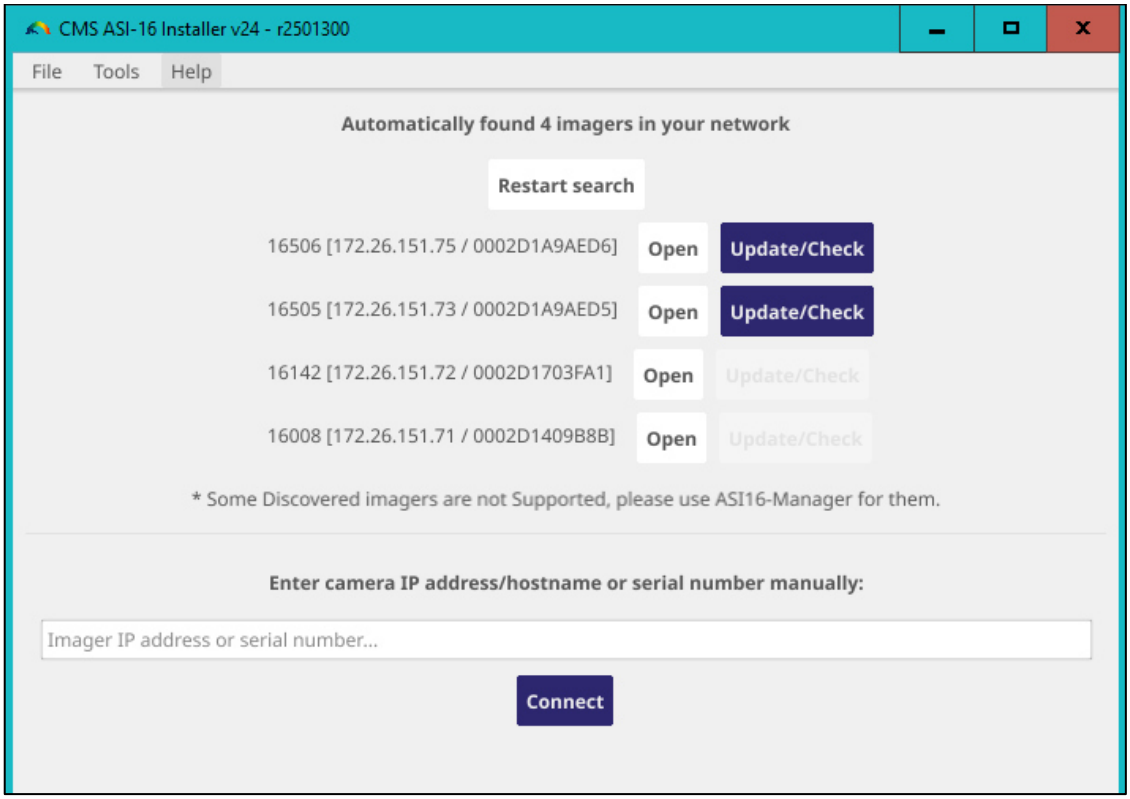
After start the "ASI16-Installer" will search the local LAN for ASI-16 imager devices.

Search may take up to 1 minute. The "list of imagers" will show ASI-16 serial number, IP-addresses, MAC-IDs for each device found, and available imager-specific functions.

If the "Auto-Search" feature does not work, try to enter a known valid IP identified through another tool, and/or a remote DDNS/VPN/REM URL, and/or enter the ASI serial number.

Open: Opens ASI-16 Web-Gui in PC web browser, for ALL CMS ASI versions.

Update/... : Show SW status, enable SW updates, restore and IP/CF maintenance.



"Connect": If the ASI-IP cannot be identified automatically, e.g. because of non-standard NET routings, enter IP or URL or ASI Serial Number, and press "Connect".

Background Explanation:

In most LAN (TCP/IP network) environments the IP address of an ASI-16 device can be identified automatically. But "auto-detection" may NOT work in networks with very strong or exotic firewall settings, and/or when moving an ASI device with fixed IP settings to another network environment.

In such case check and fix the ASI by using a peer-to-peer connection and use "ASI16-Installer" and/or an advanced "IP/Port Network Scanner", and/or contact your network administrator.

The "automatic search function" requires the PC and the ASI-16 to have IP's within the same IP subdomain range, for example a range like "192.168.2.nnn". If the ASI-16 System/Network-Type is set to "Get IP automatically", usually the (router) DHCP service will allocate corresponding IP addresses, automatically. - But, if the ASI-16 was set to "Use fixed IP ..." in networks with another subdomain range (e.g. "10.0.0.nnn", 172.16.150.nnn), and then the imager is connected to another network with another subdomain range, the ASI16-Installer search CANNOT identify and work with this "now strange" imager IP!

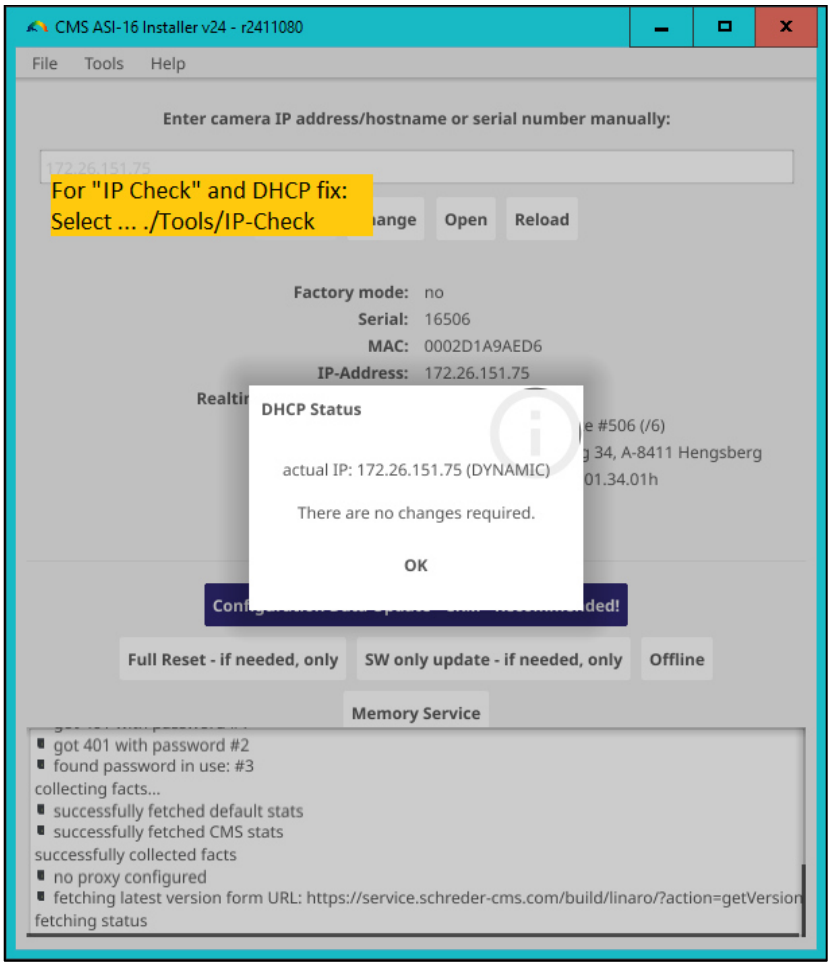
If ASI-16 was set to "fixed LAN IP" in one LAN, it likely cannot be accessed in another LAN. This can happen after moving an ASI to a new location, or you LAN does not run a DHCP service. This tool will reset the LAN properties to "Get IP automatically" (via router DHCP). After reconnection to a router and power-off/on the ASI will receive a valid IP.

You then can find the imager with its new IP via the "CMS-ASI16-Installer".
Or you can search for the camera IP with a "network scanner" tool.

6.3.1 Solving IP Problems: ASI16-Installer "Tools/ IP Check" Feature:

This function will try to reset ASI-16 to "Dynamic IP via DHCP" via its built-in "Alias-IP". Try first to run this tool via standard connection (ASI-16 <-> Router, PC <-> Router.)

If it does not work, connect ASI-16 directly with a cable to your PC/LT, and try again.



After running this tool, you MUST power-off your ASI and re-connect it to the router.

6.3.2 STILL PROBLEMS to access, even via ALIAS-IP and "Tools / IP Check"?

Please contact your IT department to check network router and firewall configurations.

6.4 ASI16-Installer - ASI Software/Config - Update & Restore

In ASI16-Installer_V24 click on "Update/Check" near the ASI-device you want to update.

NOTICE: For online "Configuration Data Update" or "Full-Reset" or " SW only update", the PC running the ASI16-Installer MUST HAVE a stable connection to the "Internet", AND it must have a stable LAN/WAN connection to the ASI-Imager to be updated. - In case of NO or UNSTABLE connection we recommend to use "Install Offline", as described below.

"Configuration Data Update - CRM - Recommended!":
Transfers and restores ALL configuration data as pre-set and as stored in CMS-CRM.
To be used IMMEDIATELY AFTER imager settings have been changed in CMS-CRM.
Recommended steps: (a) Test new settings via ASI-16 Web-Gui. - (b) When OK implement those new settings to CMS-CRM - (c) Run ASI16-Installer "Configuration Data Update" - (d) Log-in to ASI-16 Web-Gui, press (CTRL-F5), and check all settings.

"Full Reset - if needed only!":
Multi-step firmware clean-up, re-installation of software and CRM configuration data.
(a) Performing a "Deep Factory Reset" to remove eventually corrupted apps and data.
(b) Complete (re-) installation of (latest) ASI software and all CRM configuration data.

- Necessary if, even after multiple power-/OFF/Wait-15sec/ON cycles ASI software shows stability problems, strange behavior, instable FTP uploads and/or slow Web-Gui access.

- Necessary if the client wants to use new features implemented in a new SW release.

WARNING: After a "Full Reset" all locally set or changed Login/Password-sets will be deleted and lost! Only data stored in CMS-CRM will remain permanent. So, first go to CMS-CRM and setup your camera-specific data (GPS location, Timezone, Shooting template, FTP-servers, ... eventually additional LI/PW in addition to your all-in-one CMS LI/PW). - The all-in-one CMS LI/PW will continue to work in any case.

WARNING: Before "Configuration Data Update" or "Full Reset", check the Installer field "PeriCont/Com Interface Status". If it shows "disabled" and the button "Re-enable PeriCont/Com IF" is displayed, click this button first and confirm. Otherwise the Full Reset will fail.

6.5 Step-by-Step Procedures - To perform e.g. a "Full Reset":

a) Login to CMS-CRM, with your all-in-one Client-ID and Password:
URL: https://service.schreder-cms.com/crm/

b) In "CMS-CRM", check and/or update/add all pre-set data.
Proceed exactly as described in § 1.3.2 c) (client data first, then each imager).

TAKE YOUR TIME! - Some CMS-CRM data are critical for ASI operation!

c) In ./Downloads/, download latest "ASI V24 Manuals and Software" zip package.
Un-zip package to a convenient location on your PC.

d) LAN Connection: ASI-16 requires its IP to be set by a DHCP service.
ASI-16 and your PC shall be connected via a router/FW running DHCP.
Through this router, ASI-16 and the PC must have access to Internet!
DO NOT try to connect ASI-16 directly to your PC (peer-to-peer)!
DO NOT set a "fixed IP" on/via the ASI-16 web-gui user interface!

e) Start the latest "ASI16-Installer_V24" and wait till ASI(s) are listed.
If not displayed after max. 1 minute, close ASI16-Installer and re-start.
If still not displayed, find the ASI's IP by using an IP scanner tool.

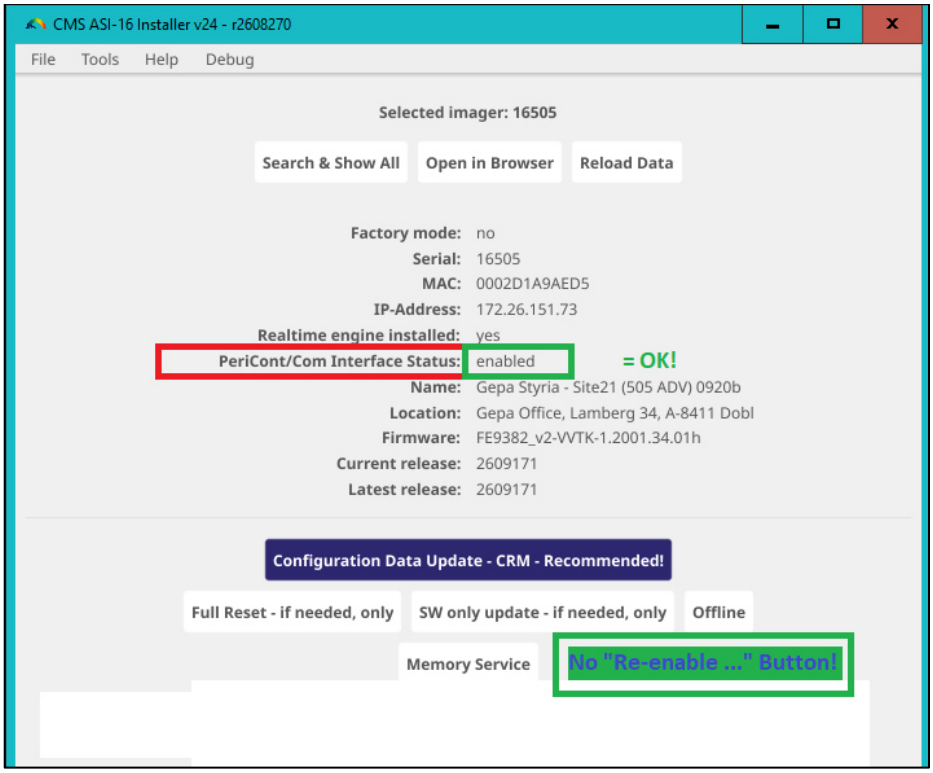
f) Click on "Open" to open Web-GUI for the ASI-16 you want to update.

g) In ./Imager/Capture/Shooting, de-activate (uncheck) in "./General".
In ./Imager/Storage/Backup-Management, click "DELETE-Uploads only".
Those settings/action make a "FULL RESET" faster and more safe.

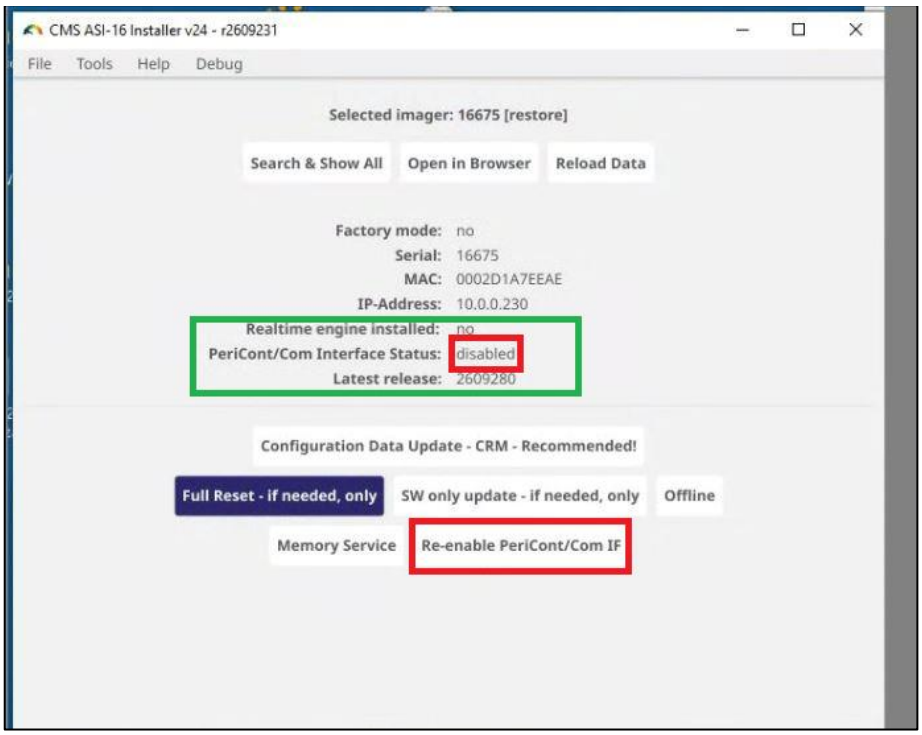
h) Power-off ASI for 15 seconds, power-on, wait about 3 minutes.

i) Close and Re-Start "ASI16-Installer_V24" and wait until your ASI(s) are listed.

j) In "ASI16-Installer", click on "Update/Check" for selected ASI imager.
OR (if not automatically found) enter ASI's IP or SN and click "Connect".
Wait 15-30 seconds, till you see a list of data and parameters.



NEW in Update/Check (ASI16-Installer V24, since 2026-09):
Line "PeriCont/Com Interface Status": Must show "Enabled"!



"enabled": Normal state - no action required (screenshot in § 1.3.2).
"disabled": The button "Re-enable PeriCont/Com IF" is shown at the bottom right.

Click it, confirm, and wait until the status shows "enabled".
Only then start "Configuration Data Update" or "Full Reset".

k) In ASI16-Installer, click "FULL RESET", and confirm safety warnings.

l) Wait up to 15 minutes, till the Installer reports "Installation ... Completed".

m) If the FULL RESET process is NOT completed after 15 Minutes, then ...
... close ASI16-Installer, and try sequence again at (j) for 2 times.
... if still not OK, power-off/wait-15sec/power-on and try again 2 times.

n) After "... Completed", wait 3 Min. before opening the ASI-GUI.
ASI-16 needs about 3 Minutes till all processes are fully loaded.

o) Open your ASI-16 Web-GUI, go through all sites, and check settings.
Especially check ./Imager/Capture/Shooting, and apply your settings.
After opening (new) ASI GUI sites, press <CTRL-F5> about 2-3 times.
<CTRL-F5> refreshes browser cache to download new page layouts.

6.6 ASI16-Installer - Advanced Features

"Install offline": SW/Config Updates for ASI Imagers with limited Internet Access.

To be used if the PC/LT accessing the ASI Web-Gui and running ASI16-Installer has NO or an INSTABLE internet access to the CMS server.

a) Log-on to CMS-CRM, open ./Imager/ and select the ASI imager to be updated.

b) In CMS-CRM open "Offline Package"

c) Select "Create a new package" - Select as needed.

d) When done, select "Download".

e) Download the "Offline Package" ZIP file to your PC.

f) Move this ZIP-file to a PC (storage) "within the strong firewall".
Run ASI16-Installer on this PC "within the strong firewall".

g) Set the ASI16-Installer to "Enable OFFLINE-Mode in any case".
Select the ASI imager to be updated via "Update/Check".

h) Start "Install offline", and select the above described "Offline package ZIP".

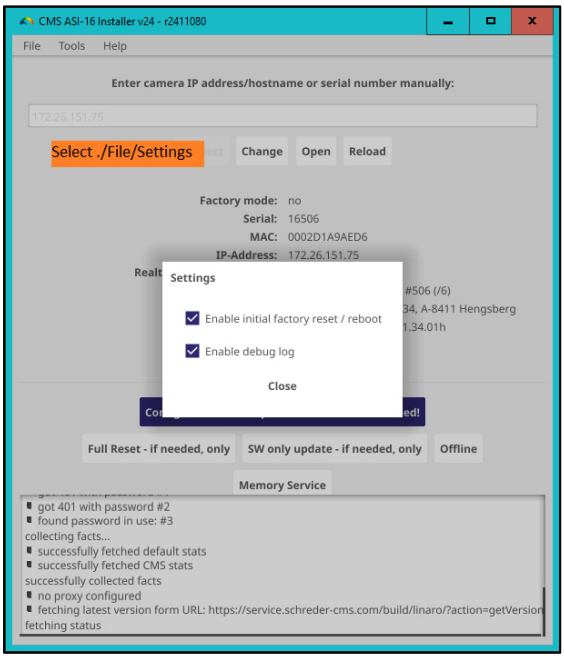
i) Proceed similar as with a regular "online installation".

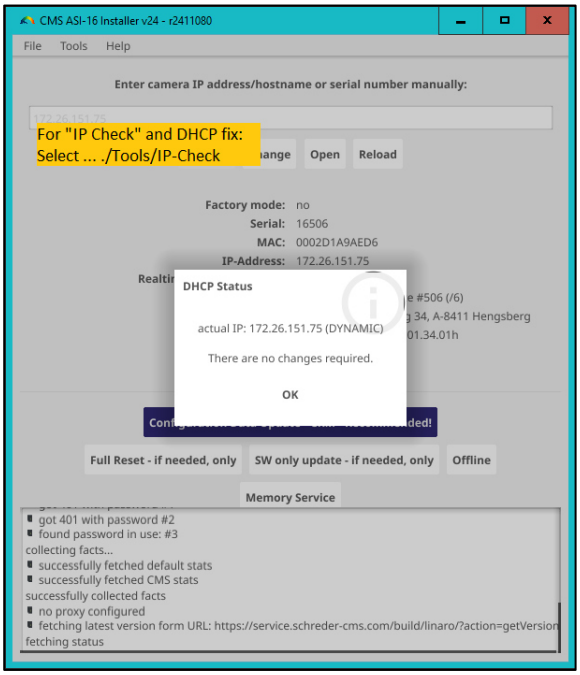
"Memory Service": Access to the ASI built-in temporary "Backup Memory".

To be used in emergency cases only, if ASI did not have access to the S/FTP server for more than a few days, and so has stored a huge amount of data to the "Backup Memory". It allows to rescue those data directly from ASI built-in backup memory, without having to wait a very long time till all such data later on are step-by-step uploaded to FTP server.

After selecting and downloading data, ALL such data must be DELETED via "Memory Service". Later-on the "Backup Memory" shall be FORMATTED by using the respective function in the ASI Web-GUI.

TOP BAR: "File / Settings": Advanced Maintenance Features.





For CMS support and CMS bug analysis only!

Enable initial factory reset / reboot: Keep "enabled".
Enable debug log ... : Keep "disabled".

TOP BAR: "Tools / IP Check":

Replacement for previous "DHCP-FixIt" Tool.

If ASI was/is set to "Fixed IP", when confirming the request, it can be used to re-set IP-Configuration to ... ... "Get IP dynamically from DHCP".

After done, ASI must be power-off, wait >15 second, power-on again, and wait >3 min. for full reboot.

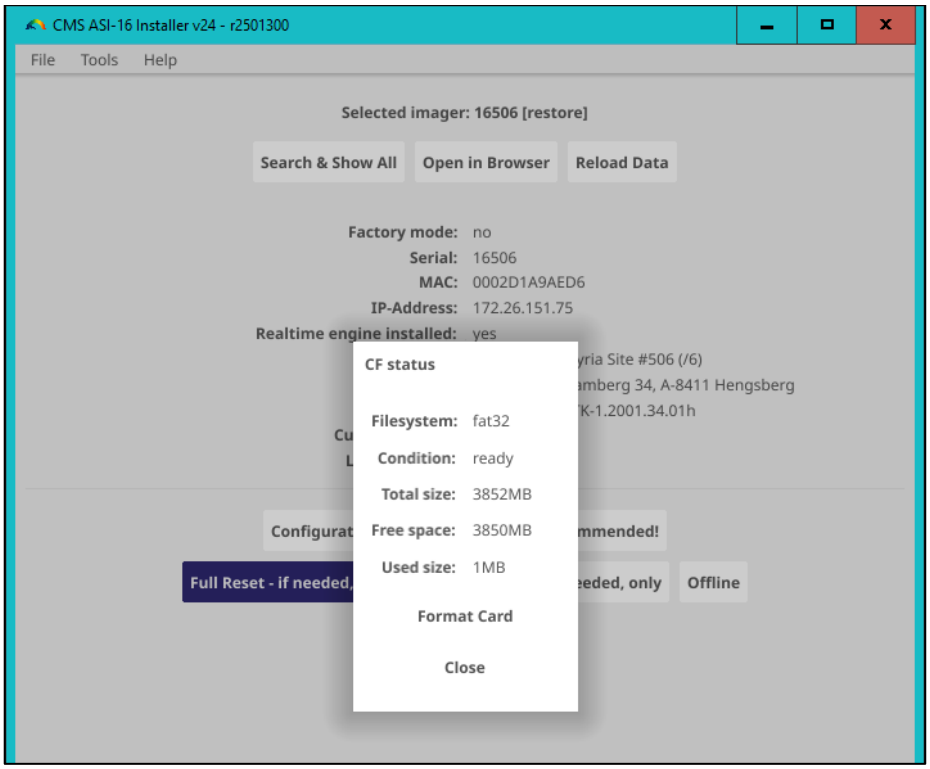
To find the ASI under its new allocated dynamic IP, ASI16-Installer must be close and restarted.

TOP BAR: "Tools / check offline package":

To check an ASI Software "Offline Package" previously generated in CMS-CRM.

Will display "package type", allocated ASI Serial Number and Software Version ID.

TOP BAR: "Tools / check CF status":



To check status of the "Backup Memory" (CF/SD memory).

To format CF/SD memory in case of corrupted file system or high load.

NOTE:

Sometimes a corrupted CF/SD memory can make the ASI-16 to run instable and/or hang and/or random crash. It also may cause problems when running an ASI16-Installer "Configuration Data Update" or a "Full Reset".

7 ASI-16 Imager Head Software (Check Config)

IMPORTANT: All imager settings and configurations SHALL BE SET / MUST BE SET in CMS-CRM, and then be transferred to ASI-16 imager by using "ASI16-Installer_V24"! - "ASI-16 Web-GUI" shall be used **to initially TEST settings and configurations** ONLY, just before implementing those settings in CMS-CRM! - All local-only setting via ASI-16 Web-GUI **will be LOST** after each software "Full Reset", or after an eventually corrupted system. "Full Reset" will re-transfer CMS-CRM settings onto the ASI-16!

7.1 HELP: How to work best with this Operator Manual Section

When going through this section, in parallel you should have opened an ASI-16 in your web browser, and read and click in parallel. Please navigate by selecting a top navigation bar topic (Home/ Imager/ System/ ...) and then clicking one of the left side topics. - After changing one or more parameters within one page/frame, press <Save>.

7.2 ASI Imager Web Browser Access - Login Procedure

To access any ASI-16 you always need to log-in via a username and a password.
You have received your "all-in-one" CMS-username/password from your distributor.
This LI/PW allows you to access all your imagers, CMS-FTP and CMS-CRM.

Open your web browser (Firefox, Chrome, Edge). Enter the imager IP or URL.

As soon as requested, please enter your "CMS account" username and password.
You can use one single "CMS client account" login for all your ASI-16 devices.

The Imager Login Name MUST START with "LI", followed by your client account number.
Customer defined Login Names MUST START with at least one Alpha (A-Z) Symbol!



Please wait a while, as the first time login may take some time.

If the browser does not continue, press <F5> to refresh your browser cache, and re-enter Login name (LI) and Password (PW).

If requested by your browser, please PERMANENTLY allow the installation of some plugins, the access to the website, accept of certificates, and maybe some more requests and warnings. Likely, after such warnings, you must press <F5>, and/or close and re-open your browser and press <F5> again (clear browser cache).

After some time you should see the CMS ASI-16 home page. - Especially when you connect the very first time, it may take more than 30 seconds.

As soon as you can see the ASI main page, we recommend to add this page IP/URL to your "browser favorites", for more easy access in the future.

If you can see the ASI-16 main page, but without an sky image view, then please recheck your browser settings. Likely your browser has blocked one plugin, or a plugin installation has been corrupted, or parts of the configuration has been corrupted during installation.

7.3 ASI-16 Main Page - Home Page - Summary

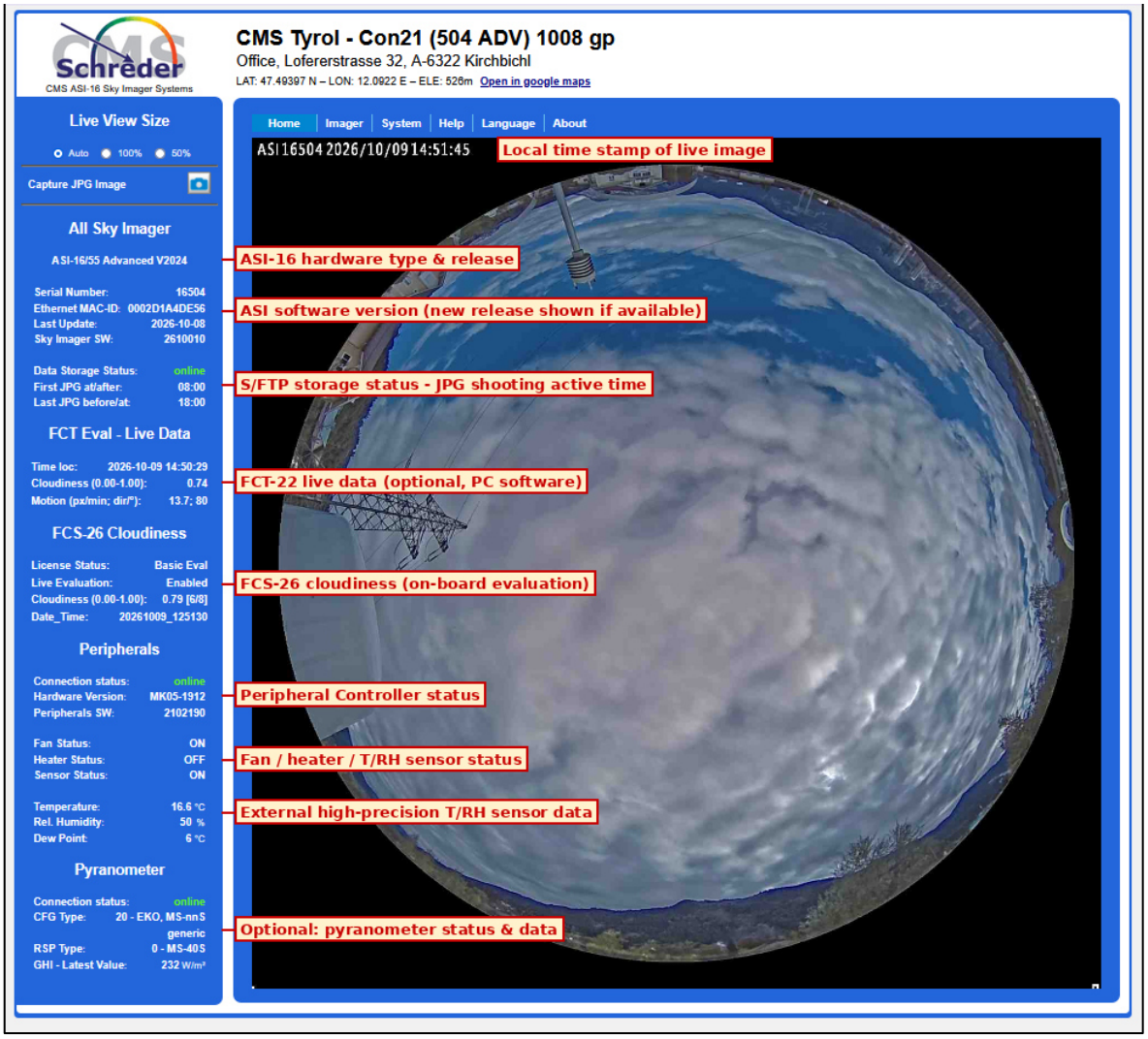
Within a LAN the "ASI-16 Homepage" can be accessed through its LAN IP address. As soon as the "Home Page" is displayed you should add this page to browser "favourites".

NOTICE: Sometimes, depending on web browsers, the screen may hang up or may look corrupted. In such case press [F5] and/or [Ctrl-F5] to refresh and/or clear browser cache. Sometimes, after pressing [Ctrl-F5], if the screen still looks corrupted, you first need to switch to another configuration screen, and then back to the screen requested.

After a reboot or restart it will take up to 5 minutes till all data, especially "peripherals data", will be available. - From time to time press "Ctrl-F5" to refresh web browser display.

7.4 Home Page - Navigation and Data Content

On the top and left side of the screen, the ASI-16 "Home Page" displays the most important real-time data and settings of the imager. On the top it also includes the "navigation bar" to access all sub-pages for configuration and maintenance. And in the centre it includes a "semi-live video-stream" of the camera.



Top Side:

Location: Mount-site name, site address and GPS coordinates
(CMS-CRM / Imager > Site Address/Loc)
"Google Maps" will display a map with using the GPS data.

Navigation Bar: To select sub-folders for configuration and maintenance.

> Home The imager home page (main page).
> Imager Imager-specific settings and functions:
Site Address/Loc: site name, address, GPS, time configuration
Capture Shooting (JPG schedules), Streaming (video streams)
Storage Data Storage Server, Backup Settings, Backup Management
Peripherals General (PeriCont, datalogger), Pyranometer
FCS-26 Status, Settings (mask), Configuration
> System General system settings and functions:
Network Network (IP configuration), DDNS / VPN - HTTP
Security User accounts, HTTPS, Firewall, IEEE 802.1x
Service Maintenance, Imaging, Network, Others
> Help READ THIS FIRST, Release Notes, Software Manual, EULA - SW License
> Language Select alternative GUI languages
> About CMS Schreder reference data

Left Side:

View Control: To change the size of the live video display.

Local Capture: Capture one JPG image for review and local storage

All Sky Imager: Parameters and settings

Serial Number: The serial number of this imager (camera head)
Ethernet MAC ID: MAC ID of the ASI imager head ETH adapter.
Last Update: Date and time of the last software update/restore
Sky Imager SW: Software version of Imager / Peripheral Controller
New SW available: Only displayed when new SW available for update.

Connection Status: Status of connection to FTP data storage server.
First JPG at/after: The time at or after the first JPG shot of the day
Last JPG before/at: The time before or at the last JPG shot of the day

FCT Eval - Live Data: Shown only if FCT-22 live data are activated (see § 7.5).
Time loc: Time of the latest FCT-22 result.
Cloudiness (0.00-1.00): FCT-22 cloudiness ratio.
Motion (px/min; dir°): Cloud motion vector (speed, direction), CMV option.

FCS-26 Cloudiness: Result of the on-board FCS-26 evaluation (see § 8.4).
License Status: FCS-26 licence (e.g. "Basic Eval").
Live Evaluation: Enabled / Disabled.
Cloudiness (0.00-1.00): Cloudiness ratio and okta, e.g. "0.79 [6/8]".
Date_Time: Time stamp (UTC) of the evaluated image.

Peripherals: Data and hardware status of Peripherals Controller.
Connection Status: Status of connection to Peripheral Controller.
Peripheral SW: Software Version of Peripheral Controller.
Hardware Version: Hardware Version of Peripheral Controller.

Temperature/ Rel. Humidity/ Dew Point: Data from external T/RH sensor.
Fan/ Heater/ Sensor Status: OFF / ON / ERR (=Error, blocked, broken).

NOTICE: High precision data require the T/RH sensor to be mounted in a "radiation shield". - Other ways of mounting will deliver lower quality data. BUT, the T/RH sensor MUST be installed and working in any case, as esp. temperature is necessary to control heating and fan.

Pyranometer: Available only after purchase of "Pyranometer Option".

Connection Status: Status of ModBus connection to Pyranometer.
CFG Type: Pyranometer type, as configured in ASI GUI
RSP Type: Pyranometer type, as reported from Pyranometer via ModBus.
Irradiance, last: Latest received irradiance value, no updates on the screen.

Below: Sample ASI Web-Gui, explaining system/hardware error indications:



Eventual PROBLEMS and FIXES:

(a) Top navigation bar not visible: Website not fully loaded.

Press <CTRL-F5> to trigger a web browser cache refresh.

(b) Live-image screen is black or blue, and does not display the live-video:

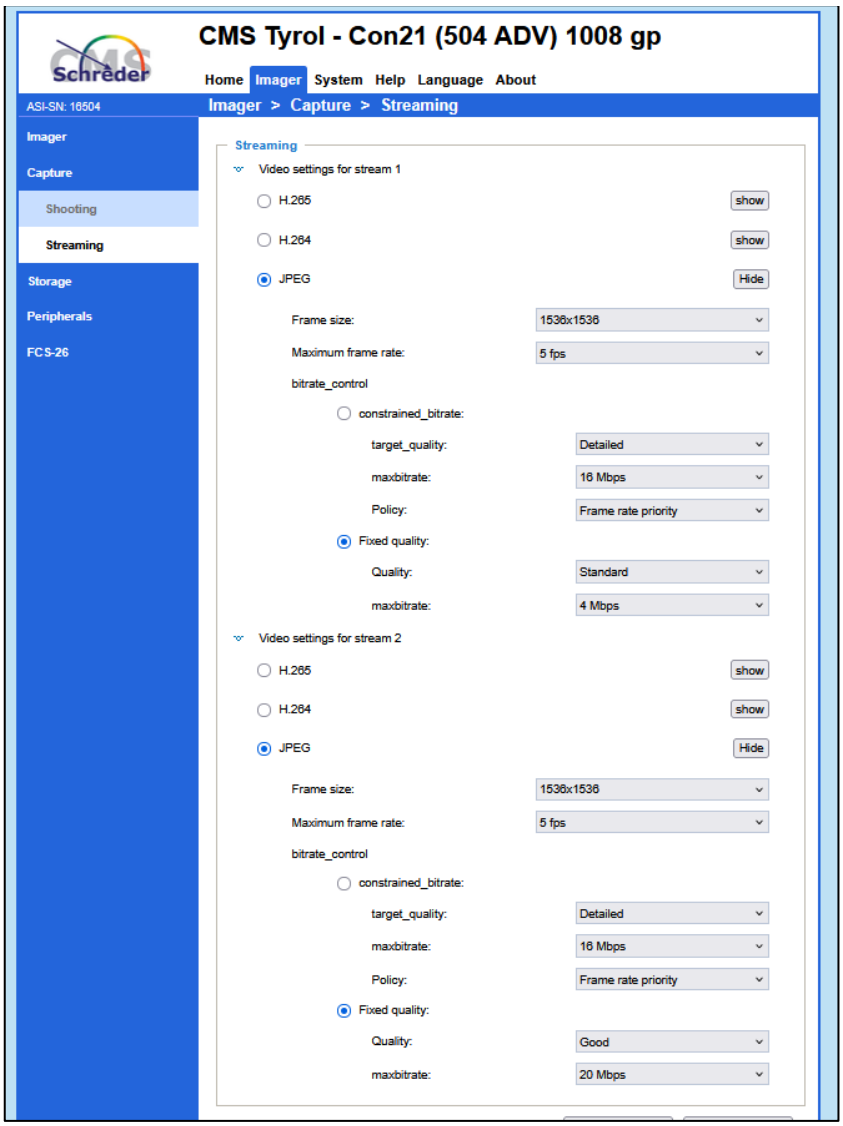


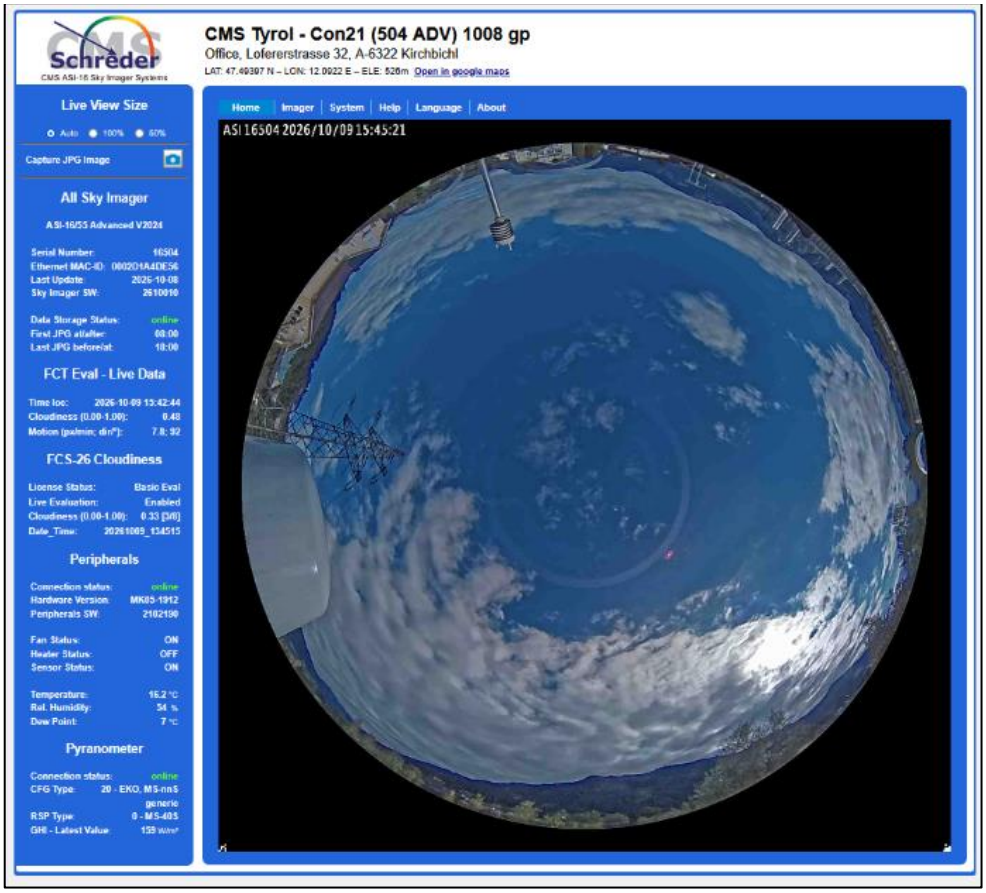
Image streaming settings got changed, sometimes after software RESET.

Navigate to ./Imager/Capture/Streaming, select "Video ... stream 1", and select "JPG".

Check and eventually change JPG parameter configuration.

Click on "Save", navigate to ./Home, and press <CTRL-F5>.

7.5 Cloud Analysis (CMS FCT-22) – Live (realtime) Data Display



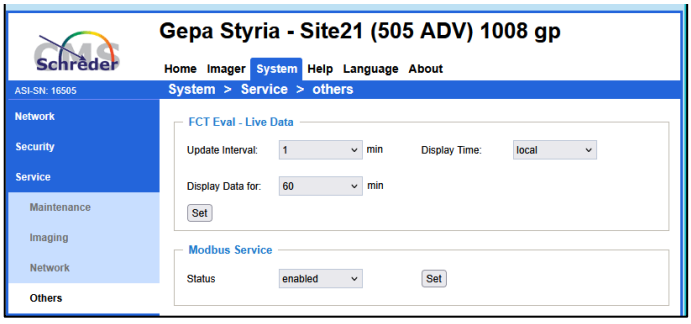
Upon separate order CMS can provide “FCT-22 (FindClouds Trinity)”. FCT-22 means an optional modular WIN-based software package for numeric cloud analysis. It can process cloudiness ratio in %, a cloud movement vector, and cloud-base height by triangulation.

When running “FCT-22” in automated (real-time) mode, resp. latest FCT evaluation live-data can be displayed on the ASI-16 imager homepage.

Hereby operators can easily monitor the FCT SW operations status.

To activate "FCT Eval - Live Data": CMS-CRM > Parameters > "FCT Live Evaluation Data" (Status/Interval, Keep for min, Time zone), then run "Configuration Data Update". Locally (for testing): System > Service > Others > "FCT Eval - Live Data" (Update Interval [min], Display Time local/UTC, Display Data for [min], button "Set"). For further details refer to the "FCT-22 Setup & Operator Manual".

And, it is an enrichment for “Viewers”, when making some ASI home-pages available to an (internal or external) public audience, e.g. as special frame or as a link on the operator’s (company’s/ institutes) public homepage.



Update Interval: The time interval where ASI is checking the primary FTP folder for new data in “fct_results.txt”.

FCT-22 ("Program Settings" > "ASI Upload" > "Evaluation Results") writes "fct_results.txt" into the camera image directory on the data storage server; the ASI reads this file. Therefore, the ASI must be able to read the folder used by FCT-22 (folder accessible in both directions, see "FCT-22 Setup & Configuration", recommended network setup).

Display Time: The last-results time (local or UTC) displayed at the ASI homepage.

Display Data for: Data will be displayed ONLY if latest “fct_results.txt” data are not older than about “Display Data for”.

No “FCT Eval …” frame to be shown, if latest data are older, or if the file “fct_results.txt” cannot be detected.

NOTICE:
The FCT-22 raw-image folder must be set/linked to the 1st Data-Storage (S/FTP) server. For further details on working with "shared folders" or use of an FTP client (e.g. WinSCP) please refer to "FCT-22 Setup and Operator Manual", download via CMS CRM.

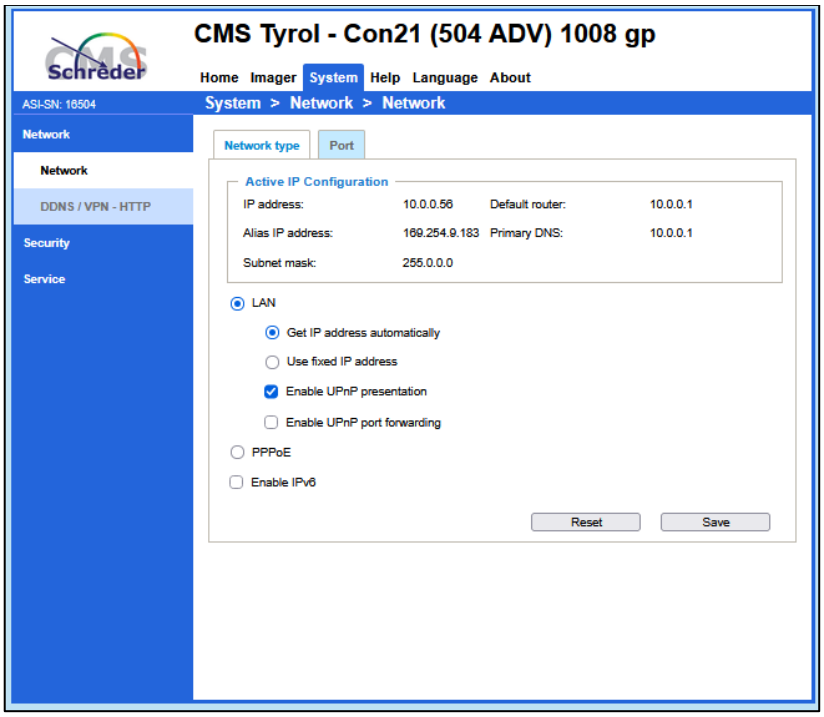
7.6 FCS-26 Cloudiness Evaluation on the Imager (FindClouds Simple)

TOP BAR: Imager - SIDE BAR: FCS-26 / Status, Settings, Configuration
For details see § 8.3 (Web-GUI) and § 8.4 (results and data files).

7.7 Imager Network - LAN Configuration

TOP BAR: System - SIDE BAR: Network / Network Type:

The network settings should follow the regulations of your IT administrator.



On the ASI-GUI we STRONGLY RECOMMEND to keep "Get IP address automatically" (DHCP). If the ASI shall always get the same LAN IP, your IT shall reserve this IP for the ASI MAC-ID in the DHCP server (main router) - NOT on the ASI. -
We STRONGLY discourage clients to set any fixed IP's on the ASI imager. - Such will

cause the "ASI16-Installer_V24" to CRASH when performing a "FULL RESET", then leading to complex recovery procedures! - Such also regularly causes confusions and problems when moving an ASI from one client site/location/network to another.

By default, upon delivery all ASI are set to "Get IP address automatically"!

Ddescription of the most commonly used setup with "dynamic IP":

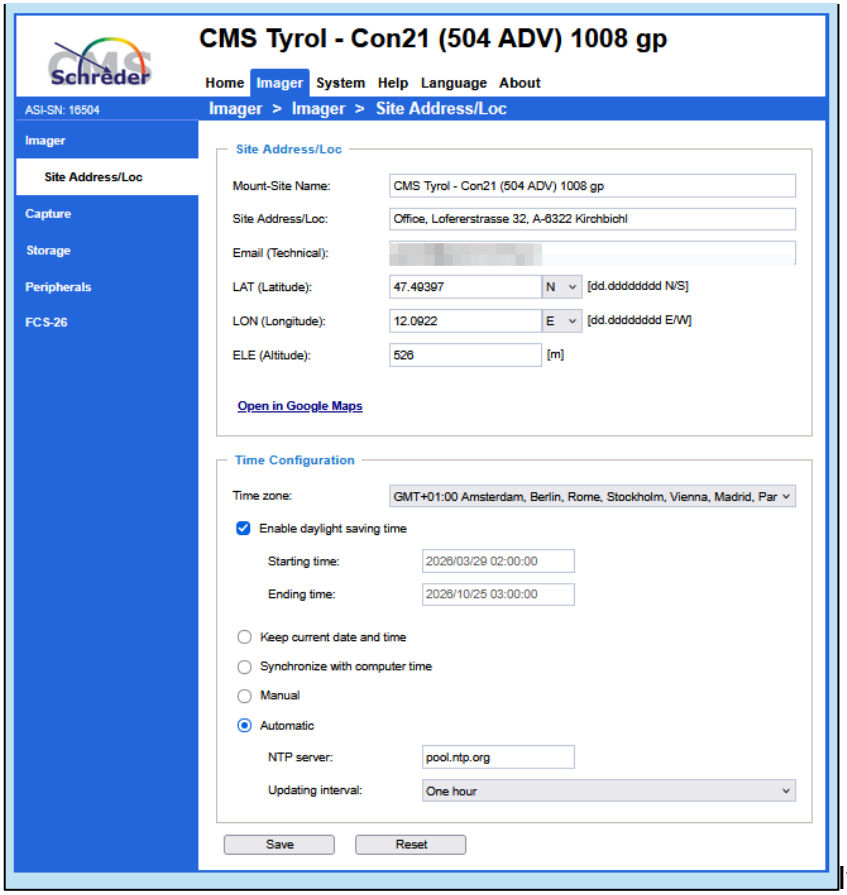
- Navigate to /System/ Network/ Network-type.
- Set LAN to "Get IP address automatically".
- Click "Save" at the bottom, and close the web browser.
- Power-off ASI-16 for about 15 seconds, by disconnection DC power supply power cable.
- Start "ASI16-Installer" again, and let it search for ASI imagers.
- Now your (new) ASI-16 Imager should be displayed in the ASI16-Installer list.
- Click on "open" to login and open the selected new imager in your web browser.
- Proceed with "Login", software update, and with basic system setup.

WARNING - ALL local setting will get lost after each software update/restore!
Register ALL imager settings in CMS-CRM, as soon as possible!

7.8 Imager Location, GPS Coordinates, Time Zone

TOP BAR: Imager - SIDE BAR: Imager/ Site Address/Loc:

Location settings and Time settings MUST be configured according to the installation site. Parameters are used to calculate time of sunrise, sunset for capturing start/stop, and calculation of the position of the solar disc within each individual JPG image.



If you have setup correct data in CMS CRM, those data are transferred to ASI after each ASI16-Installer "FULL RESET". If data in CMS-CRM are NOT correct, you must manually check and correct settings after every "FULL RESET".

Mount-Site Name:
A descriptive text, to be displayed on the web page and stored within JPG images.

Site Address/Loc:
A descriptive text, to be displayed on the web page and stored within JPG images.

Latitude, Longitude, Elevation:
GPS coordinates and elevation above sea level, stored with JPG images.

GPS coordinates and elevation are very critical for the operation of the imager and for CMS FCT analysis software.

Enter GPS data with most high precision, minimum "nn.123456" precision.

Email Technical: Email of a person in charge of service and maintenance of this ASI.

Time Configuration: NTP Server - Local time to be used within ASI-16 SW:

ASI-16 must have permanent (!) access to a qualified Time-Server (NTP-Server).
Either a public NTP via Internet, or a local NTP installed inside your network (LAN).

You MUST (!) set the imager to your LOCAL time zone (and - i.a. - "daylight saving").

For analysis-critical " time-stamps" used for and stored into JPG images we recommend to use the Filename-Time-Settings in the JPG-Image-Capturing configuration. - For CMS FCT-22 cloud analysis software this parameter MUST be set to "Use GMT".

Time zone: Select the "Time zone" of the location of your ASI-16 site.

Enable daylight ...: To be checked when your country uses "daylight saving".

Time synchronisation: **MUST be set to "Automatic"**.

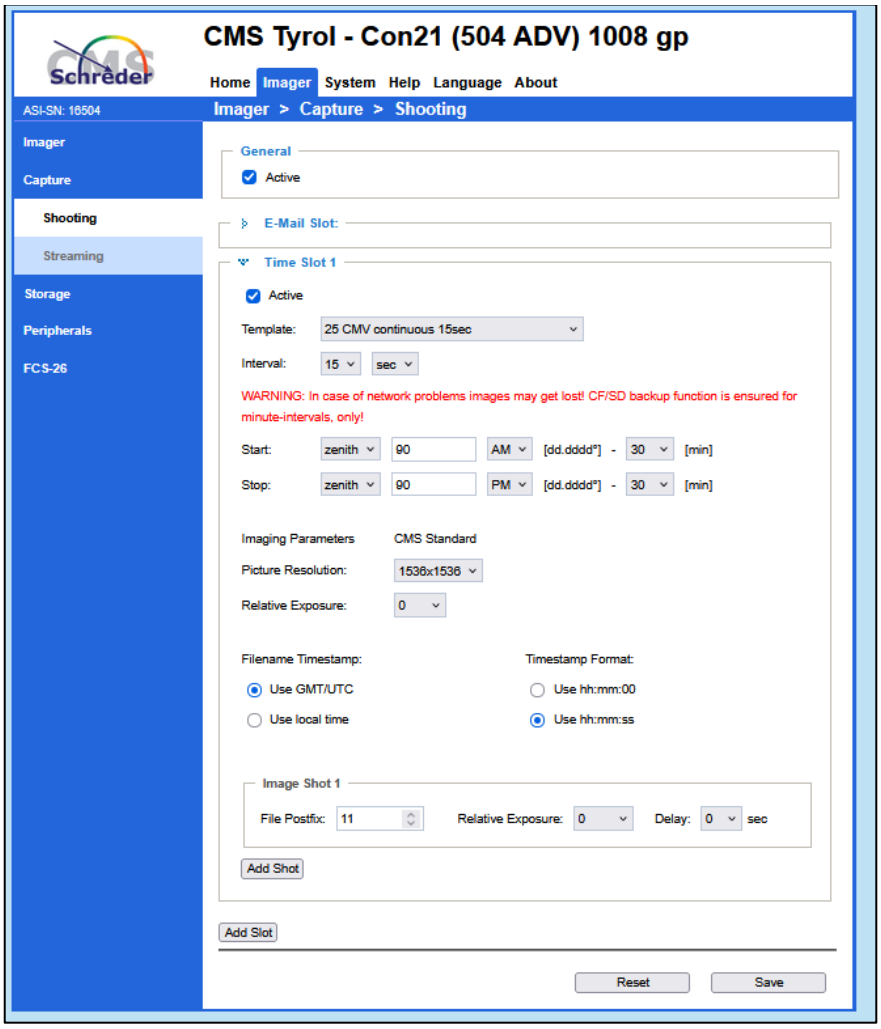
Automatic: Enable imager time to be synchronized with an NTP time server,.
NTP server: Internet URL or IP of a "NTP time server" accessible by the ASI-16.
Updating interval: "One hour", to try time synchronisation once per hour.

WARNING - Local setting will get lost after each software update/restore!
Register ALL imager settings in CMS-CRM, as soon as possible!
After making any change in CMS-CRM, re-run ASI16-Installer and perform a "Configuration Data Update" or a "Full Reset"!

7.9 JPG Image Capturing - Shooting

TOP BAR: Imager - SIDE BAR: Capture/ Shooting:

Parameters for automated capturing of JPG images. Images are uploaded immediately to a TPC/IP connected S/FTP server. - Subject and limited to settings and parameters, as soon as there is no access to the S/FTP storage server (LAN/ WAN/ Server down), if possible, images are temporarily stored on a built in "Backup Memory", and are uploaded with low priority, step-by-step, as soon as FTP storage server can be accessed, again.



Scheduler configuration when and how to store JPG images to a file server.

Active: Set "General/ Active" and "Time Slot1/ Active" to enable JPG image storage.

E-Mail Slot: Not fully implemented! -To send JPG's to an email account.

Time Slot 1 (2, ...):
One (or more, up to three) sets of predefined parameters, to capture one, typically one, or up to four JPG images within defined time intervals.

Template: Select one (out of total 9) pre-defined shooting configurations.
Templates have been defined based on wishes from multiple clients.
So, most likely one of the templates also will fit to your requirements.
Try to use one of the templates, instead of setting your own configuration.

Do NOT use Template 11/12, as they make NO sense for ASI-16 V24!

Interval: For example only ... "15 min":
A set of JPG's will be sent at e.g. 10:00, 10:15, 10:30, 10:45, ...

Start [Zenith]: First JPG image set will be captured at/after sunrise (= zenith/ 90° AM).
Stop [Zenith]: Last JPG image set will be captured before/at sunset (= zenith/ 90° PM).

Zenith Ang.: Recommended default value: 90° == Astronomical sunrise / sunset.
Values < 90°: Some time AFTER sunrise, some time BEFORE sunset.
The time delay varies depending on the location and the day-of-year!
>> 80° in Central Europe and April means a delay of about 1 h 15 min.
DO NOT use Zenith angles values above > 90° or below < 60°!

Pre/post Zenith Time correction: Through the [+/-] parameters you can modify the scheduler, to start/stop capturing up to 1 hour before/after sunrise/sunset time.

Capturing will be done at the per-hour timeslots as defined in "Interval". If, for example, "Interval" is set to 15 min, and actual Start [Zenith] time is 06:07, then the first JPG shot of the day will be captured at 06:15, and NOT at 06:07.

"Zenith control" requires correct settings of local imager time and local GPS coordinates. It may not work for zenith angles above 90°. Minimum allowed zenith angle depends on GPS coordinates and day-of-year. For further details please refer to side documents.

NOT RECOMMENDED: When changing from "zenith" to "time", you can enter fixed start/stop times. - But ASI-16 then either may capture images at night (which makes no sense and just generates data waste), or it may miss data during parts of daylight time.

Imager parameters: "CMS Standard". Not to be changed, for CMS software.

Picture resolution: Select resolution for higher or lower quality and JPG file size.

Relative exposure: NOT TO BE USE any more with new ASI-16/51+ or ASI-16/11+.
New generation ASI imager heads use advanced built-in "Wide Dynamic Range" (WDR) algorithms. - Therefore, change of exposure makes no practical sense, not anymore.

Filename / Timestamp / Format: Parameters to manage automatically generated JPG filenames. - Must NOT be changed when using CMS FCT cloud analysis software!

Image Shot 1/2/...:
Configuration of one or more images to be captured within the respective "Time Slot".
Delay: Relative delay, especially for a 2nd / 3rd shot within one time slot.

NOTICE: Capturing of each individual image will take up to about 2-5 seconds, because of processing time. Therefore, the actual file-time for the first image will 3-10 seconds past "time interval" time. Additional images will be further delayed by additional 2-5 seconds for each image within one "Time Slot". - Please consider, when setting "interval" to 15 seconds maybe sometimes a second image might get lost.

7.9.1 Template #11 and #12: For first-generation ASI-16 (V2015, V2018) only!

To be used with ASI-16/50, ASI-16/10 (V2015), ASI-16/51, and ASI-16/11 (V2018). Includes dual-image shooting packages with changing exposure levels. - Changing exposure levels does not make sense for ASI systems after V2018, when using activated WDR-PRO (built-in advanced wide-dynamic-range algorithms image, set by CMS Default Imaging Parameters. - Cam be used for V24 Cams if WDR-PRO is de-activate.

7.9.2 Template #21/22/23 - V24: For standard "Cloudiness Analysis":

Single image shooting, shooting intervals ... 15 min, 10 min, 5 min, or 1 min.

7.9.3 Template #25 for continuous "Cloud Movement Analysis":

"Cloud Movement Analysis" requires images with a time interval of 10-30 seconds.
By experience 15 seconds is the best solution for both fast and slow moving clouds.

NOTICE: Will create huge amount of data, therefore requires large storage capacity.
We recommend to move data from primary storage to a backup storage, once a month.

7.9.4 Template #26 for "Cloud Movement Analysis" each 10 Minutes:

This config includes three (3) shots with 15sec delay in one 10min interval time slot.

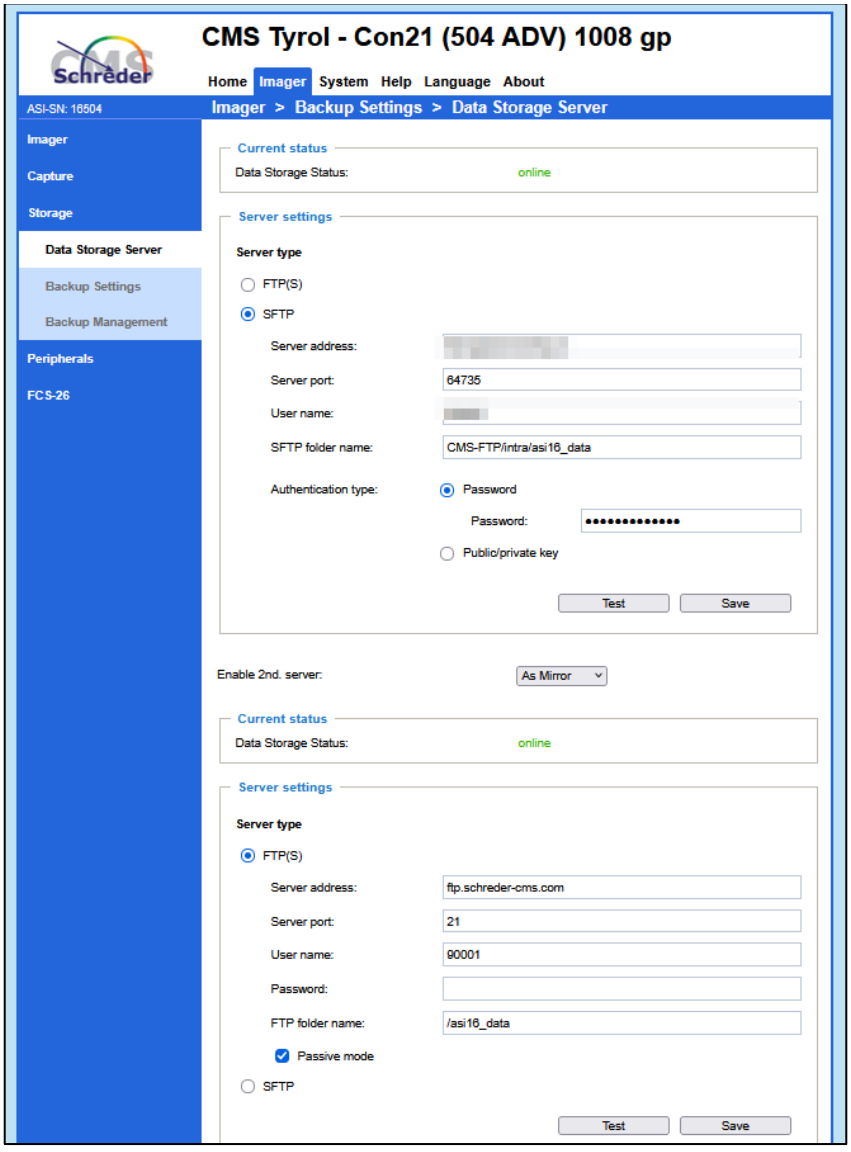
Shot interval 15 seconds - see § 7.9.3.

Three shots increase probability to get at least one valid set of movement vector data.

7.10 Network Storage Settings for JPG (FTP, NAS, FileShare)

TOP BAR: Imager - SIDE BAR: Storage/ Server Settings:

Captured JPG images will be sent automatically to one (or two) FTP "Network Storage".



The Network Storage (= FTP-server) IP/URL and corresponding login data.

For testing and initial operation, you may use the FTP server provided by CMS. Later-on you may change to an FTP server of your company. When using the CMS FTP service, you MUST NOT change the pre-defined LI/PW settings!

S/FTP Server Account Data (Address [IP/URL], Server Port, User Name, Password):
We recommend to create just ONE SINGLE server account for ALL imagers!
For multiple ASI-16 at the same client/site usually only ONE account is needed.
In most scenarios it makes no sense to create individual accounts for each ASI.

S/FTP Folder Name: Should be set to "asi16_data" (especially when using FCT-22 SW). The folder name is RELATIVE to the FTP root of the account - never enter an absolute PC/NAS path like "C:/.../asi16_data"!
This "root-folder" will be the data-root for ALL imagers uploading to this FTP server.
If this folder does not exist already on the FTP, it will be created by the ASI-16.
ASI-16 uses its SN to automatically generate its own individual data subdirectory!
Therefore it makes NO SENSE to create folders manually for each individual ASI.

SFTP Authentication Type: We recommend to use "Password" authentication.
"Public/Private Key" is more complex to implement and cannot be set in CMS-CRM.

NOTICE:
After a Software "FULL RESET" or "Data Config Update" via ASI16-Installer_V24 all local Server Settings will be reset to the FTP account settings as stored in CMS-CRM!

Button "Test":
To check and verify if the Storage Server can be accessed via the entered settings.
Use the "Test" button BEFORE permanently save settings via "Save server".
With "Test" the Imager will try to send a "test.txt" file to the root of the storage.

A second browser window will pop up and will indicate if the test transmission was successful, or if it failed. If failed, then recheck the settings (IP/URL, LI/PW, ...), and check if the storage is online and can be accessed. Take care of the folder formats used.

Second FTP server: If activated, ASI will support two independent FTP servers.

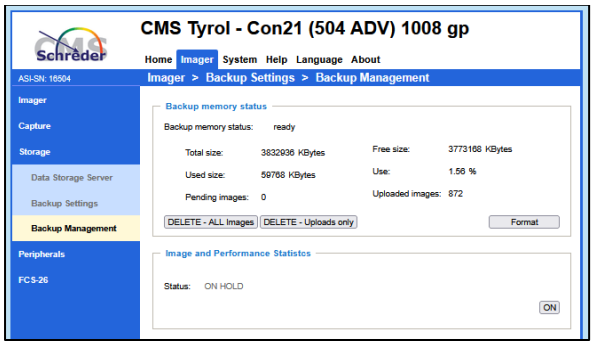
"Mirror":	Data are always sent to BOTH FTP servers, at the same time.
"Fall-back":	Data are sent to 2nd FTP only if 1st FTP server is offline.
... Backup:	Backup Memory will be activated if BOTH FTP are offline. Backup data are uploaded to first FTP getting online again.

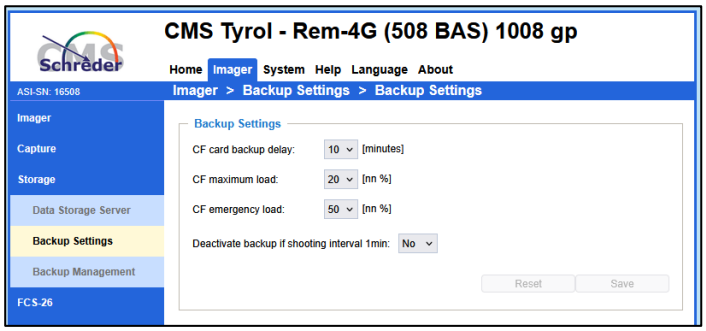
7.11 Backup Storage (Temporary Storage on Flash Memory)

TOP BAR: Imager - SIDE BAR: Storage/ Backup Setting:

In case of a temporary problem with the online "Network Storage" access, like router down or network down or WAN down or storage server down, ASI-16 will temporarily store JPG's within the imager. Later on, as soon as the "Network Storage" is back online for a reasonable time, ASI-16 will transfer temporarily stored images to the network storage.

The low-priority process of sending "backup images" will be merged into the - more important - high-priority process of capturing and sending "new images". Therefore, sending all backup images may take some time, depending on quantity. - Multiple connection breakdowns during recovery process may eventually cause loss of images.





"Backup delay": Initially data are stored in a non-remanent RAM memory.
After the delay time data are moved to a remanent CF-memory.
In case of a power-down within this period RAM data will be lost.

"Maximum load": Usually all data, even if marked as transferred, will be kept;
If this parameter exceeded, transferred data will be deleted;

"Emergency load": If this parameter exceeded, a part of "older data" are deleted,
till the CF memory has reached a free capacity of about 50%.
Means: Some "old data" will be lost, newer data will survive.

Flag "Deactivate backup if shooting interval 1min":

With a shooting interval of e.g. "15 sec" (as needed for FCT-22 "CMV - Cloud Motion Analysis"), the backup function will be less stable, sometimes cause loss of files. - Also, later "pending uploads" may take very long time, with average 3000 JPG (1000 to > 5000) images per each day. - Also, usually such high-speed data are used for "real-time" FCT-22 analysis, only. Therefore, a backup of such data does not make sense. - If "shooting interval" is set to >= 1 min. setting this parameter does not make any difference.

Automated daily "Backup Memory" clean-up process:

Each day at (about) 00:05 local time (about 5 minutes after midnight) ASI-16 runs an automated check and clean-up process, which also includes a check of the "Backup Memory" status. - If "uploaded" or "pending" images counts are found to exceed any pre-defined limits, and/or the check algorithm identified corrupted data, this maintenance algorithm will automatically delete a part or all data on the "Backup Memory".

ASI16 Installer "Full Reset": CF-Memory check and eventual CF-Format:

When using "ASI16-Installer_V24" to perform a "Full Reset", in an initial step the installer will check status and consistency of the "CF Memory", which - also - contain "Backup Memory" data. - When identifying consistency issues, the Installer automatically will perform a CF-Memory FORMAT, which (also) will delete all backup data and log files.

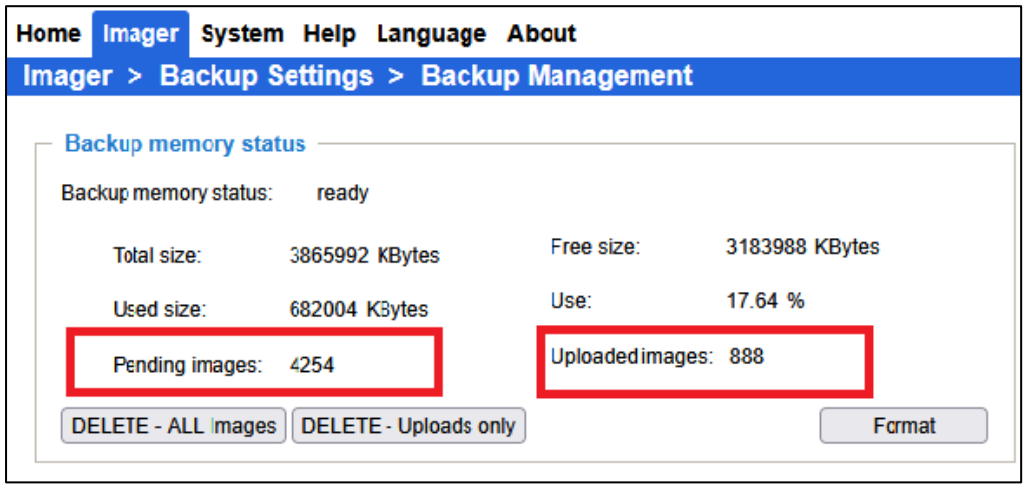
ADVICE NOTICE: Regularly check "Backup Storage" status, about once each month!
Each month, upon regular check, click "DELETE - Uploaded Only".
Each three (3) months, click on "Format" and wait > 10 minutes.
After "Format" completed, power-off, wait >1 min., and power-on

DETAILED EXPLANATION about "Backup Memory" algorithms:

ASI-16 "Backup Memory" function is - temporarily- activated ONLY if an ASI-16 CAN NOT upload an image to an FTP-server. Such happens if the (or both) FTP-server(s) are down, network is down or disconnected, if client's IT department has changed network configurations (router, firewalls, server login), or if FTP log-in data set in CRM and/or locally on ASI-16 are wrong. - Or, if an ASI-16 was connected to AC/DC power-on for more than 10 minutes, but without connecting the ETH adapter/cable to any switch or router.

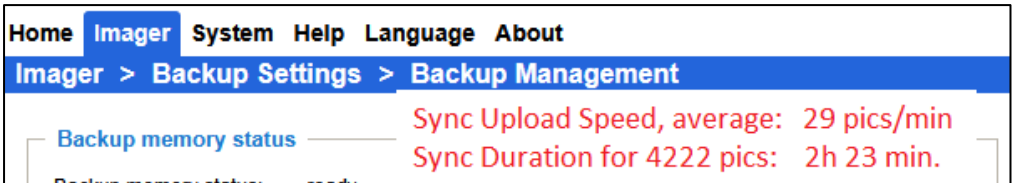
When FTP server got offline, for a period of about 10 minutes files are temporarily stored in the ASI-16 RAM memory. If, within these 10 minutes, FTP server(s) gets online again, all pending files will be uploaded, immediately. In such case you will NOT SEE any change in the ASI-16 "pending" counter display. It will remain to "0". - If, within this 10-minute period, the ASI-16 will be "power-off", then all "pending data" will be lost.

If FTP server is offline for MORE than 10 minutes, then pending images resp. older than 10 minutes are transferred to the "Backup Memory". ONLY THEN the ASI-16 "pending" counter will show an increasing number, increasing with each new JPG shot.



If, later on, FTP gets back online, pending JPG's will be uploaded in packages of about 10-20 files per minute. Therefore, upload of a few thousand images will take multiple hours. - AVOID to have more than 2-3 days of "Pending Images" on your ASI-16!

The "Pending Images" upload runs in a low-priority background process, and starts with the very oldest data and files first. After each file upload the "pending" counter will decrease, and the "uploaded" counter will increase.



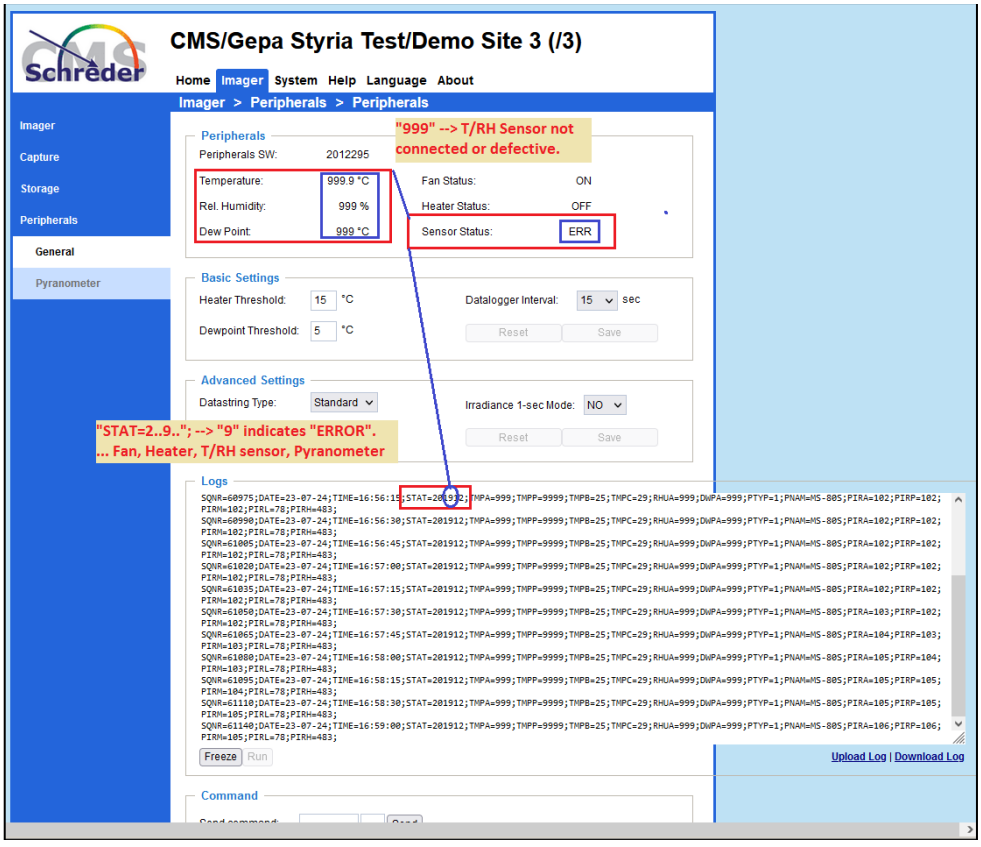
When "Pending Images" upload is completed, "Pending Images" counter will show "0".

All NEW shot files (images) will be uploaded to FTP "immediately", and therefore will NOT affect the counters. After upload of all pending files, the "pending" counter will be "0", and "uploaded" counter will stay as-is. Lateron the counter values will change ONLY, if, maybe some time later, FTP-server(s) may get offline, again.

7.12 Peripherals Controller (PeriCon Settings, Data Logger)

TOP BAR: Imager - SIDE BAR: Peripherals / General:

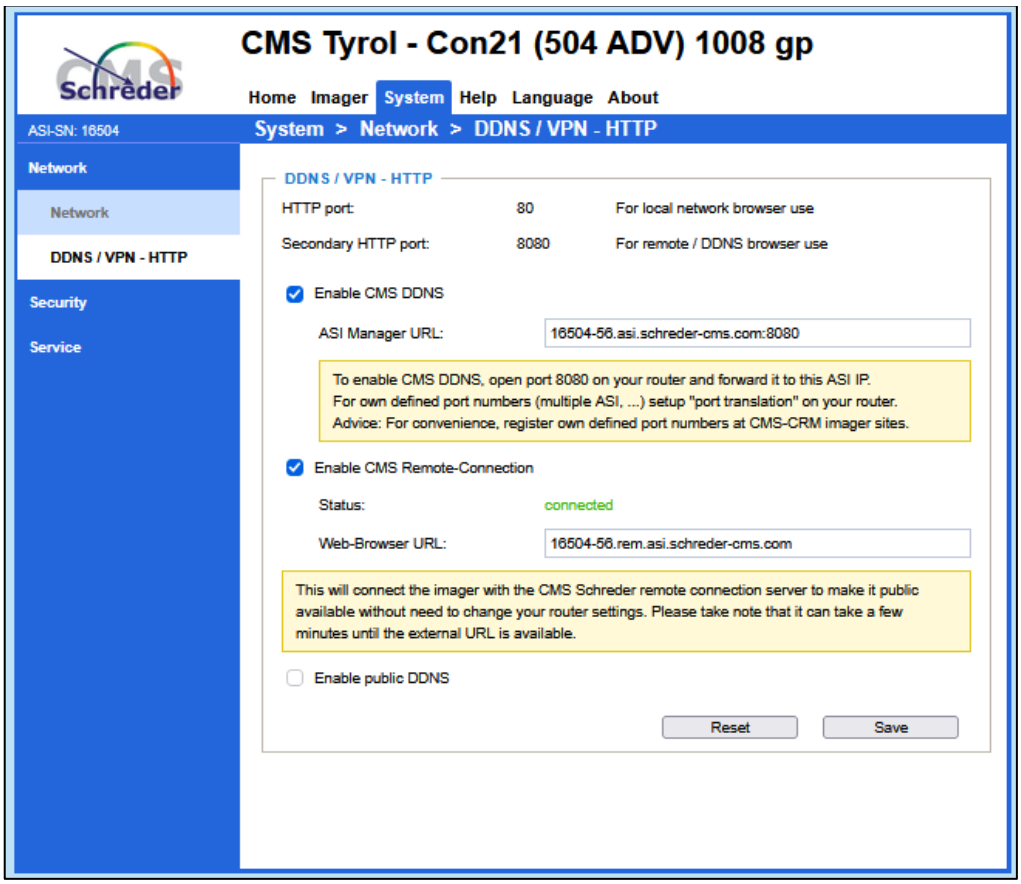
Please refer to Section 9ff, for detailed hardware and software descriptions.
Below screenshot shows a special bug-case scenario (defective T/RH sensor).



7.13 Networking - CMS DDNS (Dynamic Domain-Name) and VPN

TOP BAR: System - SIDE BAR: Network / DDNS - HTTP:

For customers which do not have a fixed (static) WAN IP, or which do not want to formally disclose this fixed static IP, CMS provides a free of charge non-public DDNS-Service. If enabled, ASI-software automatically synchronizes its WAN IP with CMS-DDNS-Server, and CMS-Server will publish the auto-generated URL based on the ASI serial number.



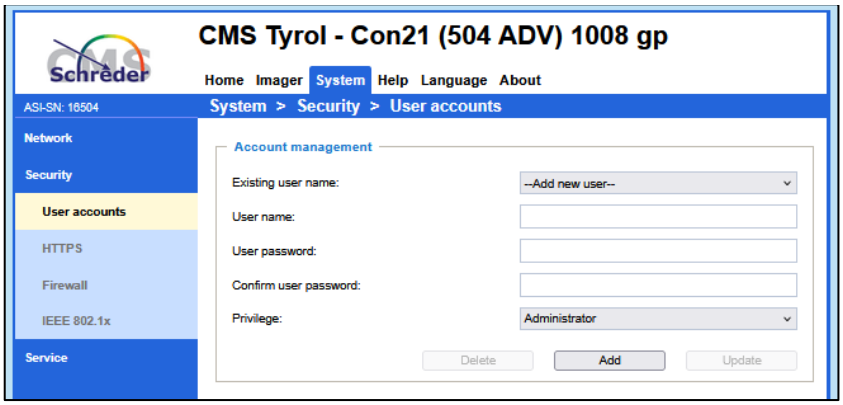
Secondary Port: Must be "8080" if you want to run online-updates via Internet.
For access via Internet, setup a router rule for port forwarding.
In case of multiple ASI within the same LAN, use port translation.

Enable ... DDNS: Please check, if you want to use this CMS-DDNS internet service.
WARNING: If checked, ASI will send messages to the CMS server.

Enable ... Remote: Available with ASI-16 V24 (Serial >= #16501).
When activated, ASI-16 establishes an encrypted tunnel between ASI-Imager and CMS-Schreder CRM-Server. Then a remote user or CMS support can securely access the ASI via the HTTPS-URL as provided and shown in CMS-CRM for this specific ASI imager.

7.14 Security Settings - User Accounts - Name/Password

TOP BAR: System - SIDE BAR: Security/UserAccount:



Each ASI comes with a pre-defined set of User/Password LogIn's, stored in CMS-CRM.

Most important: Your personal CMS "Customer" LI/PW, based on your account ID.
It can be used at any time, at delivery or after any update/restore.

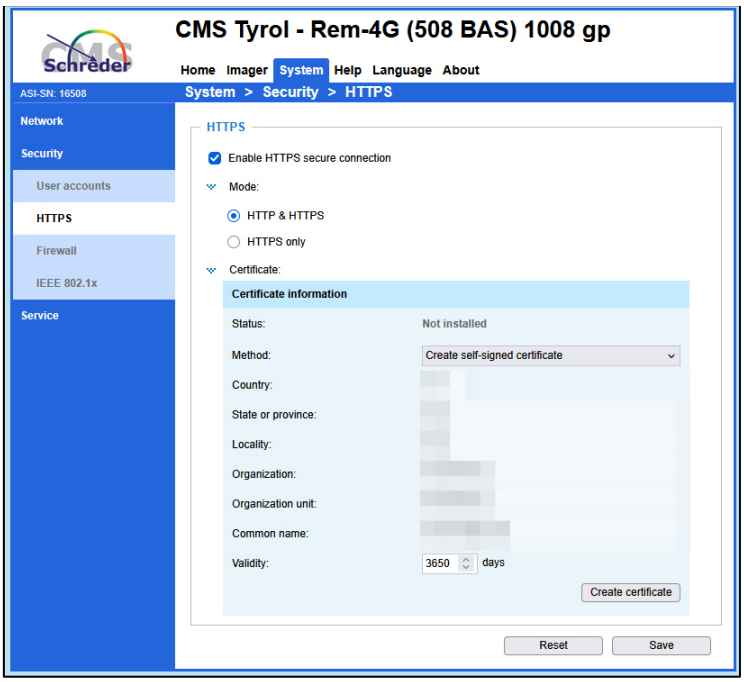
Also, up to you: Your personal LI/PW, as defined by you via the CRM account.
It can be used after entry at CRM and the next update/restore.
Please enter secondary password in CRM, and run "update".

WARNING - Local security Data are lost after each software "FULL RESET".

The ASI Web-GUI allows to (temporarily) enter new users with passwords, and/or allows to (temporarily) change user names and passwords and rights. - ALL THOSE CHANGES WILL BE LOST after any "software restore" and/or "software update", for example by using the ASI16-Installer tool. - Please take carefully note of Network Settings and Security Data before and software update or restore, or total imager reset! - Use CMS-CRM to setup permanently available Username/Password sets.

7.15 Security Settings - HTTPS

TOP BAR: System - SIDE BAR: Security/HTTPS:



To activate HTTP/S connection protocol. Requires a trustful "SSL/TLS certificate".

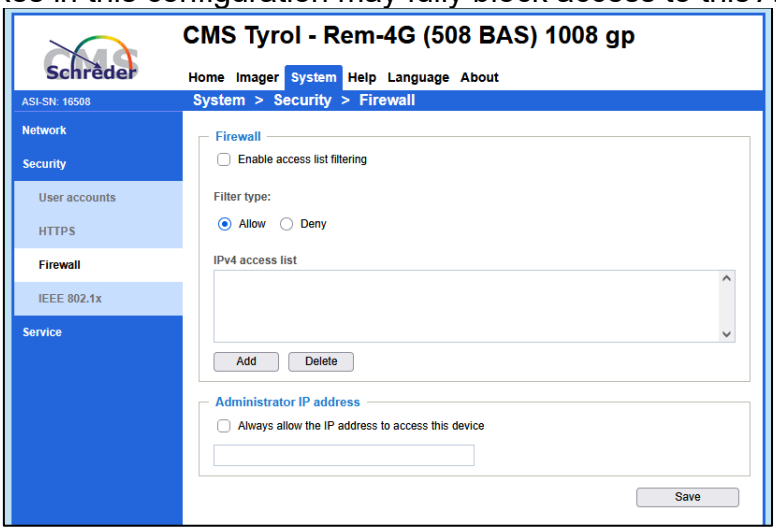
WARNING: Do NOT immediately deactivate standard HTTP protocol, without proper testing of a new HTTPS configuration in parallel. A mistake in the HTTPS configuration will fully block access to the ASI, which then requires a complicated low-level hardware reset!

7.16 Security Settings - Firewall

TOP BAR: System - SIDE BAR: Security/Firewall:

To manage access to this ASI, by blocking or opening specific IP's or IP ranges.

WARNING: Mistakes in this configuration may fully block access to this ASI!



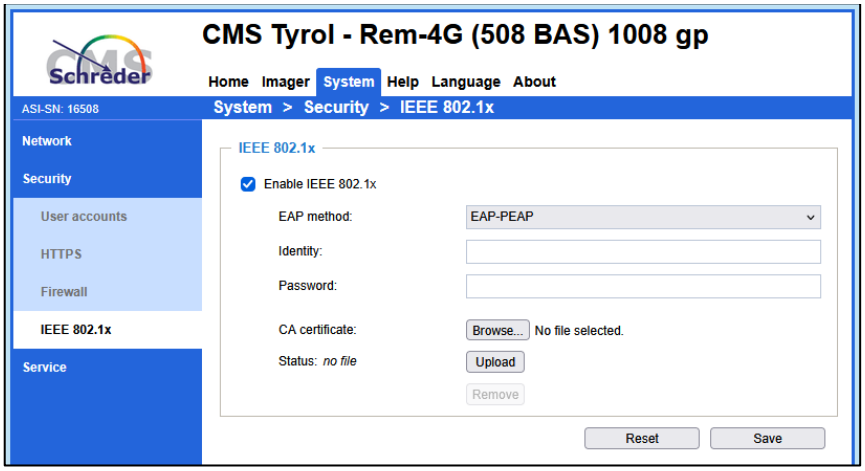
7.17 Security Settings - IEEE 802.1x

TOP BAR: System - SIDE BAR: Security/IEEE 802.1x:

Port-based network access control, ONLY if required by the client network (switch port with 802.1x authentication). Settings: "Enable IEEE 802.1x", EAP method (e.g. EAP-

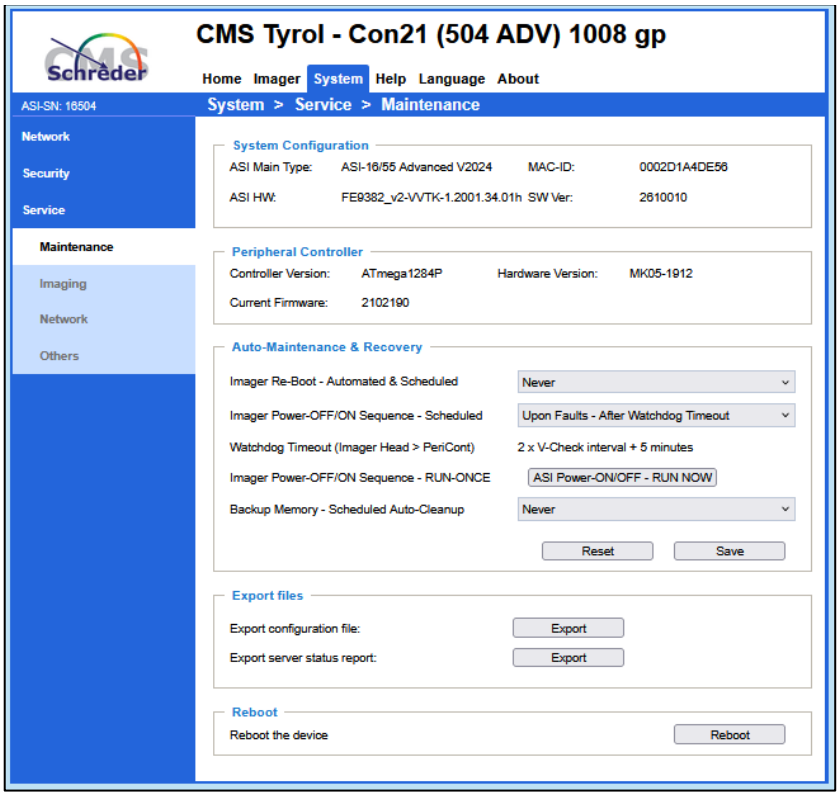
PEAP), Identity, Password, CA certificate (Browse / Upload / Remove). Data to be provided by your IT department.

WARNING: Wrong 802.1x settings block network access to the ASI. Configure and test together with your IT, with local access to the imager. Keep "Enable IEEE 802.1x" unchecked if not required.



7.18 Service - Maintenance, Imaging, Network, Others

TOP BAR: System - SIDE BAR: Service / Maintenance:



System Configuration:	Data about ASI imager head hardware and software.
Peripheral Controller:	Data about Peripheral Controller hardware and software.
Export configuration file:	Generate a backup of a part of local configurations
Export server ... report:	Generate a package to help analyse problems or bugs. Please send this package to CMS support, via Email.

SIDE BAR: Service / Imaging:

Imaging Parameters - Core Settings: WDR Pro, WDR enhanced, Strength, Fixed quality, Framerate, RGB gain, Saturation, Brightness, Contrast, Sharpness, Noise Reduction, Exposure Time and Gain range. Imager Center Calibration (X/Y axis, auto-calibration). DO NOT CHANGE - CMS has calibrated the imager; permanent values are stored in CMS-CRM.

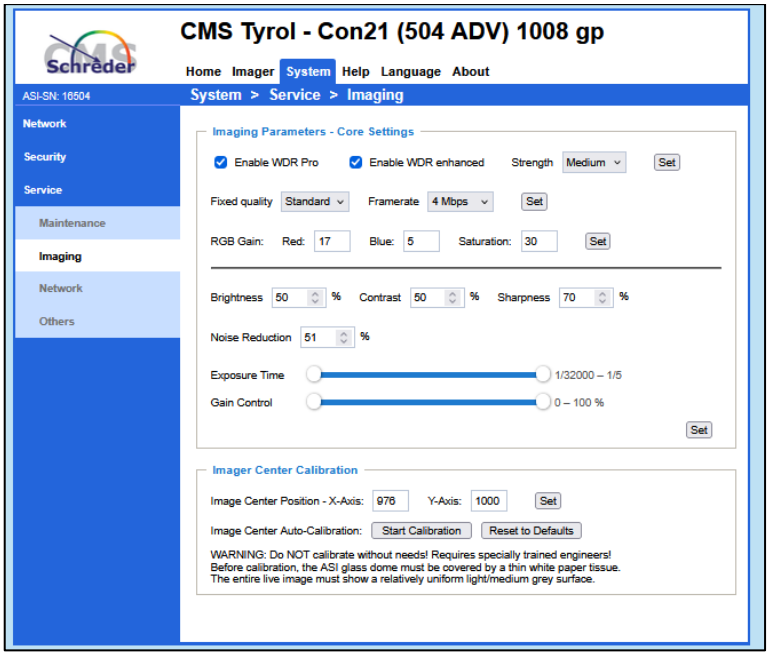


Image Calibration: Tools for testing and calibration by CMS, only!
CMS has already optimized settings before delivery.
Approved data are stored in/ taken from CMS-CRM.

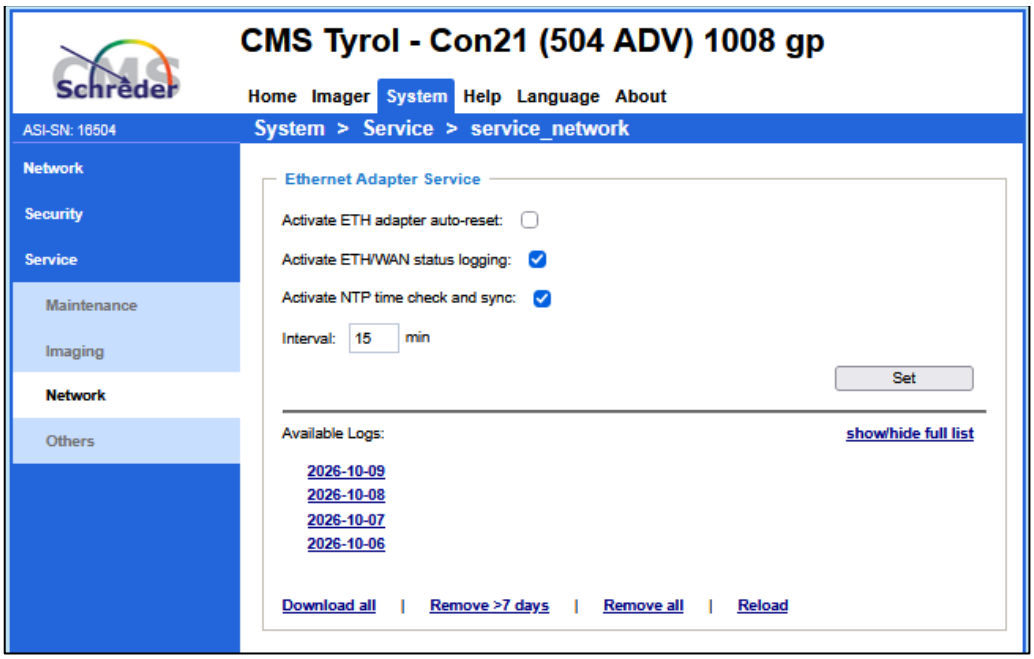
Image Quality: To select JPG compression level and network bandwidth limit.
As "better" setting, as better image quality, but as larger file size.
For FCT-22 cloud analysis software we recommend to use "Good".

SIDE BAR: Service / Network:

Ethernet Adapter Service: Functions to check and to auto-fix some client LAN issues.

... ETH auto-reset: Unmounts and re-mounts the ASI Ethernet interface [15] minutes after FTP-Server or NTP-Server could not be accessed via LAN. Fixes issues where a less stable DHCP server does not re-establish connection after power-down or other network related problems.

... ETH ... logging: Logs LAN/WAN connectivity, to identify issues in client's network.
... NTP ... sync: Check stability of client's NTP server, and re-sync time if necessary.
... Interval: Time Interval for all "Ethernet Adapter Services" and log entries.
... Available logs: To download and/or delete one or more "ETH Service" log files.

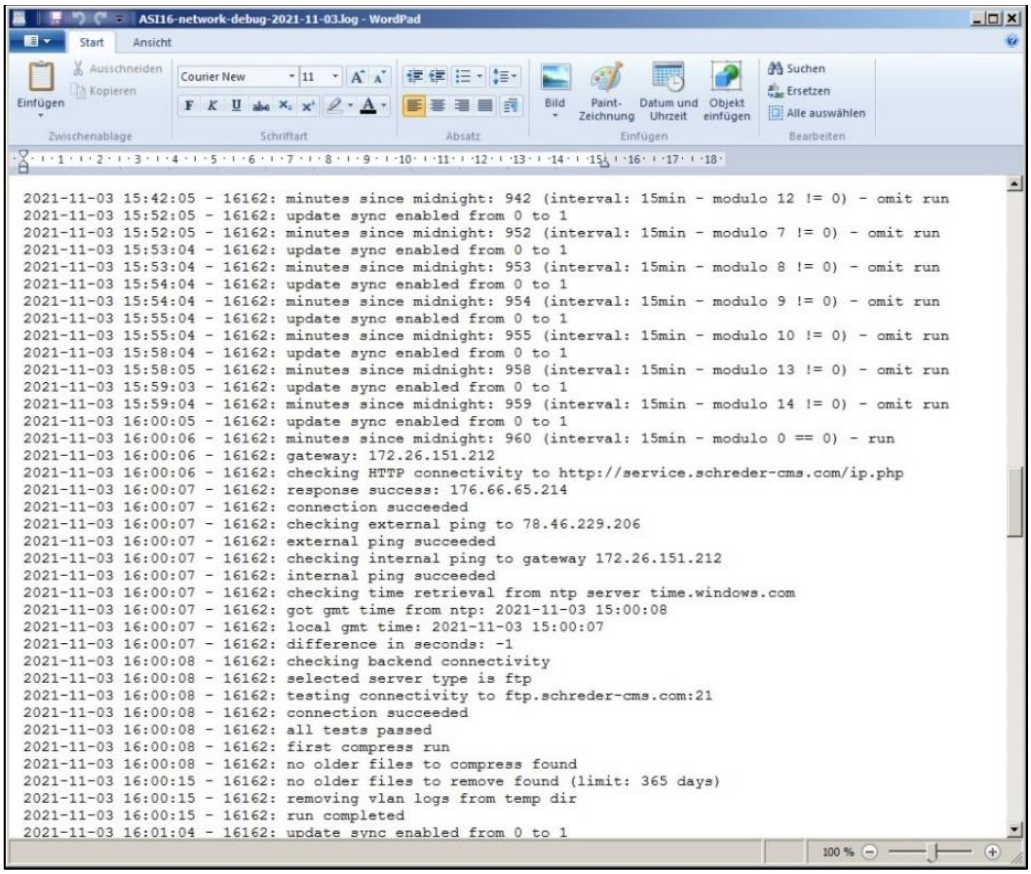


SIDE BAR: Service / Maintenance:

Reboot: To reboot the ASI imager. - May take up to 3 minutes.

==========

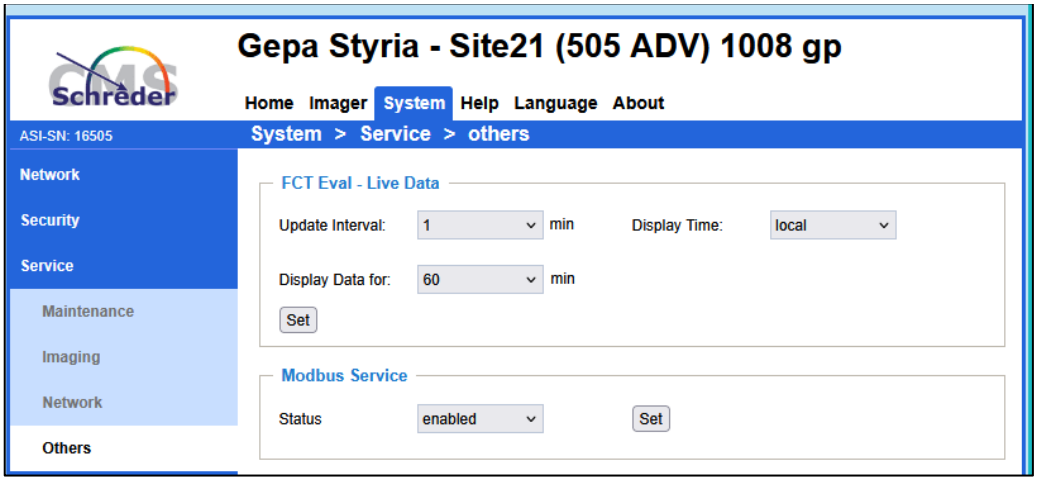
Example of "Ethernet Adapter Service" log file:



SIDE BAR: Service / Others:

FCT Eval - Live Data: To display live data of "FCT-22 Cloud Analysis SW".
Requires the FCT-22 software to run in "Automatic Mode".
Update Interval: Interval [min] for reading the FCT-22 results file (CRM: "Status/Interval", "disabled" = off)
Display Time: Display timestamp in local time or in UTC/GMT
Display Data for: Time period to hold ("freeze") display data.

Modbus Service: Status enabled / disabled - Modbus-TCP interface, see § 8.5.
(Permanent setting: CMS-CRM > Network > "Modbus via TCP".)



7.19 Modbus-TCP Interface - Data Read-Out for PLC / SCADA

Modbus-TCP server (TCP port 502) for PLC / SCADA systems and data loggers.
For details see § 8.5.

8 On-Board Cloudiness Evaluation (FCS-26) Modbus-TCP Interface for Sensor Data

Since SW 2610010 the ASI-16 V24 imager does not only capture images: it evaluates the cloudiness on board (FCS-26) and provides its data to other systems via Modbus-TCP. This chapter describes both functions, from the configuration in CMS-CRM to the results.

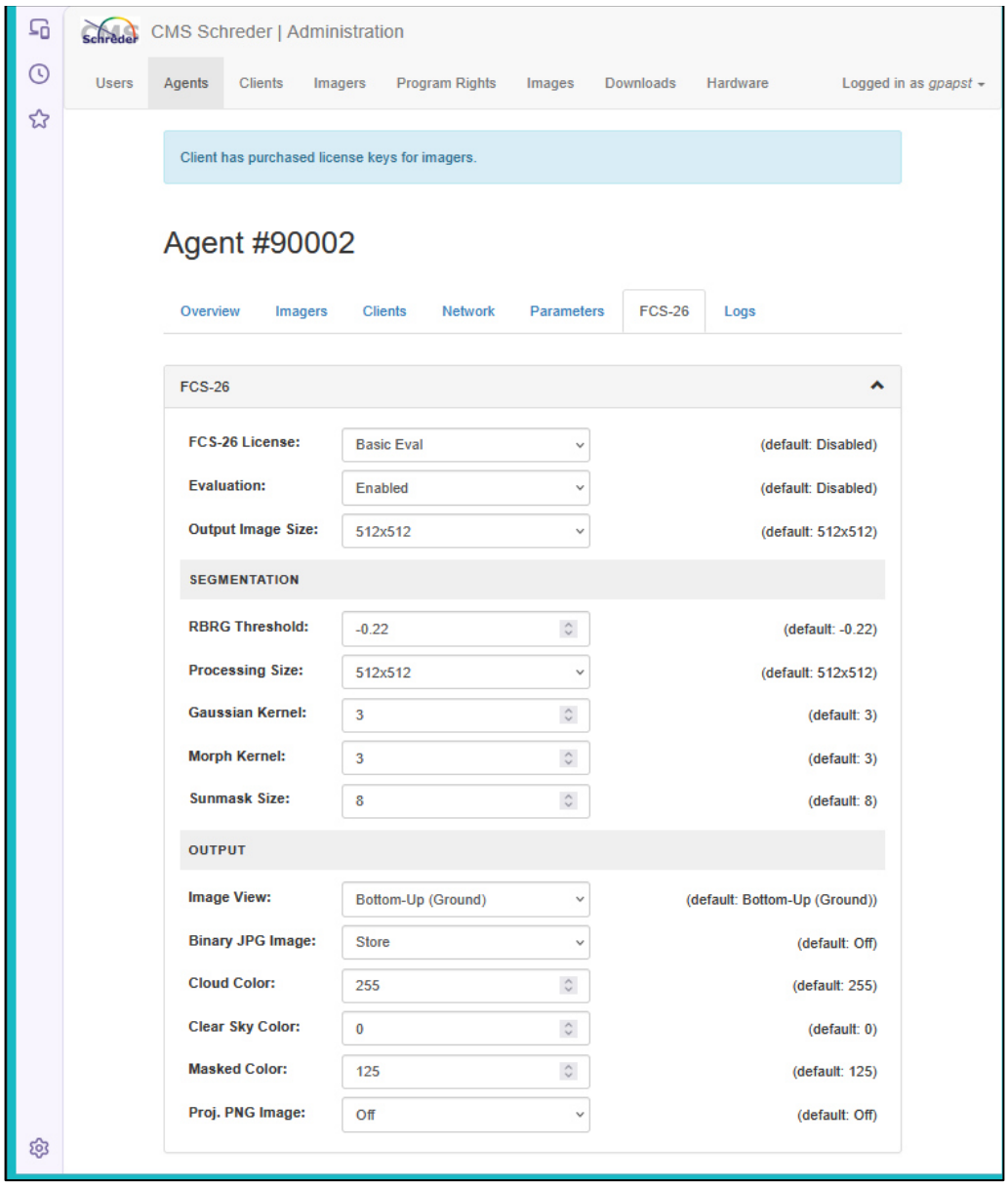
8.1 Overview

FCS-26:	"FindClouds Simple" - software option (licence set by CMS). Evaluates each captured JPG image on the imager and calculates the cloud fraction. Results: ASI home page, JPG EXIF data, data file "fcsdata", binary cloud image, Modbus register "Cloudiness" (see § 8.4).
Modbus-TCP:	Modbus-TCP server on the imager (TCP port 502). PLCs, SCADA systems and data loggers read site data, capture time, sensor data (temperature, humidity, irradiance) and the FCS-26 cloudiness (see § 8.5).
Configuration:	Both functions are configured in CMS-CRM and transferred to the imager with the ASI16-Installer ("Configuration Data Update" or "Full Reset", see § 6.4). The ASI Web-GUI is used to check the settings.
FCT-22:	For detailed cloud analysis (cloud density, cloud base height, cloud movement) use the FCT-22 cloud analysis software (see § 7.5).

8.2 FCS-26 Configuration in CMS-CRM

8.2.1 Client Defaults (My Data > FCS-26)

Tab "FCS-26" defines the default parameters of the on-board cloudiness evaluation FCS-26 ("FindClouds Simple", see § 8.3) for all imagers of this client. The evaluation mask (orientation, zenith, horizon) is imager-specific and is set on the imager page only (see § 8.2.2).

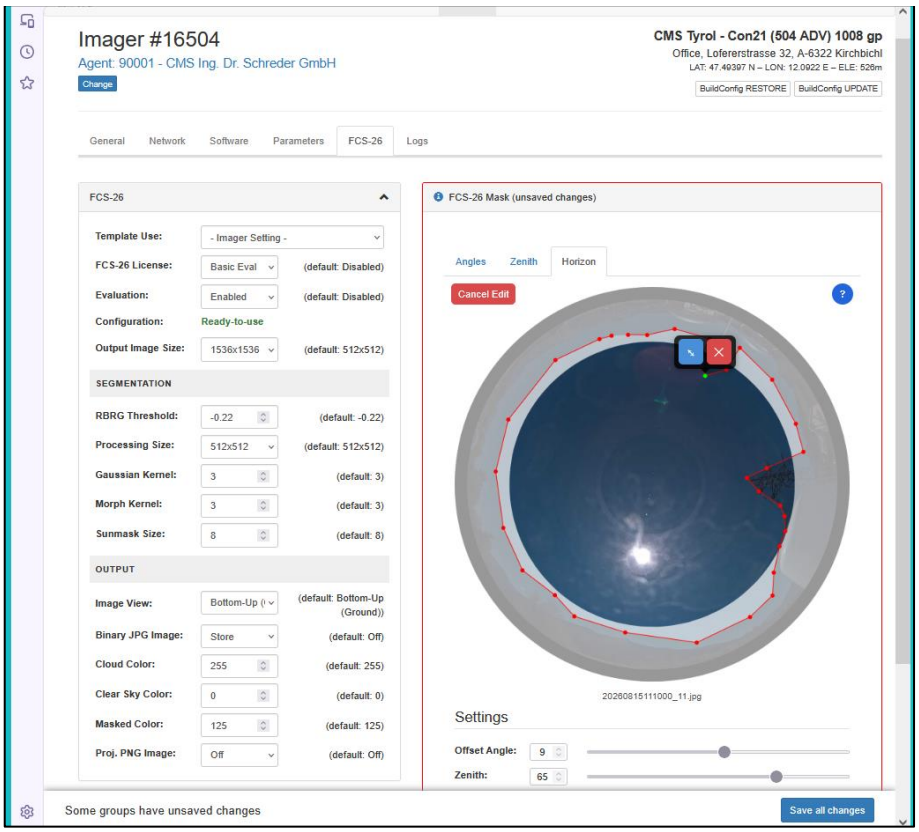


FCS-26 License: Licence status (e.g. "Basic Eval"); set by CMS.
Evaluation: Enabled / Disabled.
Output Image Size: Size of the binary result image (e.g. 512x512, 1536x1536).
Segmentation: RBRG Threshold, Processing Size, Gaussian Kernel, Morph Kernel, "Sunmask" Size - DO NOT CHANGE without advice of CMS.
Output: Image View (Bottom-Up (Ground)), Binary JPG Image (Store/Off), grey values for Cloud (255), Clear Sky (0), Masked (125), Proj. PNG Image.

8.2.2 Imager Parameters and Evaluation Mask (Imagers > FCS-26)

Tab "FCS-26" of the imager: "Template Use" = "- Client Default -" (client values, see § 8.2.1) or "- Imager Setting -" (individual parameters). "Configuration: Ready-to-use" shows that the evaluation is configured on this imager. The evaluation mask is set here, for each imager individually.

Horizon mask editing (red polygon; "Cancel Edit" / "Save all changes"):



FCS-26 Mask - tabs "Angles", "Zenith", "Horizon":

Angles: Offset Angle [°] = rotation between image "north" and true north (orientation of the ASI).
Zenith: Maximum zenith angle [°] to be evaluated (default 65°); the outer image ring is masked.
Horizon: Polygon mask to exclude obstacles (buildings, masts, trees). Click "Change image" to load a sample image of this imager, edit the polygon, then "Save all changes".

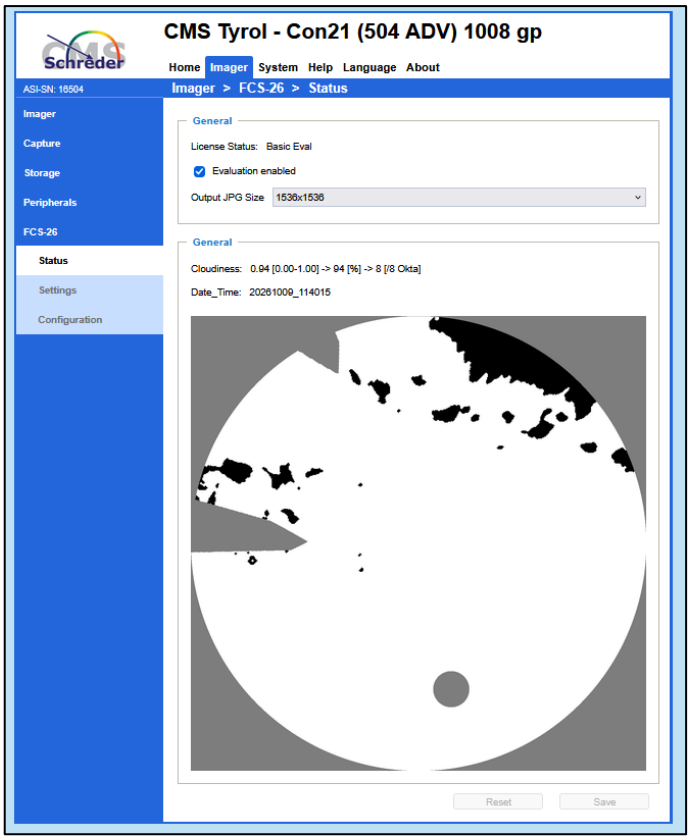
8.3 FCS-26 in the ASI Web-GUI

TOP BAR: Imager - SIDE BAR: FCS-26 / Status, Settings, Configuration:

FCS-26 ("FindClouds Simple") is a software option running directly on the ASI-16 imager. It evaluates each captured JPG image and calculates the cloudiness (0.00-1.00, %, okta). No separate PC is needed. For cloud motion (CMV), cloud base height (CBH) and extended analysis use FCT-22 on a Windows PC. Permanent settings MUST be made in CMS-CRM (Imagers > FCS-26, see § 8.2.2) and transferred by "Configuration Data Update".

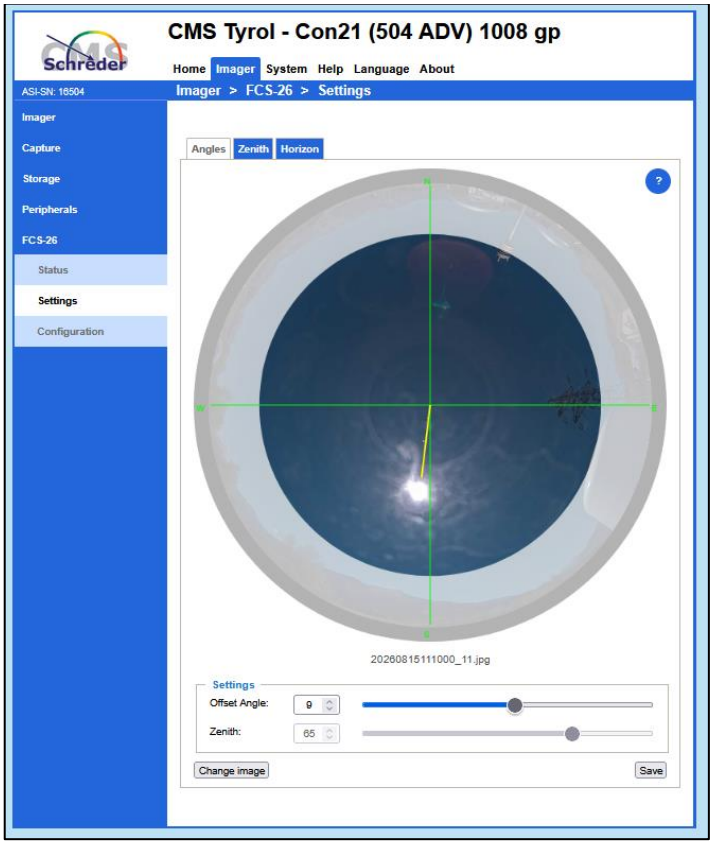
FCS-26 / Status:

License Status: FCS-26 licence (e.g. "Basic Eval").
Evaluation enabled: Switches the on-board evaluation on/off.
Output JPG Size: Size of the binary result image.
Cloudiness: Result, e.g. "0.79 [0.00-1.00] -> 79 [%] -> 6 [/8 Okta]".
Date_Time: Time stamp of the evaluated image (UTC, as in the JPG file name).
Result image: white = cloud; black = clear sky; grey = masked (horizon, sun mask).



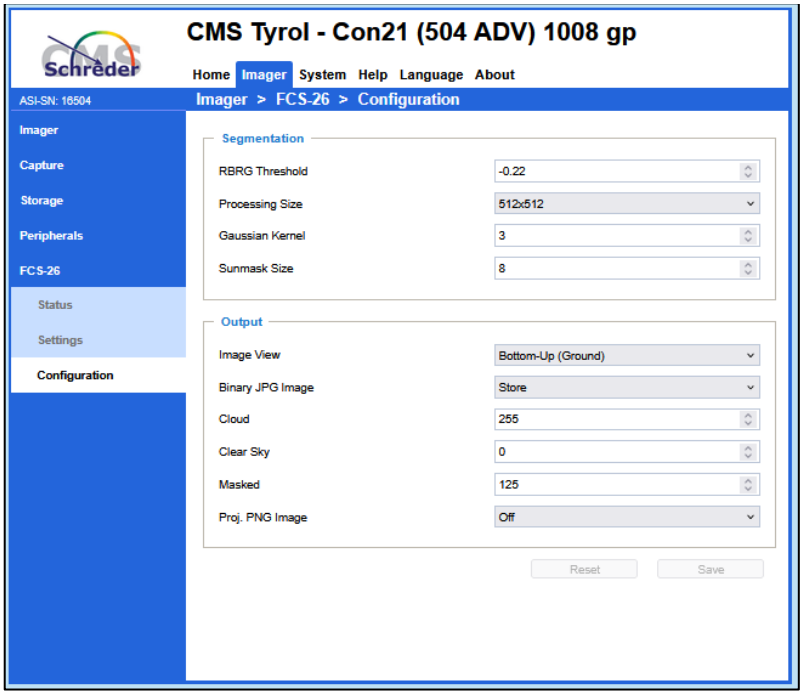
FCS-26 / Settings (evaluation mask):

Tabs "Angles", "Zenith", "Horizon" with "Offset Angle" and "Zenith" - same function as in CMS-CRM (§ 8.2.2). The "?" button opens a help text.



FCS-26 / Configuration:

Segmentation (RBRG Threshold, Processing Size, Gaussian Kernel, Sunmask Size) and Output parameters (Image View, Binary JPG Image, grey values Cloud / Clear Sky / Masked, Proj. PNG Image). Keep CMS defaults unless advised by CMS support.



8.4 FCS-26 Results and Data Files

Results: The FCS-26 cloudiness is shown on the home page ("FCS-26 Cloudiness"), stored in the JPG EXIF data and available via Modbus-TCP (register "Cloudiness", see § 8.5). In addition, a daily file "fcsdata_<SN>_<yyyymmdd>.csv" (one line per image: site, date/time (UTC), file name, peripheral data and cloud fraction FCLOU 0-1) and - if "Binary JPG Image = Store" - the binary result image ("..._binary.png") are uploaded with the JPG images into the day folder of the data storage server.

Format of "fcsdata_<SN>_<yyyymmdd>.csv": one line per evaluated image, "key=value;" pairs, no header line. Example (ASI 16505, 2026-10-10):

LAT=46.8805;LON=15.4193;ELE=382;DATE=26-10-10;TIME=06:00:00;ASISN=16505;FILE=20261010060000_11.jpg;STAT=201222;TMPA=8;TMPP=87;RHUA=92;PTYP=1;PIRA=27;FCLOU=0.10

Key	Content	Unit / format
LAT, LON, ELE	Site coordinates (CMS-CRM / GUI)	deg, deg, m
DATE, TIME	Capture time of the image = file name time, UTC	yy-mm-dd, hh:mm:ss
ASISN	ASI serial number	-
FILE	Evaluated JPG file	yyyymmddhhmmss_nn.jpg (UTC)
STAT	PeriCont hardware status flags (see § 9.5)	mlkjih
TMPA, TMPP	Outdoor temperature (external T/RH sensor)	°C (integer), 0.1 °C
RHUA	Outdoor relative humidity	%
PTYP	Pyranometer type code	-
PIRA	Irradiance at capture time (pyranometer option)	W/m²
FCLOU	FCS-26 cloud fraction	0.00 - 1.00

NOTICE: Time base - JPG file names and fcsdata DATE/TIME are UTC; the peridata file (§ 9.5) uses the local ASI time.

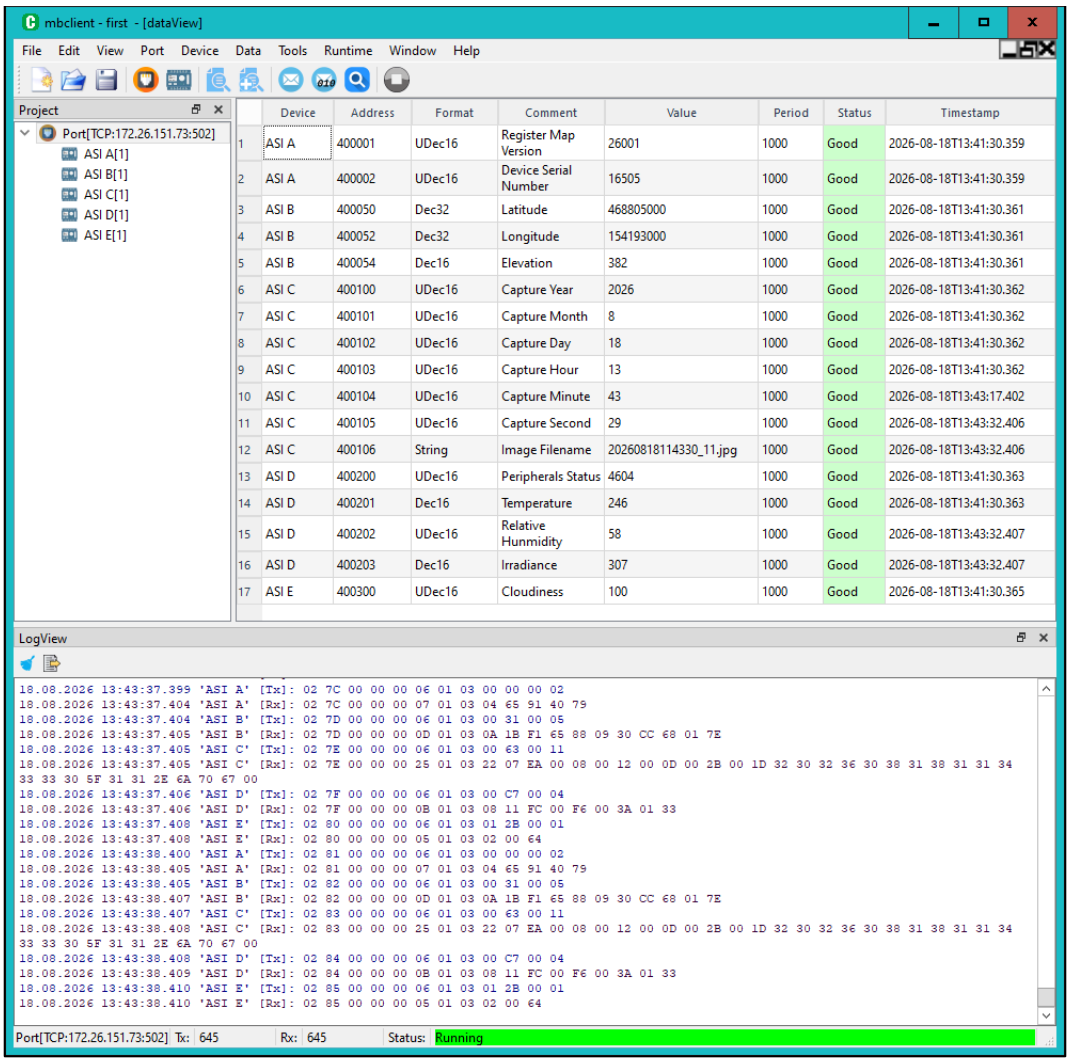
8.5 Modbus-TCP Interface - Data Read-Out for PLC / SCADA

ASI-16 V24 (SW 2610010 and later) provides a Modbus-TCP server (TCP port 502). A PLC, SCADA or data logger can read the site data, the latest capture time and file name, the peripheral data (temperature, humidity, irradiance) and the FCS-26 cloudiness.

Activation: CMS-CRM > (My Data or Imagers) > Network > "Modbus via TCP": Modbus Status = Enabled;
then ASI16-Installer "Configuration Data Update". Local status: System > Service > Others.
Addressing: Holding registers, 1-based addresses (Modbus PDU offset = address - 1); big-endian; for 32-bit values the most significant word is at the lower address.
Scaling: Real value = raw value x scaling factor.

Address	Description	Type / Length	Scaling / Unit
1	Register Map Version	UINT16	- (e.g. 26001)
2	Device Serial Number	UINT16	-
50	Latitude	INT32 (2 reg.)	1e-7 deg
52	Longitude	INT32 (2 reg.)	1e-7 deg
54	Elevation	INT16	m
100-105	Capture Year, Month, Day, Hour, Minute, Second	UINT16 each	-
106	Image Filename	ASCII, 21 chars (9 reg.)	-
200	Peripherals Status	UINT16	-
201	Temperature	INT16	0.1 °C
202	Relative Humidity	UINT16	%
203	Irradiance	INT16	W/m²
300	Cloudiness (FCS-26)	UINT16	0.01 (0-100 = 0.00-1.00)

Example: read-out with a Modbus client tool (address 400001 = holding register 1):


mbclient - first - [dataView]
File Edit View Port Device Data Tools Runtime Window Help
Project
Port[TCP:172.26.151.73:502]
ASI A[1]
ASI B[1]
ASI C[1]
ASI D[1]
ASI E[1]
Device Address Format Comment Value Period Status Timestamp
1 ASI A 400001 UDec16 Register Map Version 26001 1000 Good 2026-08-18T13:41:30.359
2 ASI A 400002 UDec16 Device Serial Number 16505 1000 Good 2026-08-18T13:41:30.359
3 ASI B 400050 Dec32 Latitude 468805000 1000 Good 2026-08-18T13:41:30.361
4 ASI B 400052 Dec32 Longitude 154193000 1000 Good 2026-08-18T13:41:30.361
5 ASI B 400054 Dec16 Elevation 382 1000 Good 2026-08-18T13:41:30.361
6 ASI C 400100 UDec16 Capture Year 2026 1000 Good 2026-08-18T13:41:30.362
7 ASI C 400101 UDec16 Capture Month 8 1000 Good 2026-08-18T13:41:30.362
8 ASI C 400102 UDec16 Capture Day 18 1000 Good 2026-08-18T13:41:30.362
9 ASI C 400103 UDec16 Capture Hour 13 1000 Good 2026-08-18T13:41:30.362
10 ASI C 400104 UDec16 Capture Minute 43 1000 Good 2026-08-18T13:43:17.402
11 ASI C 400105 UDec16 Capture Second 29 1000 Good 2026-08-18T13:43:32.406
12 ASI C 400106 String Image Filename 20260818114330_11.jpg 1000 Good 2026-08-18T13:43:32.406
13 ASI D 400200 UDec16 Peripherals Status 4604 1000 Good 2026-08-18T13:41:30.363
14 ASI D 400201 Dec16 Temperature 246 1000 Good 2026-08-18T13:41:30.363
15 ASI D 400202 UDec16 Relative Hunmidity 58 1000 Good 2026-08-18T13:43:32.407
16 ASI D 400203 Dec16 Irradiance 307 1000 Good 2026-08-18T13:43:32.407
17 ASI E 400300 UDec16 Cloudiness 100 1000 Good 2026-08-18T13:41:30.365
LogView
18.08.2026 13:43:37.399 'ASI A' [Tx]: 02 7C 00 00 00 06 01 03 00 00 00 02
18.08.2026 13:43:37.404 'ASI A' [Rx]: 02 7C 00 00 00 07 01 03 04 65 91 40 79
18.08.2026 13:43:37.404 'ASI B' [Tx]: 02 7D 00 00 00 06 01 03 00 31 00 05
18.08.2026 13:43:37.405 'ASI B' [Rx]: 02 7D 00 00 00 0D 01 03 0A 1B F1 65 88 09 30 CC 68 01 7E
18.08.2026 13:43:37.405 'ASI C' [Tx]: 02 7E 00 00 00 06 01 03 00 63 00 11
18.08.2026 13:43:37.405 'ASI C' [Rx]: 02 7E 00 00 00 25 01 03 22 07 EA 00 08 00 12 00 0D 00 2B 00 1D 32 30 32 36 30 38 31 38 31 31 34 33 33 30 5F 31 31 2E 6A 70 67 00
18.08.2026 13:43:37.406 'ASI D' [Tx]: 02 7F 00 00 00 06 01 03 00 C7 00 04
18.08.2026 13:43:37.406 'ASI D' [Rx]: 02 7F 00 00 00 0B 01 03 08 11 FC 00 F6 00 3A 01 33
18.08.2026 13:43:37.408 'ASI E' [Tx]: 02 80 00 00 00 06 01 03 01 2B 00 01
18.08.2026 13:43:37.408 'ASI E' [Rx]: 02 80 00 00 00 05 01 03 02 00 64
18.08.2026 13:43:38.400 'ASI A' [Tx]: 02 81 00 00 00 06 01 03 00 00 00 02
18.08.2026 13:43:38.405 'ASI A' [Rx]: 02 81 00 00 00 07 01 03 04 65 91 40 79
18.08.2026 13:43:38.405 'ASI B' [Tx]: 02 82 00 00 00 06 01 03 00 31 00 05
18.08.2026 13:43:38.407 'ASI B' [Rx]: 02 82 00 00 00 0D 01 03 0A 1B F1 65 88 09 30 CC 68 01 7E
18.08.2026 13:43:38.407 'ASI C' [Tx]: 02 83 00 00 00 06 01 03 00 63 00 11
18.08.2026 13:43:38.408 'ASI C' [Rx]: 02 83 00 00 00 25 01 03 22 07 EA 00 08 00 12 00 0D 00 2B 00 1D 32 30 32 36 30 38 31 38 31 31 34 33 33 30 5F 31 31 2E 6A 70 67 00
18.08.2026 13:43:38.408 'ASI D' [Tx]: 02 84 00 00 00 06 01 03 00 C7 00 04
18.08.2026 13:43:38.409 'ASI D' [Rx]: 02 84 00 00 00 0B 01 03 08 11 FC 00 F6 00 3A 01 33
18.08.2026 13:43:38.410 'ASI E' [Tx]: 02 85 00 00 00 06 01 03 01 2B 00 01
18.08.2026 13:43:38.410 'ASI E' [Rx]: 02 85 00 00 00 05 01 03 02 00 64
Port[TCP:172.26.151.73:502] Tx: 645 Rx: 645 Status: Running

9 Peripherals Controller, Hardware / Software

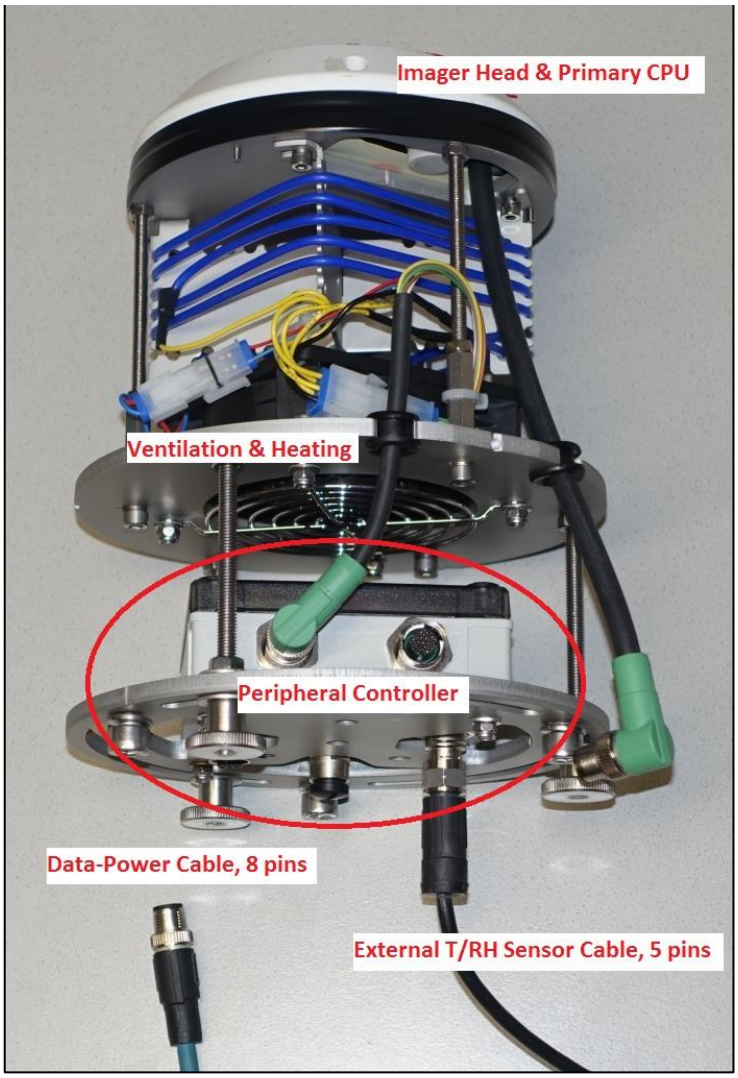
ASI-16/5n (Advanced) incorporates a secondary "Peripherals Controller" (PeriCont), physically and logically separated from the "Main Controller" in the imager camera head.

PeriCont Hardware is mounted in a separate box at the bottom mounting plate.

PeriCont-V2 includes additional optional features, like additional external and internal sensors, advanced heating and power management, and UC-RTC-based timing. For high precision T/RH measurements, TRH sensor is connected via a 2m cable and mounted into a DM 12 mm stainless steel tube to allow installation into a "Radiation Shield". TRH sensor MUST be connected in any case, as otherwise the heating system will NOT work, and the ASI GUI will indicate a TRH sensor ERROR!

9.1 PeriCont - Hardware and Sensors - Summary

The "Peripheral Controller" with its independent CPU manages power- and data-distribution, multiple internal and external sensors, and controls and supervises functionality of forced ventilation (fan) and air flow heating. - An internal multi-colour LED indicates the status of all configured components connected to the PeriCont.



9.2 PeriCont - Hardware LED Status Signals

The multi-colour LED is mounted inside the PeriCont box, and is visible from all sides through the semi-transparent cover of the box. - In bright sunlight it might be necessary to look relatively close to the ASI-16 imager.

During "boot sequence" long signals indicate three steps. No signal or hanging in one step indicates "no power", or a defect in hardware, or a corrupted firmware. - Reboots will happen three times after "power-on", after ASI imager reboot, or during and after ASI software updates.

After "boot " the status of internal and external modules is indicated by a SEQUENCE of long and short signals in different colours, which is repeated each about 30 seconds.

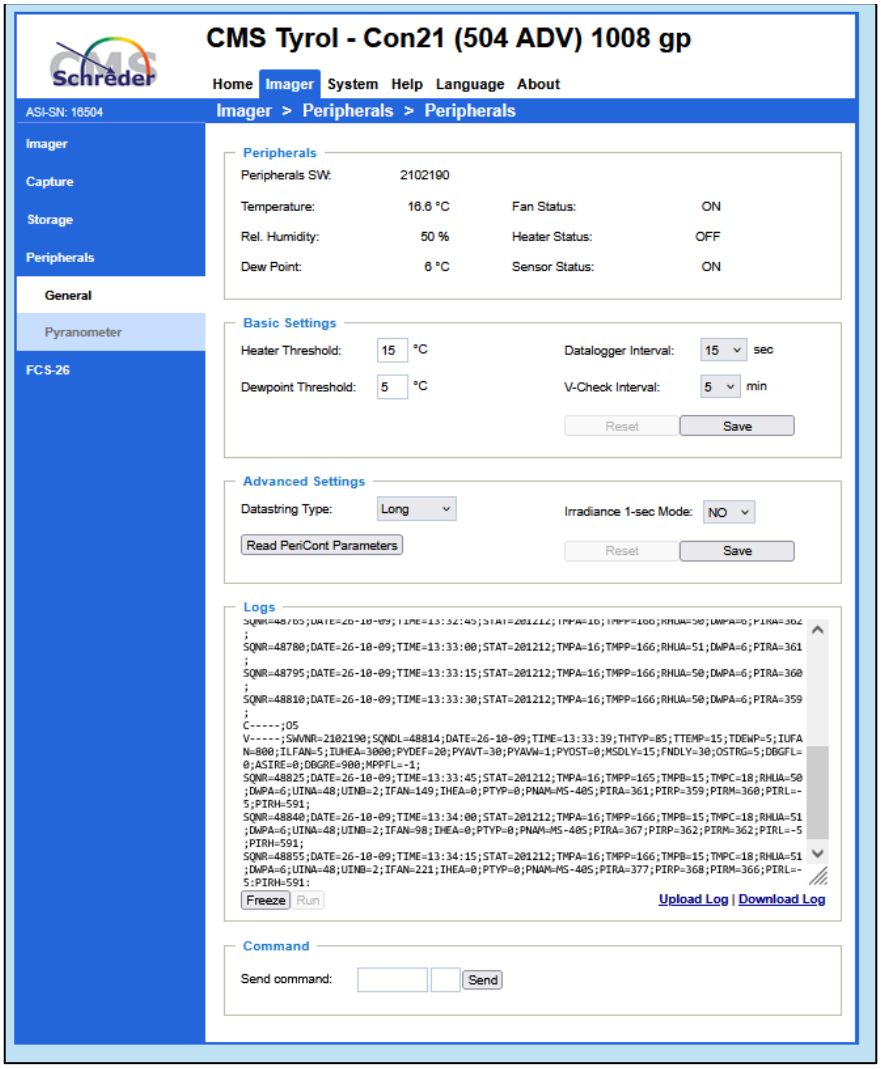
Step	Time	Colour	Meaning
Boot 1	long	White	Pre-boot check sequence.
Boot 2	long	Yellow	Post-boot: Internal hardware checks.
Boot 3	long	Green	Post-boot: Driver connectivity check.
Pause	long	dark	.----------
Run 1	long	Green	Summary: All HW modules and sensors OK
		Red	Summary: Some HW Module(s) on ERROR
Run 2	short	Blue	Ventilation (Fan): Running, OK.
		Red	Ventilation (Fan): Blocked, defective, ERR.
Run 3	short	Blue	Heating: OK, but now heating OFF.
		Yellow	Heating: Heating switched on, ON.
		Red	Heating: Defective, not connected, ERR.
Run 4	short	Green	T/RH Sensor: Connected, working, OK.
		Red	T/RH Sensor: Not connected, defective.
Run 5	short	White	Pyranometer: Not configured (CRM, ASI).
		Green	Pyranometer: Connected, working, OK
		Red	Pyrano: Not connected, defective, ERR.
Pause	long	Dark	.----------
Repeat			Repeat sequence at step "Run 1".

Watch the LED signal especially during and after (outdoor) installation.

Heating LED "White" = heater energy saving active (status value 5 = "SAV", see § 9.5).

9.3 PeriCont - ASI GUI - General Settings

TOP BAR: Imager - SIDE BAR: Peripherals / General:



Peripherals: Data as delivered by the PeriCont. - Please press [F5] for refresh.
The same data also are displayed at the Imager homepage.

Temperature/ Rel. Humidity/ Dew Point: Data from the environmental T/RH sensor.

NOTICE: For high-quality temperature and humidity data the external T/RH sensor MUST be installed into a professional "Radiation Shield"!

Fan/ Heater/ Sensor Status: OFF / ON / ERR (ERR = Error >> blocked, broken)

Settings: To manage "ON/OFF" status of heater, and performance of datalogger.

Heater Threshold: Minimum outdoor temperature, to switch on/off the heater.

Dewpoint Thr...: Minimum dew point deviation, to switch on/off the heater.

Datalogger Int...: Time interval to request PeriCont live data updates from PeriCont.

V-Check Interval: Interval [min] for the PeriCont parameter check ("V" string).
Also defines the watchdog timeout: 2 x V-Check interval + 5 min
(see § 4.2.5).

Datastring Type: Amount / variety / length of (system internal) data to be logged.
For debugging, set to "long" and provide the "peridata.csv" file.

Irradiance 1sec ...: To log Pyranometer data (irradiance) once every second.

Button [Save]: To re-transfer configuration data to PeriCont datalogger controller.
Used to transfer NEW settings after having made any changes.
Or to re-transfer settings if PeriCont may have lost some settings.

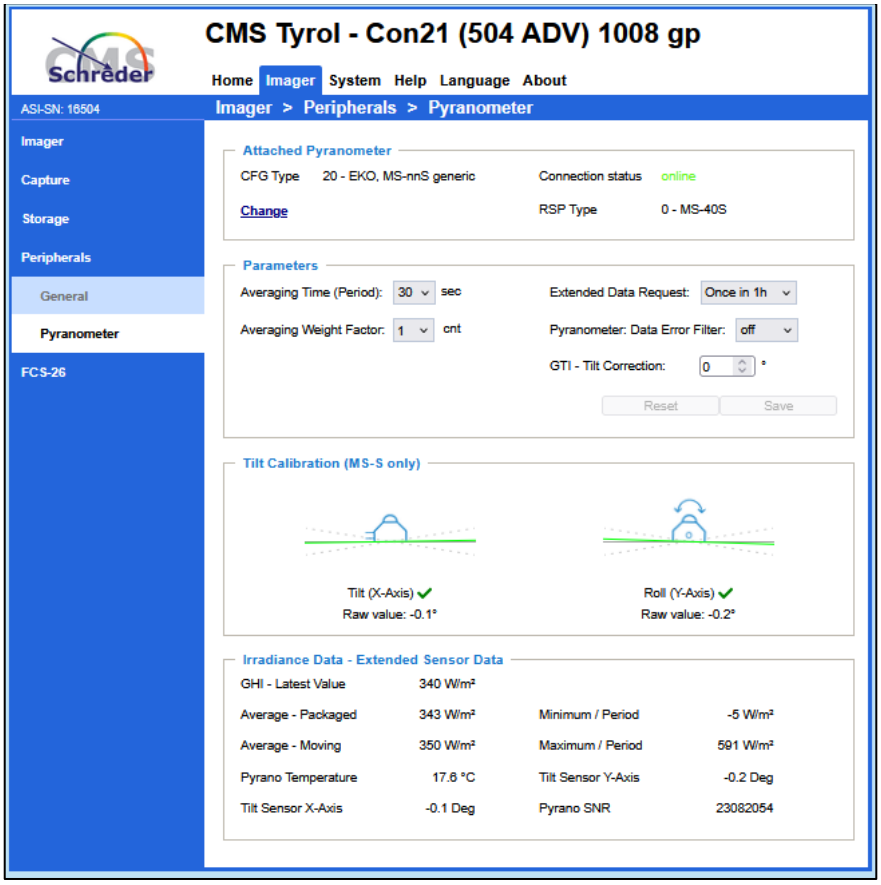
Button [Read PeriCont Parameters] - Click once for one single instant [?] request:
Request PeriCont to respond with a "V---" parameter data string.
"V---" shows all currently set/active PeriCont parameters and flags.

Logs: Current as-is live data as received from or sent to the PeriCont "Data Logger".
All Data are stored in the "peridata.csv" file, once a day, along with images.
Important data are also stored in the JPG image "EXIF" data structure.

Command: To send special and encrypted command to PeriCont;
(Commands and encryption code upon special request).

9.4 PeriCont - ASI GUI - Pyranometer Configuration / Data

TOP BAR: Imager - SIDE BAR: Peripherals / Pyrano:



Attached Pyranometer:

CFG Type: The type of Pyranometer configured at this moment:
RSP Type: RSP Type: Pyranometer type, as reported from device via ModBus.

Change: To change the type of Pyranometer, mainly for trial purpose.
For permanent storage, please also update settings in CRM.
CFG type MUST match with actually installed Pyrano hardware.
After change of setting ASI must be power-OFF for 15 seconds.

Parameters:

Internally, PeriCont collects irradiance data once very second, eve if not sent to the ASI datalogger. Within each "Averaging Period" PeriCont internally calculates averages, minimum and maximum, and sends it to the datlogger within each "looging period".

Averaging Period: Timeframe for averages, minimum and maximum.

Weight Factor: Set a dynamic priority for "newer" data above "older" data.
Applicable for "moving average", only.

Ext Data Requ.: Interval to send less-important data to the datalogger.
E.g. Pyrano serial number, internal temperature and tilt.

Data Error Filter: Suppresses logging of possibly high-frequency received corrupted or irrelevant pyranometer sensor data (on / off).

GTI -Tilt correct.: To adjust tilt calibration for GTI (Global Tilted Irradiance). Frequently used in solar power (PV) applications.

Tilt Calibration: Shows real-time tilt/roll angles (X/Y) of the Pyranometer, to assist mechanical levelling (fine-tuning) of the mounting. Available with EKO MS-S (smart) models only. Levelling should be within +/- 1° in both axes (X/Y).

Irradiance Data - Extended Sensor Data (self-explaining):
Presents values depend on the Pyrano HW model installed.

9.5 Datalogger File - Dataset Codes - Command Codes

ASI-GUI ./Imager/Peripherals/General contains a "Log-Frame" showing the last few minutes of communication between "PeriCont Controller" and "ASI Imager Head".

Entire communication is stored into a "peridata_<SN>_<yyyymmdd>.csv" File, one file per days, sent to the network-storage-place, into corresponding day-date-folders along with JPG images. The file at the network storage place is updated once per hour, a few seconds after the full hour. Because of its special structure, this "Peridata.CSV" cannot be directly used for imports into SQL databases or XLS sheets. - For such use, CMS provides a "PeriData Converter Tool", which can be downloaded from CMS-CRM/Downloads. - This tool automatically generates table-style CSV files. - See Sections below

Description of Dataset Identifiers and Command Codes:

RX: SQNR Dataset: Sequence ID, "PeriCont Controller" --> "Imager Head":

SQNR=57326; Time stamp, seconds after midnight, synced to ASI time;; The timestamp is INVALID for about 3 minutes after reboot (values 99000-99998 until the ASI time synchronisation); after SQNR=86399 follows SQNR=0;

DATE=19-09-01 Real time clock DATE, Format: "yy-mm-dd"
TIME=18.55:44 Real time clock TIME, Format: "hh:mm:ss"

STAT=201222; Hardware status flags; Format "STAT=mlkjih";
h = Fan Status, h= Stat * 1;
i = Heater Status, i= Stat * 10;
j = T/RH Sensor Status, j = Stat * 100;
k = Pyranometer Sensor Status, k =Stat * 1000
l = "0", reserved for future hardware extension;

Z=0: "---", does not exist; LED= "Dark"
Z=1: "OFF", OK but switched off; LED= "Green" or "Blue";
Z=2: "ON", switched on; LED= "Blue" or "Yellow";

Z=9: "ERR", defect (shortcut, blocked, broken ...); LED= "Red";

Additional status values (PeriCont FW 2102190):
Z=5: "SAV", heater energy saving active; LED "White";
Pyranometer (k): 1 = OK; 7 = invalid response (CRC error); 8 = unknown pyranometer; 9 = not connected;
STAT=900000: no communication between ASI and PeriCont.

m = Version of PeriCont Communication Protocol:
1= 2016-01 till 2017-12
2 = 2018-01 till today, including Pyranometer and RTC;

Examples: 202222 = Fan ON, Heater ON, TRH Sensor OK; Pyrano ON/OK;
209212 = Fan ON, Heater OFF, TRH Sensor OK; Pyrano ERROR;
200219 = Fan ERR, Heater OFF, Sensor ON, Pyrano not defined;
200912 = Fan ON, Heater OFF, TRH Sensor defect or not connected;

TMPA=5; Outdoor Temperature, by environmental sensor;
TMPP=50; Outdoor Temperature, by env. sensor, as 0.1°C value;
TMPB=19; Temperature inside the camera (imager head), analog KTY sensor [°C];
TMPC=16; Temperature in the fan/heater compartment, analog KTY sensor [°C];
RHUA=65; Outdoor Relative Humidity, by environmental sensor;
UINA=48; Primary Input Voltage (HPoE line entry point)
IFAN=204; Fan sensing current, Fan is ON (mA);
IHEA=1251; Heater current, Heater is ON (mA);

PI..=654; Pyranometer data, Irradiance in W/m2
+) PIRA=654; Non-averaged value of one second ago measurement;
+) PIRP=654; "Packaged Average" over averaging period;
+) PIRM=654; "Moving Average" over averaging period;
+) PIRL=650; Minimum, lowest value within last averaging period;
+) PIRH=660; Maximum, highest value within last averaging period;

Additional SQNR data (PeriCont FW 2102190; example peridata_16505_20261010.csv, TIME = local ASI time):
DWPA=8; Dew point (simplified, minimum 0 °C), from external T/RH sensor [°C];
UINB=6; Input voltage for the heater coil (with heater load) [V];
PTYP=1; Pyranometer supplier / technology code (1 = EKO);
PNAM=MS-80S; Pyranometer model name (from Modbus data);
PIRL / PIRH; Irradiance minimum / maximum within the last datalogger interval (MSDLY) [W/m²];
Special values (all data): -1 or -4 = no valid value; 9999 or 99999 = sensor defective or not connected.

RX: V----- Parameter Dataset: From "Pericont Controller" to "Imager Head":

SWVNR=160815; Software version of PeriCon Firmware;
TTEMP=15; Threshold temperature for heater control;
TDEWP=5; Threshold dewpoint diff. temperature, heater control;
IUFAN=800; Upper limit (blocked) for fan current (mA);
ILFAN=5; Lower limit (broken) for fan current (mA);
IUHEA=3000; Upper limit (shortcut) for heater current (mA);
MSDLY=15; Message delay, time between messages (sec);
FNDLY=30; Fan delay time, retry to start after "Error" (sec);
SFLAG=30; Status-Flag time, update interval status flags (sec);
OSTRG=3; Output string format; 1=short; 3= standard; 5=long;
DBGRE=0; Debug-Flag, watchdog time; CMS internal use only;
...

Additional V----- parameters (FW 2102190):
SQNDL=2; Sequence counter of the data line (CMS internal);
THTYP=85; T/RH sensor chip type (85 = Sensirion SHT85; 75 = SHT75, PeriCont HW until 2018-06);
IUHEA=3000; Upper limit (short-cut) for heater current (mA);
OSTRG=5; Output string format: 1 = minimum, 3 = standard, 5 = long (housekeeping data);
ASIRE=0; ASI watchdog [s]: automatic ASI power-off/on if no "?" command received (0 = off);

DBGFL, DBGRE: Debug flag and debug watchdog (CMS internal);
MPPFL=-1; Multi-purpose flags, not implemented.

+) PYDEF=15; Pyranometer definition; brand, type, ...;
+) PYAVT=30; Pyrano Averaging Time; Seconds;
+) PYAVW=1; Pyrano Weighting Factor for Moving Average;

RX: P----- Extended pyranometer dataset (pyranometer option, MS-nnS types; sent once after command "P1001",
repeated at the "Ext Data Request" interval, e.g. once per hour):
PSNR=190475032; Pyranometer serial number (from Modbus data);
PTMP=96; Pyranometer internal temperature [0.1 °C];
PRHU=34; Pyranometer internal relative humidity [%];
PSTX=30; PSTY=-8; Pyranometer tilt, X / Y axis [0.1°] (MS-80S).

TX: Command - from "Imager Head" to "PeriCont Controller":

B15 Command to set TTEMP to 15°C;
C5 Command to set TDEWP to 5%;
I15 Command to set MSDLY to 15 seconds;
... Additional commands are hidden (not displayed);

Commands sent by the ASI are logged in the file as "C-----;<command>", e.g.:
? Request V----- parameter dataset (each V-Check interval, e.g. 5 min);
also resets the PeriCont ASI watchdog (ASIRE);
P1001 Request P----- extended pyranometer dataset;
U26-10-10 Date synchronisation of the PeriCont real-time clock (yy-mm-dd).
Other message types: R----- PeriCont reboot message; E----- error message (invalid command or parameter).

+) Available only when having purchased the "Pyranometer Modbus" Option.
Supported: EKO pyranometers with Modbus interface (MS-80S, MS-40S, MS-nnS).

9.6 "PeriDatConv---.jar" - Peripheral Data Converter Tool

Download the "PeriData Converter Tool" from CMS-CRM, download site.

This tool (semi-automatically) converts raw "peridata_<SN>_<yyyymmdd>.csv" files into table-structured "peridata_<SN>_<yyyymmdd>_tab.csv" files. Storage locations for raw data and converted data can be selected in the "Configuration Section". When using multiple storage locations for multiple "sites", the user can create and store multiple "profiles".

The Configurator automatically detects if the "raw data" root directory contains one or multiple ASI imagers, one ASI imager only, or a "single day" directory. We strongly recommend to allocate the raw data root to the ASI default root "/asi16_data/".

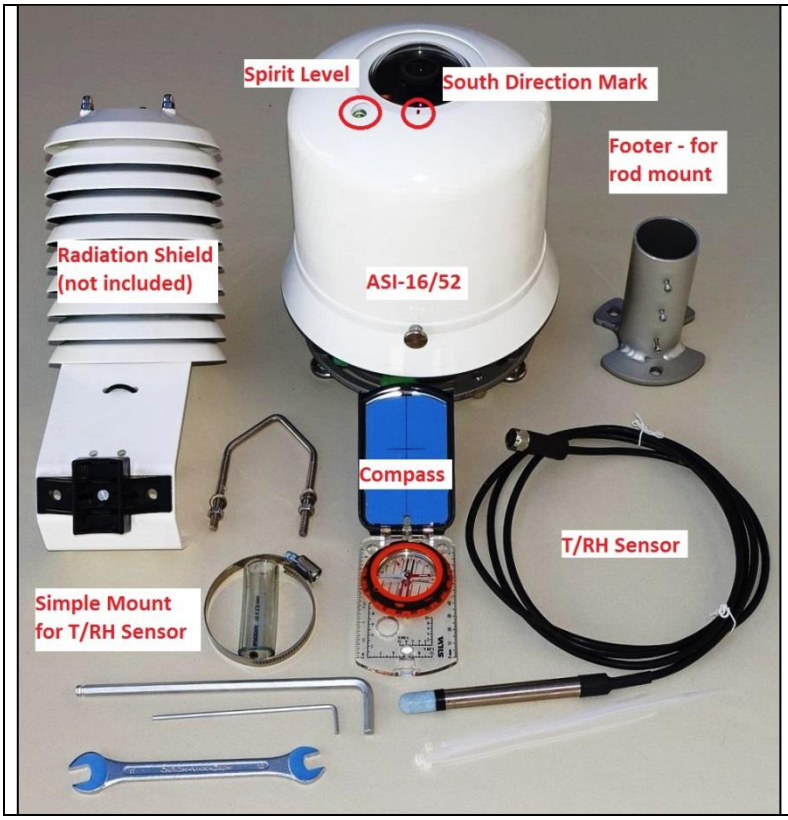
10 ASI-16/5n - Mechanical Installation Guide

10.1 ASI-16/5n Imager - Sample Mast-Mount Designs





10.2 Preparation for Mounting (applicable for both V20 and V24 HW)



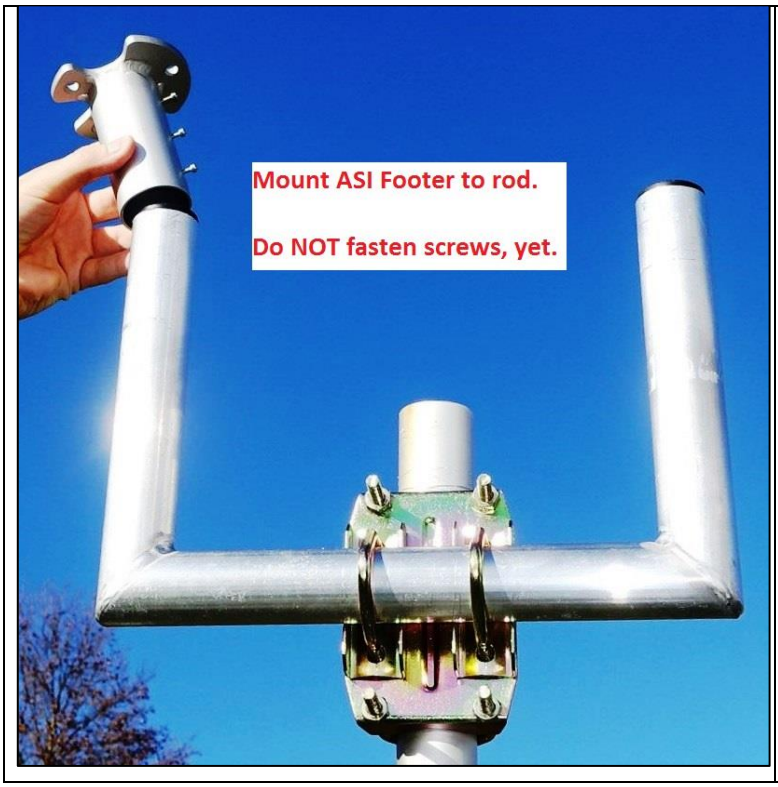
Top Left:
Single-Mast mounding, example.

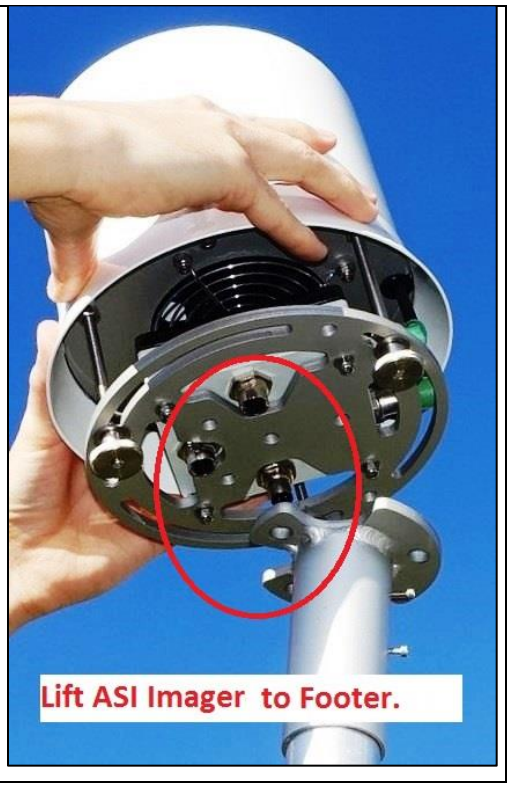
Top Right:
Double-Mast mounting, example.

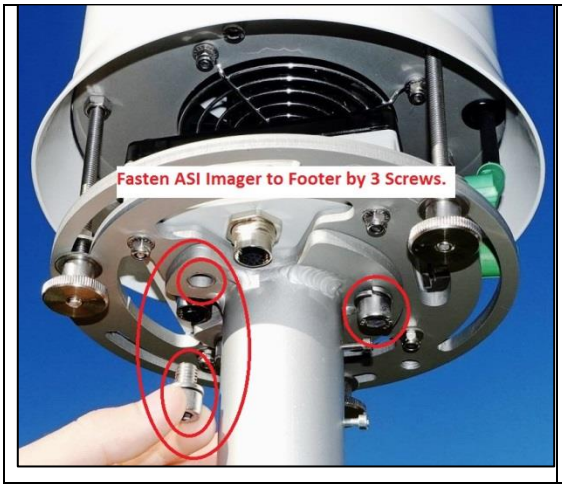
Right:
Parts and Tools for mounting.

- Allen key for M3 screws
- Allen key for M8 screws
- Compass and small mirror

10.3 Step-by-step Mounting Guide

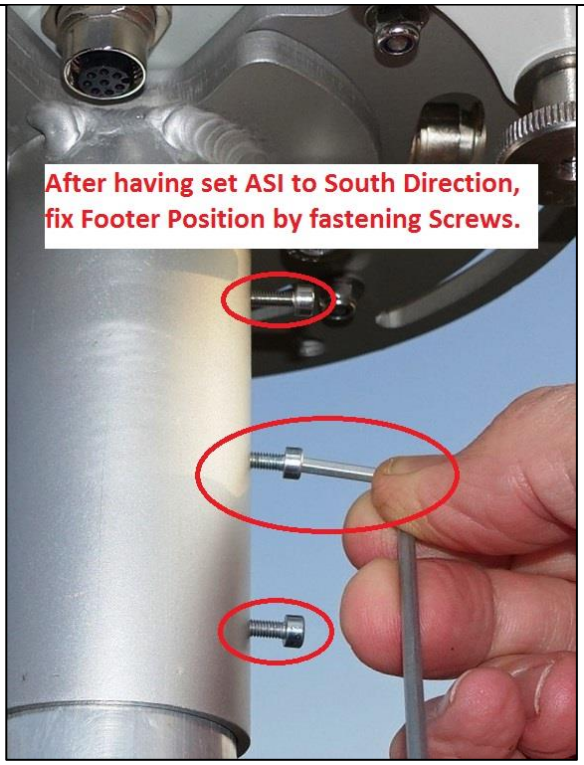




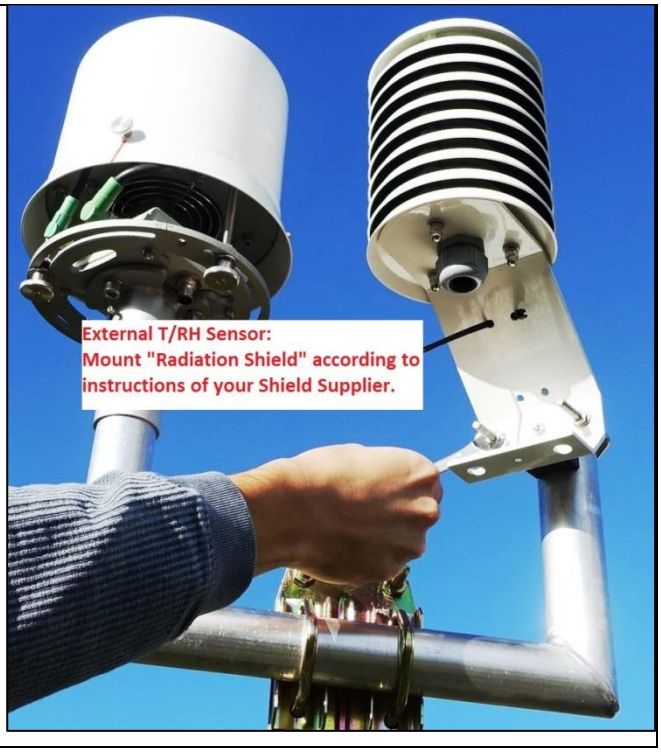





South Direction Mark.
Check Imager Top Mark.
Use Compass and rotate Imager till
the Mark looks into South Direction.

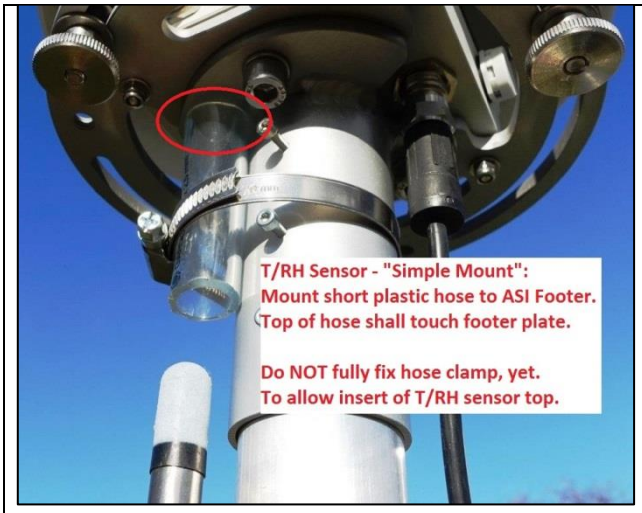

After having set ASI to South Direction,
fix Footer Position by fastening Screws.


Loosen all three bottom hand screws.
Watch Spirit Level at Top of Imager.
Rotate Threaded Nuts to adjust level.
When done, fasten 3 bottom screws.


External T/RH Sensor:
Mount "Radiation Shield" according to
instructions of your Shield Supplier.


Insert T/RH Sensor


Insert T/RH Sensor into
Radiation Shield as shown.
Connect T/RH Sensor Cable
(4-Pin Connector) to Imager.


T/RH Sensor - "Simple Mount":
Mount short plastic hose to ASI Footer.
Top of hose shall touch footer plate.
Do NOT fully fix hose clamp, yet.
To allow insert of T/RH sensor top.


T/RH Sensor "Simple Mount":
Insert T/RH Sensor Head into short Plastic Hose.
Keep blue Sensor Top 3-5 mm below Hose Top End.
When done, fasten Hose Clam.


Connect Power-Data-
Cable (8-pin) to Imager.

	WARNING: The CMS HPoE Injector and the AC/DC Power Supply must be installed at a dry and safe place without the risk of exposure to water or strong (condensing) humidity!
Electrical connection (inside building): 1. Connect HPoE cable to CMS injector. 2. Connect power supply to injector. 3. Connect router LAN cable to injector. 4. Connect power supply to AC power.	Check basic electrical operation: Check imager controller box for illuminated LED(s). Colour and number of LEDs vary, depending of ASI-16 release version. At least one LED must be illuminated.

11 Pyranometer Option - Hardware Installation Guide

11.1 Pyrano Mounting - Components

Pyranometer Option delivery includes the "Pyrano Mounting Arm" and the ModBus Cable. It does NOT include the Pyranometer itself. - An ASI-16 qualified pyranometer can be ordered separately via your local agent, via EKO-Europe or via CMS-Schreder.

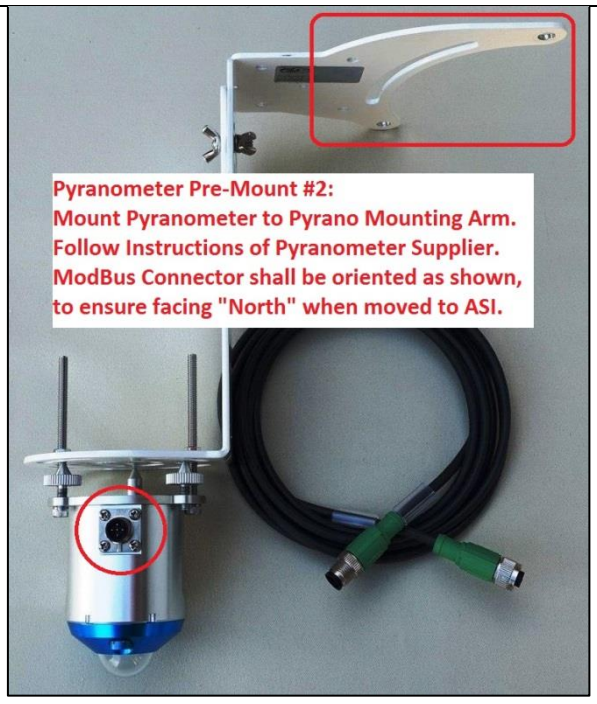


ASI-16/5nn"Pyranometer Mounting Arm" comes with two (2) non-pre-assembled mounting arm components, and small additional parts (screws, washers) for assembly and mounting the arm extension onto the ASI body.

Screws to mount the Pyranometer itself are NOT included. Usual those screws are a part of the Pyranometer supplier scope of supply.

11.2 Mounting the Pyrano Mounting Arm to an ASI-16/5n



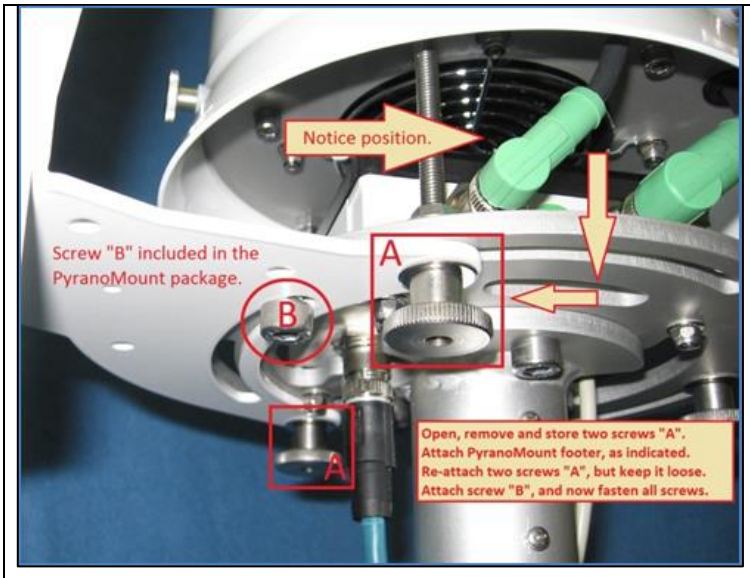




When mounting the Pyranometer, consider Northern or Southern hemisphere.

The plug and cable always shall face "away from sun", to avoid heat by exposure to direct sun

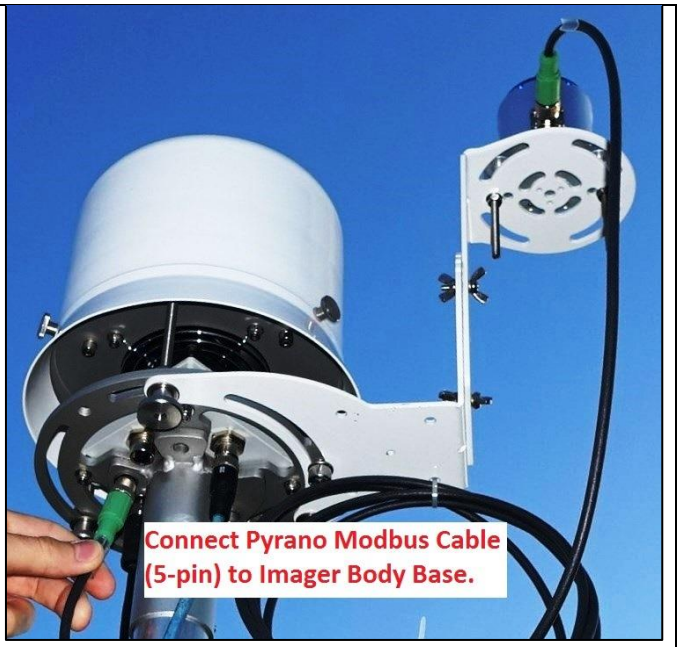




The Pyrano mounting arm allows to adjust the pyranometer to variable tilt angles for GTI (Global Tilted Irradiance) measurement.

Only ONE (of three) possible ways of mounting the arm ensures the correct North-South arm orientation, necessary for non 90° tilt angle adjustments, required for GTI measurement.

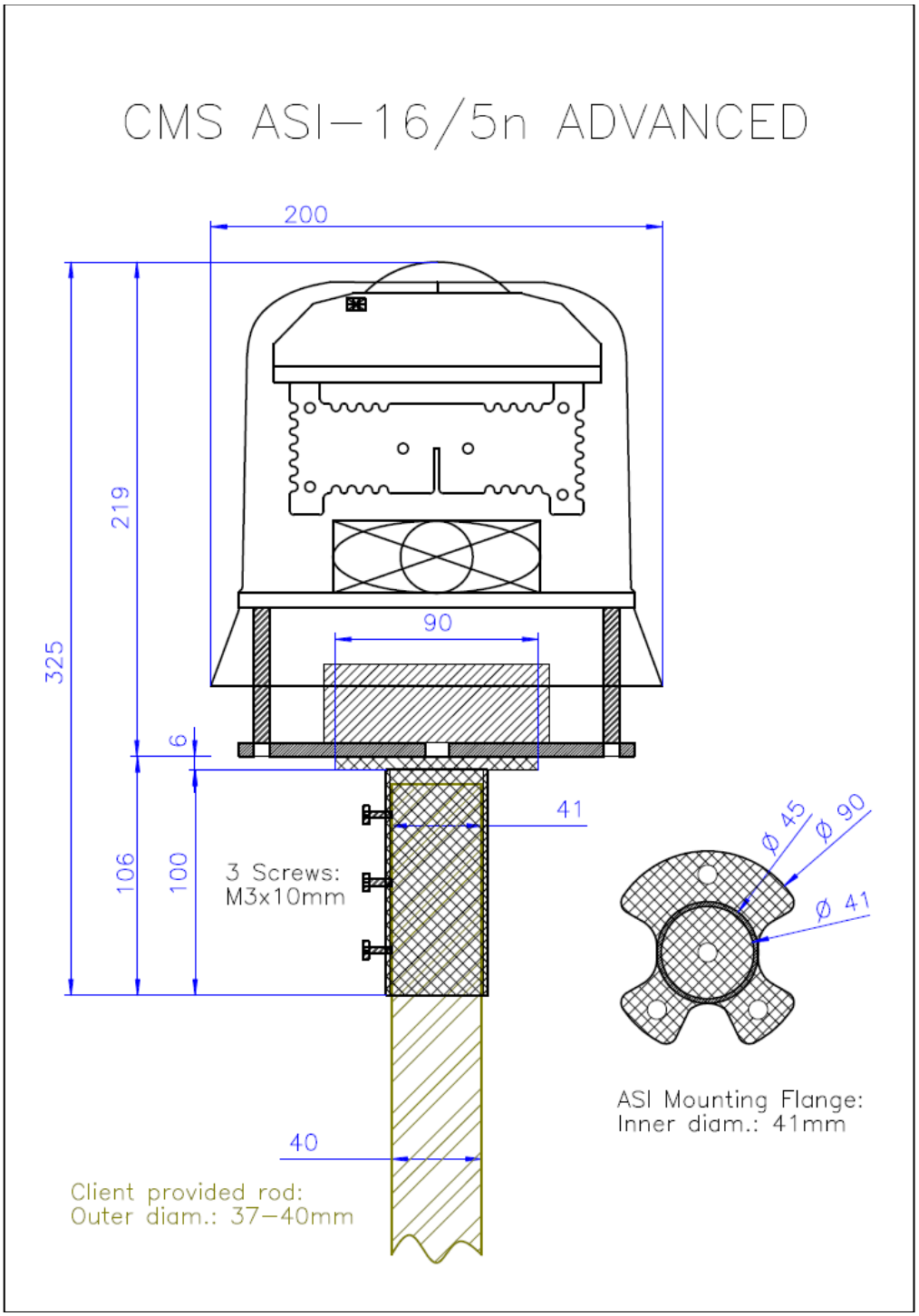




After mounting, use the "liquid Level" to adjust levelling of the Pyranometer!

12 Mechanical & Electrical Drawings

12.1 ASI-16/5n Mechanical Drawings



13 Service & Maintenance

13.1 Regular Preventive Maintenance - Hardware/Software:

Preventive hardware maintenance intervals strongly depend on the site outdoor environment. ASI-16 is mainly an "optical instrument", comparable to e.g., Pyranometers. Areas with air (seasonally or permanently) polluted by aerosols, pollen or sand, or areas close to salt water shores will require relatively short check and maintenance intervals.

Therefore each "maintenance schedule checklist" must be localized and customized. Dome cleaning must be done as soon as the "Live Web View" shows any contamination.

1x / Day: Check ASI Web-GUI/home "Live View" for contaminated live video/pic.
Check ASI Web-GUI/home for any sign of ERROR or OFFLINE status.
Check ASI Web-GUI "Backup-Memory", for pending/upload count status.
Check S/FTP target server "data folders" for continuous JPG data upload.
>>> TAKE IMMEDIATE ACTION - in case of any issues found!

1-4 Weeks: Check ASI Web-GUI "Maintenance", latest ETH-Service logs, for errors.
Gently clean ASI-16 "glass dome" by soft tissue and demi-water/ethanol.
W.A.: Gently clean Pyranometer by soft tissue and demi-water/ethanol.

1x / Month: Check "Backup-Memory" (SD/CF) via ASI-16 Web-GUI, click "DELETE - Uploads only".
Each 3 months: "Format" (see § 7.11) - or use CRM "Backup Memory - Scheduled Auto-Cleanup".
Re-Boot ASI-16 via Web-GUI. - Or run a one-time Power-Off/On cycle.

2-6 Months: Remove ASI "outer cover", check fan, remove eventual insects.
Check and gently re-fasten all plugs at the "Peripheral Controller"
When near to salt water: Add (new) dielectric grease around all plugs.

13.2 Non-Regular SW Maintenance - Upon specific issues:

(A) ASI Web-GUI issues:
a) In your Web-Browser, press "CTRL-F5" multiple times.
b) In your Web-Browser, check for new AV-/ FW plug-in's.
c) Re-boot ASI-16 via Web-GUI. - Or run Power-Off/On cycle.
d) Check for changes in your IT network/router/firewall/ config.
e) Use "ASI16-Installer_V24" to run "Configuration Data Update".
f) Use "ASI16-Installer_V24" to run "Full Reset" 2-3x.

(B) S/FTP uploads hang:
a) Re-boot ASI-16 via Web-GUI. - Or run Power-Off/On cycle.
b) Check ASI-GUI "Maintenance", latest ETH-service logs.
c) Check S/FTP for availability or recent (security) updates.
d) Check for changes in your IT network/router/firewall/ config.
e) Re-format ASI "Backup-Memory" via Web-GUI, and reboot.
f) Use "ASI16-Installer_V24" to run "Full Reset" 2-3x.

13.3 Troubleshooting:

Please refer to separate docs, enclosed in the ZIP/RAR package on CMS-CRM!

Quick troubleshooting overview (details: "ASI16_SW-Recovery_step-by-step" guide and "ASI-16_HardReset_Procedures" in the ZIP package on CMS-CRM / Downloads):

Symptom	Check / Action	Reference
No PeriCont LED blinking	AC supply, power supply 48 V, HPoE injector, data/power cable and plugs (corrosion, tightened?). Re-connect only the 8-pin data/power cable; if LED blinks, re-connect other plugs one by one.	SW-Recovery guide 1; § 9.2
ASI not found by ASI16-Installer	PC in same subnet; enter IP or serial number + "Connect"; IP scanner (MAC-ID); "Tools / IP Check" (reset fixed IP); IT: firewall / MAC registration / DHCP.	§ 6.2, 6.3
Web GUI corrupted / installer "Failed to establish HTTP connection"	CTRL-F5; reboot; Configuration Data Update; Full Reset 2-3x; format backup memory; Shepherd factory restore; then Full Reset.	SW-Recovery guide 2
Still not reachable via router	Peer-to-peer: PC fixed IP 169.254.1.1 / 255.255.0.0, ASI alias IP; afterwards set PC back to DHCP!	SW-Recovery guide 3
Nothing helps	Low-level hardware reset (reset button inside imager head, indoor, clean room).	ASI-16_HardReset_Procedures.pdf
Full Reset fails	Installer shows "Re-enable PeriCont/Com IF"? Click it first. CRM data complete? Stable internet? Else use "Install offline".	§ 6.4, 6.6
No JPGs on FTP, "pending images" increase	Data Storage Server "Test"; IP/port/user/password; folder name RELATIVE ("asi16_data"); firewall rules (IP/MAC/port); FTP server online; ETH service log.	§ 7.10, 7.11, 13.4

13.4 FAQ - Frequent Client Questions

Q: The ASI does not upload images to our own (local) FTP server.

A: Check in Imager > Storage > Data Storage Server with "Test": server address, port, user name, password and folder name. The folder name must be RELATIVE to the FTP root of the account (e.g. "asi16_data"), never an absolute path like "C:/FTP/asi16_data". If the test fails, ask your IT to check firewall rules (IP/MAC/port bindings) between ASI and FTP server. Do not run the FTP server on a general-use office PC; use a NAS or dedicated server with RAID storage.

Q: The site has no internet. How do we get the images?

A: Install a small router with DHCP service (fixed IP reservation by MAC-ID) connecting ASI and a local PC/NAS. The PC/NAS runs an S/FTP server with reliable storage (e.g. RAID-1). The ASI needs a NTP time server - e.g. GPS-based (router or separate device). Software updates: CRM "Offline Package" + Installer "Install offline" (§ 6.6).

Q: Do we have to use "Use GMT/UTC" for the file names?

A: YES, if images are analysed with FCT-22 or FCS-26. In addition, the ASI MUST be set to the local time zone, with correct GPS (LAT/LON/ELE) - otherwise capturing starts/stops at wrong times (e.g. uploads at night).

Q: FCT Eval - Live Data are not shown on the home page.

A: Requirements: (a) FCT-22 runs in "Automatic Mode" with "ASI Live ..." activated, (b) images are uploaded to an FTP storage that FCT-22 reads in real time, (c) FCT-22 writes the results file into the imager root directory on the 1st data storage server, (d) "FCT Eval - Live Data" is activated (§ 7.5) and the data are not older than "Display Data for".

Q: Can the ASI store images via HTTP or network file share?

A: No. Since ASI SW 2023-01 (dual-FTP) only FTP, FTPS and SFTP are supported. Use a second server as "mirror" or "fall-back" (§ 7.10).

Q: What is the image resolution, and can the JPG compression be changed?

A: Sensor 3096 x 2094 pixel; the fisheye image uses max. 1920 x 1920 pixel; standard capture size 1536 x 1536. JPG quality ("Fixed quality") is set in CMS-CRM > Parameters (local test: System > Service > Imaging). WDR combines several fast exposures internally.

Q: The image is not exactly centred / not exactly north-oriented after re-mounting.

A: The level bubble is a rough guide only. Small deviations have no practical effect on cloudiness. Correct the orientation in the analysis software (FCT-22 camera configuration "Angle", FCS-26 "Offset Angle") or rotate the ASI slightly. For CBH (camera pairs) orientation is more important.

Q: How often must the dome be cleaned, and is calibration required?

A: Clean the dome as soon as the live view shows contamination - depending on the site typically every 1-3 months (§ 13.1). A periodic calibration is not required.

Q: Some images are missing at 15 s shooting interval.

A: Each capture takes 5-10 s; at 15 s interval single images may be lost occasionally (§ 7.9). Short LAN/FTP interruptions can also cause single missing or 0-byte files. Check ETH service logs (§ 7.18) if gaps are frequent.

13.5 ASI-16/5n Peripheral Controller - Firmware Upgrade

Firmware Upgrade via "Programming Adapter" and Laptop

This **PeriCont Firmware Upgrade Procedure** is required ==>> (A) in any case for all ASI-16/5n with Serial Numbers above SN 16101, and ==>> (B) in case of a previous PeriCont firmware update (via ASI Web-GUI) was interrupted by mistake, and after next Power-OFF/ON Peripheral Controller does NOT re-start and work anymore, as by (1) NO PeriCont LED blink signals, and (2) NO PeriCont SQNR-Data ("SQNR=12345; DATE=...") listed in ASI Web-GUI under ./Imager/Peripherals/General/[Logs].

(A) Preparations, Requirements:



- "ASI-16 PeriCont-USB Programming Adapter":
To connect the Peripheral Controller to a Laptop.
Cannot be directly plugged into a PC/LT US port.
Requires a standard USB cable as described below.
Supplied as LOAN ONLY by your EKO/CMS agent.
Must be returned to your agent within 2 weeks.

- USB cable, plugs type "Mini-A" to type "2.0 A".

- Laptop with fully loaded battery, running on Windows WIN-7 or later.

- Tools: 6mm hex wrench, if ASI must be taken down from its mounting rod. See 3.2

- For glass dome cleaning: Soft wet tissues, soft dry tissues.

- PeriCont programming software, PeriCont firmware:
  ZIP-Archive: Included in "ASI-nn_Manuals_SW_Tools.ZIP" on CMS-CRM.
  Updater SW: "UpdateLoader-win32.exe/.ini".
  Firmware: "ASI-PeriCont_SRn_nnnnn.hex".

(B) Procedure:

1. CMS-CRM/Downloads: Download (a) latest "Release Notes_nnn.pdf", (b) latest "ASI16-Installer_V24.exe", and (c) latest "ASI-PeriCont_Firmware_yymmdd,zip".
Store "ASI16-Installer" to the PC connected to the ASI and Internet via LAN/router/switch.
Store "ASI-PeriCont...zip" to the Laptop used outdoor (on site) to update Pericont.
We recommend to unzip the entire "ASI-PeriCont...zip" folder directly to the Desktop.

2. Office PC: Run ASI-Software "Full Reset" according to instructions in "Release Notes".

3. Prepare for safe physical access to the ASI-16 imager, outdoor on site or indoor.

3.1 If the ASI can be accessed easily and without any risks of injury (falling down, slipping), then the ASI can remain on place, on the mounting rod. If wanted, remove the outer hood (green circle mark).

3.2 Otherwise the ASI (without rod mounting flange)must be taken down, by taking out the three M8 screws (red square marks) at the mounting plate. The rod mounting flange shall stay on the rod, to avoid later mechanical re-adjustments, after re-mounting the camera.

4. Disconnect Data-Power cable (red mark) and cable to imager head (yellow mark).

5. Connect "PeriCont-USB Programming Adapter" via USB cable to Laptop.

6. Re-connect Data-Power cable, switch-on Laptop and start "UpdateLoader-win32.exe".

7. In "Port" select a serial port marked "FTDIBUS". If it does not appear, connect the adapter to another USB port on the Laptop, wait for driver installation, and try again.

8. In "Firmware-Update" select the "ASI-PeriCon_SRn_nnnnn.hex" file.

9. Double check all other settings, according to screen shots.

10. Click on "Update starten!". - After a few seconds the update will start. DO NOT INTERRUPT!!!

11. Wait till "Update finished", and the PeriCont LED's show a white-yellow-green signal sequence.

12. Disconnect Data-Power cable (red mark) and "PeriCont-USB Programming Adapter".

13. Clean glass dome, first by a soft wet tissue, followed by a soft dry tissue.

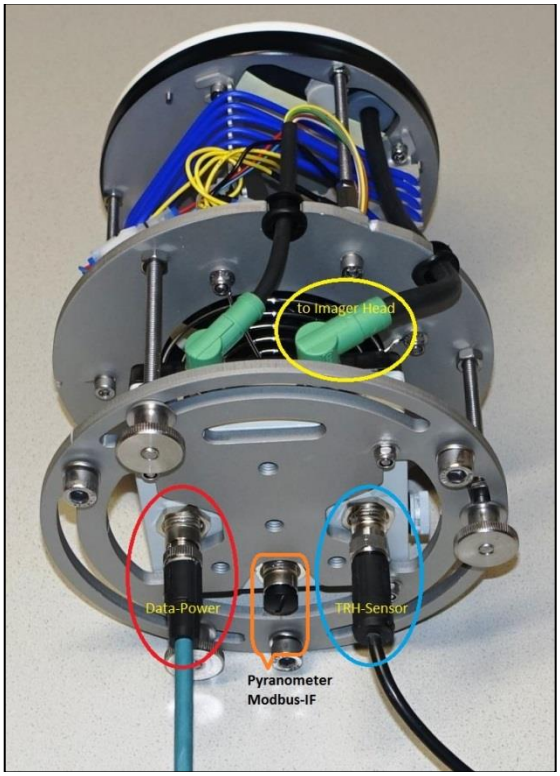
14. Remove insects and/or other large particles from heating coil and fan protection.

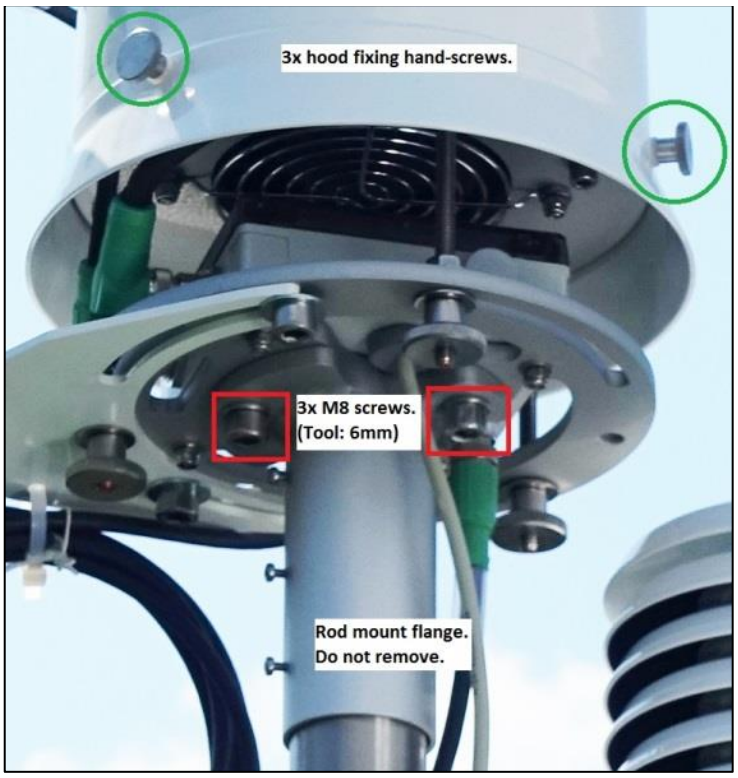
15. Re-mount outer hood.

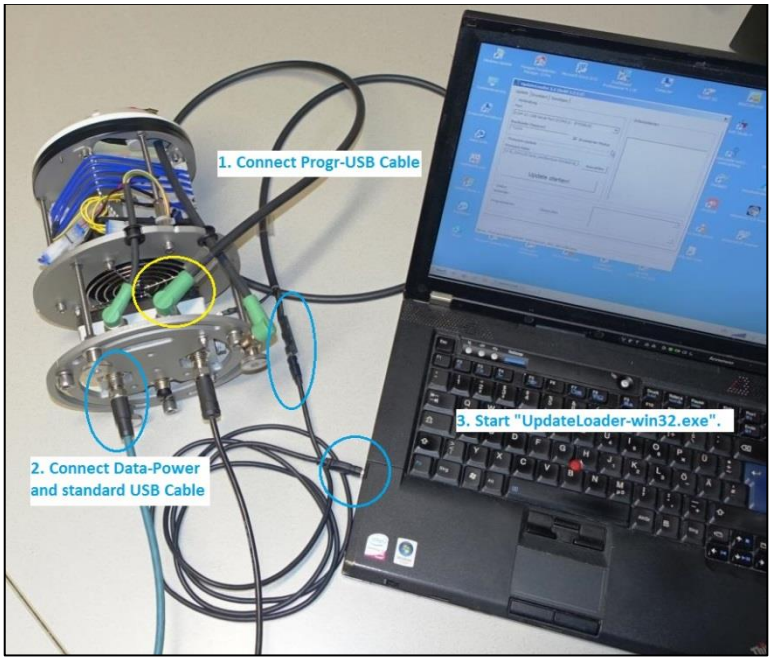
16. Re-connect cable to imager head (yellow mark) and Data-Power cable.

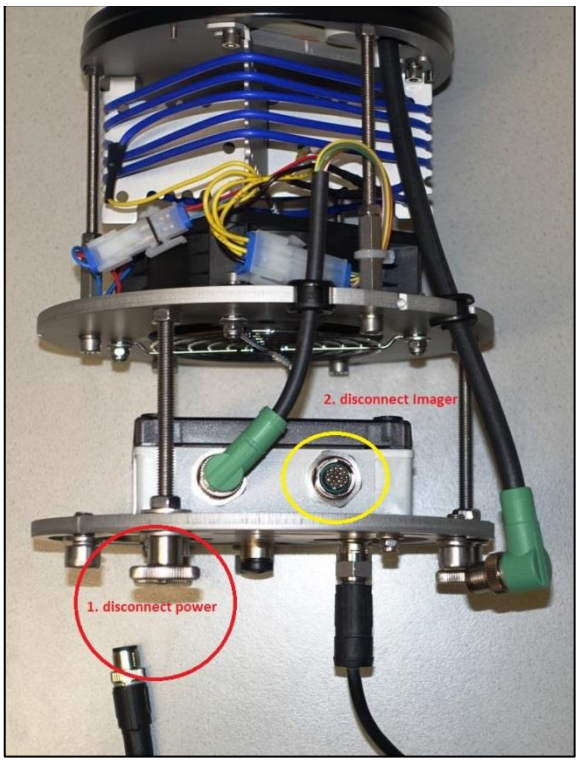
17. (Re-mount ASI to rod mounting flange.)

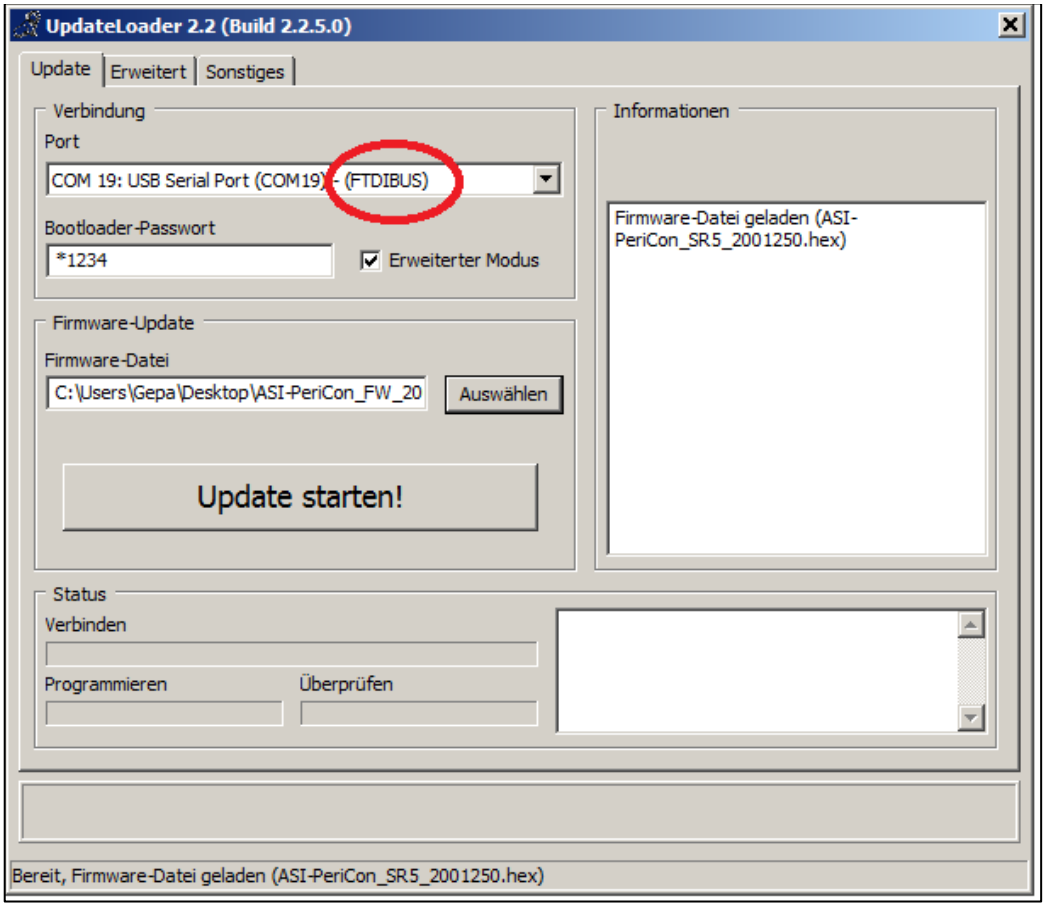
18. Office PC: Check entire functionality and settings via ASI-GUI (browser interface).

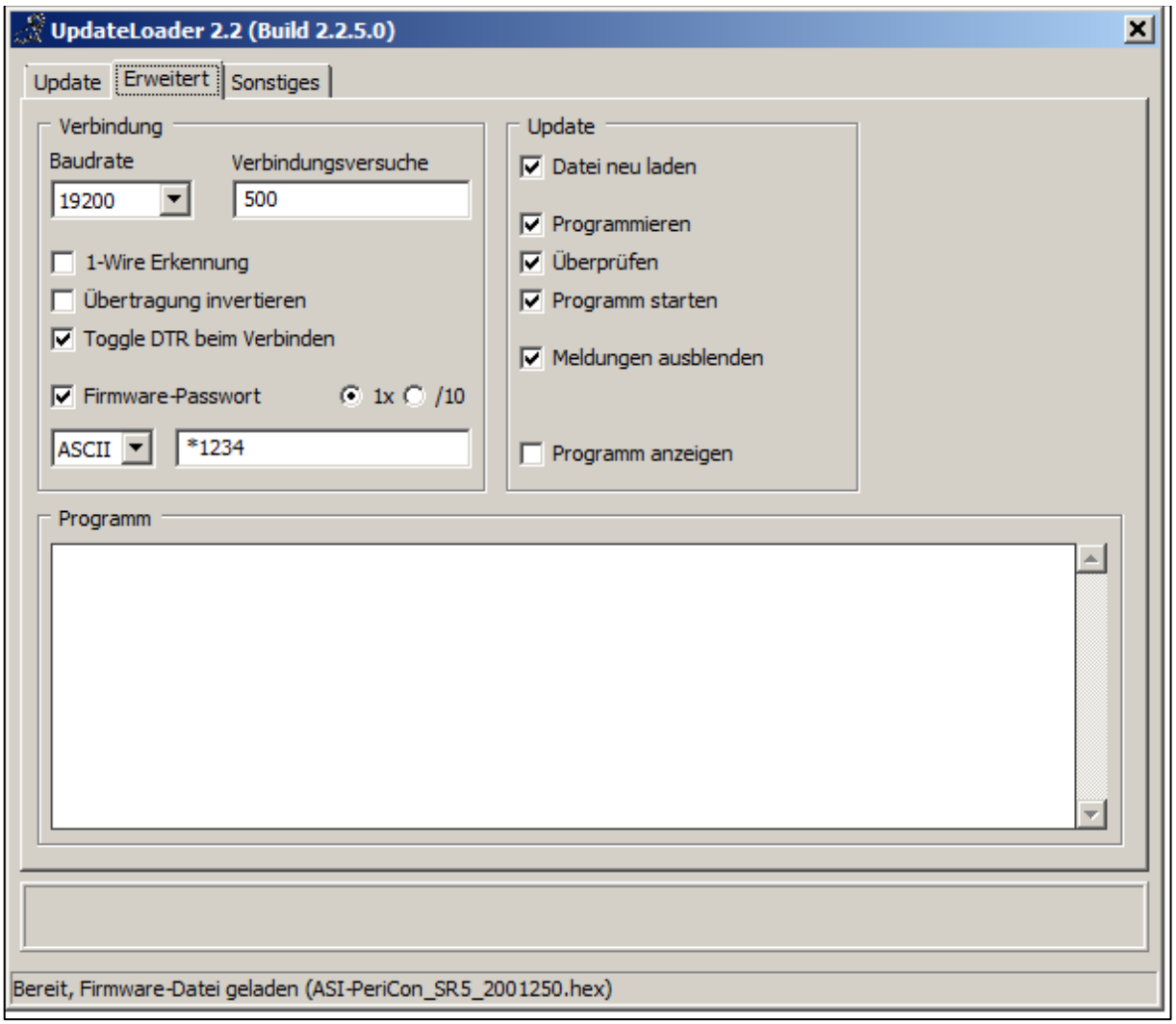



3x hood fixing hand-screws.
3x M8 screws.
(Tool: 6mm)
Rod mount flange.
Do not remove.


1. Connect Progr-USB Cable
2. Connect Data-Power
and standard USB Cable
3. Start "UpdateLoader-win32.exe".


2. disconnect Imager
1. disconnect power


UpdateLoader 2.2 (Build 2.2.5.0)
Update
Erweitert
Sonstiges
Verbindung
Port
COM 19: USB Serial Port (COM19) - (FTDIBUS)
Bootloader-Passwort
*1234
Erweiterter Modus
Firmware-Update
Firmware-Datei
C:\Users\Gepa\Desktop\ASI-PeriCon_FW_20
Auswählen
Update starten!
Informationen
Firmware-Datei geladen (ASI-PeriCon_SR5_2001250.hex)
Status
Verbinden
Programmieren
Überprüfen
Bereit, Firmware-Datei geladen (ASI-PeriCon_SR5_2001250.hex)


UpdateLoader 2.2 (Build 2.2.5.0)
Update
Erweitert
Sonstiges
Verbindung
Baudrate
19200
Verbindungsversuche
500
1-Wire Erkennung
Übertragung invertieren
Toggle DTR beim Verbinden
Firmware-Passwort
1x
/10
ASCII
*1234
Update
Datei neu laden
Programmieren
Überprüfen
Programm starten
Meldungen ausblenden
Programm anzeigen
Programm
Bereit, Firmware-Datei geladen (ASI-PeriCon_SR5_2001250.hex)

13.6 Spare Parts - Part Order Numbers - Refer to Price Table for details.



PART DESCRIPTION	ORDER NUMBER
ASI-16/55_V24 ADVANCED	1035.10.01.03
Outer Hood (Outer Cover)	1035.110.90 
Hood mounting screw	1035.130.34 
Data/Power Cable, 20m	1035.210.15.2 
CMS HPoE Injector	1035.160.00 
AC Power Supply 48V, 90W	1035.210.11 



Imager Head (complete)	1035.110.00.3 
Dome and Cover Assembly	1035.110.20.3 
Heater Star Assembly	1035.120.20 
Ventilation Unit Set (Fan)	1035.130.50 
Peripheral Controller	1035.150.00 
Multipole Cable (Heat/ Vent)	1035.150.70 
T/RH Sensor - standard	1035.150.40
T/RH Sensor - enh. protection	1035.150.47
Data/Power Cable, 2 m (indoor tests)	1035.210.36
Connector, bottom plate	1035.150.90
Shadow Ring (Dome-Cover)	1035.110.44.4.2
Rod Mounting Shaft	1035.140.50 

14 Commercials - Legal - License - Conformity

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Seller hereby warrants the equipment to be free from defects in materials and workmanship, and the equipment being tested to perform according to material and critical specification, but warranty is limited to environmental and functional and operational restrictions, and limited to qualified installation, configuration and operation strictly according to Seller's instructions and to be performed under Buyer's responsibilities,

Within the limits of what is set forth above and below, Seller agrees to repair or replace, without cost of labour and parts to Buyer, any defective equipment or Buyer-serviceable modules or components, when such defect occurs within a period of twelve (12) months from the date in which Seller's goods have been put into use. The warranty duration is 12 months from installation date but never more than 18 months from invoice date, even if, for any reason, the equipment will not be utilized.

Buyer must immediately notify Seller of any defect, specifying the serial number of the equipment. At Sellers sole decision and notice, Buyer either shall send to Seller the defective item for repair or replacement, delivery at the Buyer's costs, and Seller will perform the repairs or provide a replacement within a reasonable period of time, or Seller will deliver replacement equipment or replacement spare parts and Buyer will perform the repair works. In any case, if not otherwise confirmed by Seller, Buyer shall be obliged to immediately, not later than 2 weeks after notice, return the defective equipment or defective components or modules to Seller, otherwise if Buyer fails to return Seller shall be entitle to charge and Buyer shall be oblige to pay the list price of the replacement parts delivered. Upon effecting such repair or replacement, Seller shall have fulfilled its warranty obligations.

Seller is not responsible for defects resulting from improper use of the equipment, lack of proper maintenance, tampering with the equipment, or by repairs effected by the Buyer which have not been approved by Seller in writing and in advance, or by the Buyer using spare parts not being delivered or approved by Seller, or the Buyer not strictly following Seller's instructions and advise for User repair and service procedures.

Seller will not be liable for any injury to persons or things, or for any direct or indirect commercial damages (loss of revenue or profit) due to the failure of operation or the loss of imager data, or instability or non-reliability of data generated by Sellers software.

Seller does not warrant the compliance of its equipment with the laws of non-EEC countries in which the equipment may be installed. Buyer shall indemnify and hold Seller harmless against any claim by third parties resulting from failure to comply with the aforesaid non-EC laws and standards.

14.2 Contact

CMS Ing. Dr. Schreder GmbH.
Lofererstrasse 32, A-6322 Kirchbichl, Austria
Tel.: +43 (5332) 77056-00, Fax: +43 (5332) 77056-14,
Email: info@schreder-cms.com, Web: www.schreder-cms.com

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Version V05, 2025-07-01 (gepa)

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14.5 EC - Declaration of Conformity

EG-Konformitätserklärung

Declaration of EC-conformity

Für das folgend beschriebene Geräte
The following described item

ASI-16/55, ASI-16/15 All Sky Imager

wird hiermit bestätigt, dass es mit den Schutzanforderungen der folgenden Richtlinien übereinstimmt.
herewith is declared to be conform with the safety requirements stated in the EEC-regulation.

EMC Directive 2014/35/EU
RoHS Directive 2011 65 EU

Diese Erklärung gilt für alle Exemplare und verliert ihre Gültigkeit bei mit uns nicht abgestimmten Änderungen.
This specification applies to all specimens and is voided by not with us coordinated changes made.

Zur Beurteilung des Erzeugnisses hinsichtlich der elektromagnetischen Verträglichkeit wurde folgende Normen herangezogen:
For judging the products conformity the following standards have been applied:

EN 61000-6-1:2019
EN 61000-6-3:2011

Die Konformität dieses Produktes ist sichergestellt. Der Hersteller erklärt damit die alleinige Verantwortung für von ihn vertriebene Geräte des oben angegebenen Typs.
The conformity of this product is secured. The manufacturer declares hereby the sole responsebility for appliances mentioned above and produced by the manufacturer himself.

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Kirchbichl	01.12.2023	
Ort *place*	Datum *date*	rechtsverbindliche Unterschrift *legal signature*