CIMEL

ADVANCED MONITORING

Multiband photometer CE318-N

User's Manual V2.1 (rev. Mar. 2015)

Dear Customer and users,

You have just purchased a Cimel sunphotometer and we would like to thank you.

We have placed in this instrument all our passion and know-how so that it best meets your needs. Innovation and performance: we designed it so that it is always easy to use.

In the line of Cimel products, you will also find a wide range of remote sensing and automatic Sun Sky Photometer CE318-N that can be coordinated with your new Cimel CE37x LIDAR.

Of course, in an ongoing effort to satisfy your demands as best as possible concerning our products, our after-sales service department is at your disposal and ready to listen and answer to all your questions and suggestions (contact information at the end of this booklet).

Please visit our website at www.cimel.fr: you will find all our products, as well as additional and useful information.

Cimel

As part of our commitment to constantly improve our products, we reserve the right to make changes to their technical, functional and/or esthetic properties in line with their technological development.

Caution: Before installing and using your instrument, please read carefully this guide, which will help you to be quickly familiarized yourself with its operation.

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1 Product overview

1.1. *Presentation*

This high-precision multiband photometer measures the optical properties of the atmosphere especially by measuring on one hand, the sun irradiance and on the other hand the soil and sky radiance. It provides the quantification and physical-optical characterizations of the aerosols.

Due to its very low power consumption thanks to the MicroAmps® technology, to its self-powered system and to its rugged design, the CE318 fully meets the operational requirements of continuous monitoring in terms of reliability, long lifetime and very low maintenance cost.
The CE318 photometer technology is constantly enhanced to match the new technological challenges for climate observation and monitoring. Cimel's photometers are still the benchmark devices for most aerosol observing networks and more specifically for the international federation of AERONET.

The large range of parameters that are derived and calculated from the measurements and from the atmospheric physics equations make the CE318 photometer a worldwide benchmark device for the following applications:

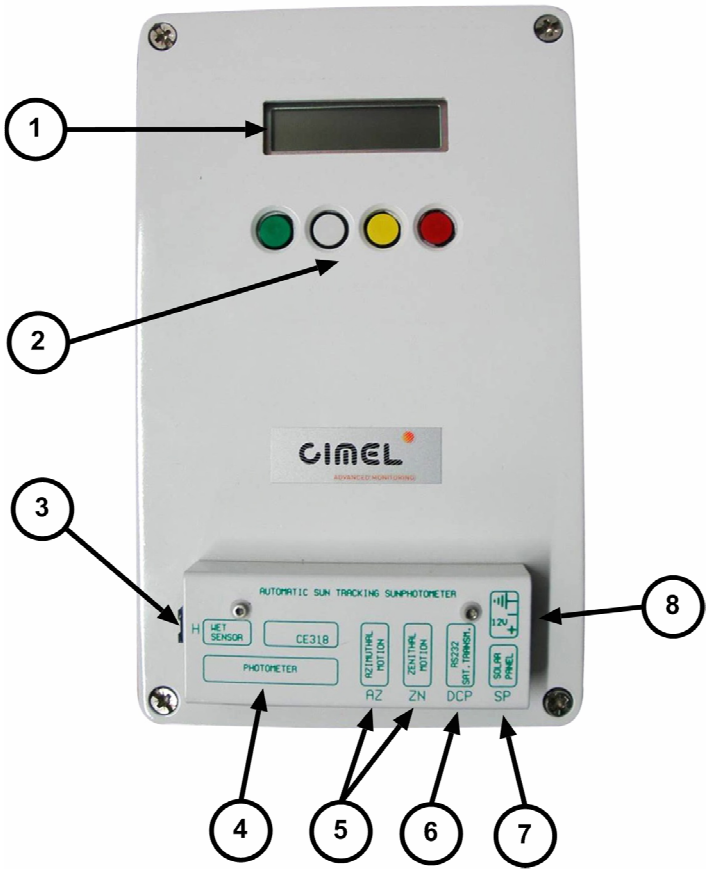
- Characterization and quantification of aerosols
- Satellite calibration of aerosol measurements
- Detection of volcanic ashes plumes in real time
- Determination of Aerosol Optical Depth
- Determination of fine mode and coarse mode AODs
- Determination of the optical properties of the atmosphere for satellite imaging
- Determination of the ocean's colour
- Determination of the amount of precipitable water
- Air quality monitoring
- Volume size distribution
- Nature of aerosols

1.2. *System components quick description*

The photometer system is delivered with:

1. **Control Unit (CU)**

The Control Unit is the component where all the data acquired by the optical head are sent and it is used as the user interface to parameterize the whole system running.
The CU gets four colored buttons and a screen display which enable the users to navigate through the menus.
The features and the menus are described more precisely in **chapter 3**.



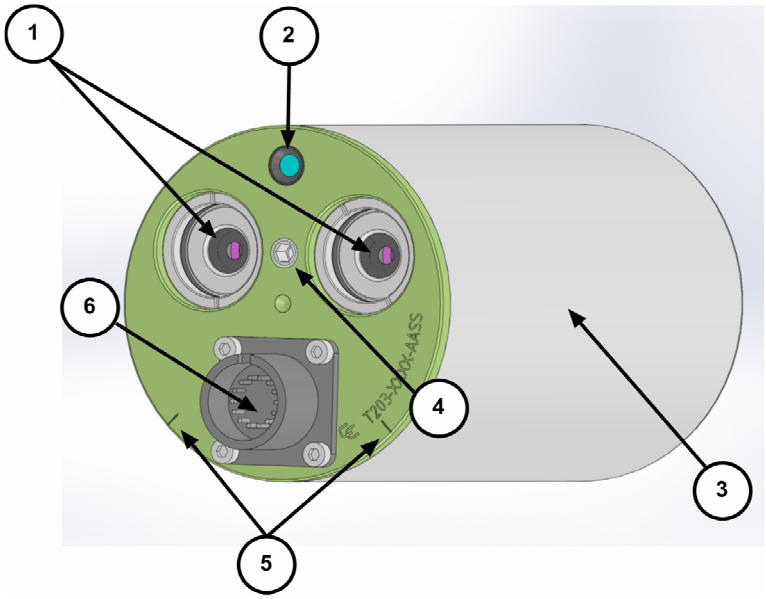
User interface:
1: Graphic display.
2: Coloured buttons.

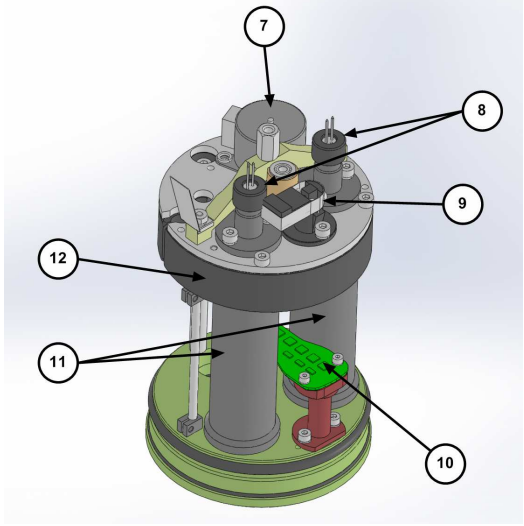
Removable terminal block:
3: Wet sensor.
4: Sensor head.
5: Robot azimuth and zenith motion.
6: DCP / Serial communication.
7: Solar panel.
8: External battery.

2. Sensor head and collimator

a. The sensor head

The sensor head measures the received signal from the sun, sky, soil or sea. Then it is sent and recorded to the CU.
Detectors can be either silicon and InGaAs or silicon only for the SEAPRISM sensor head type. InGaAs detector is used for near-infrared wavelengths.

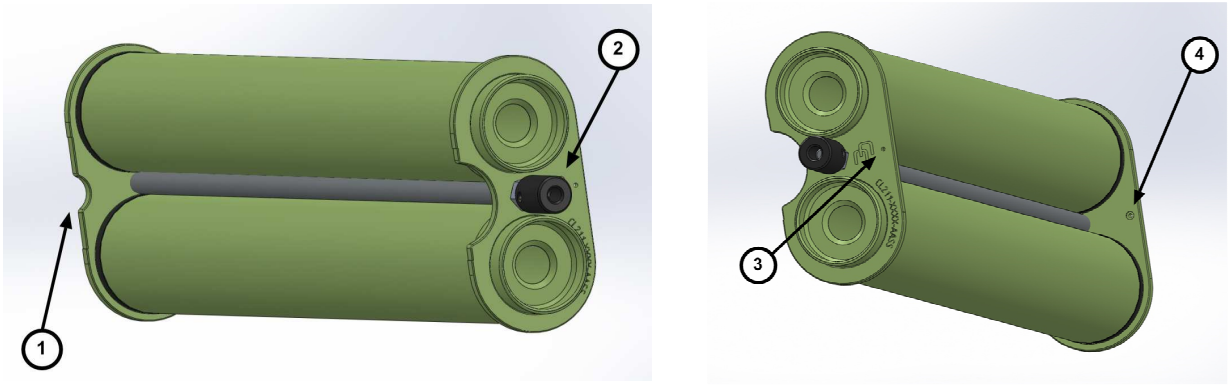




1: Front plate lenses and optical chambers entrance
2: 4 quadrant detector lens
3: Cover
4: Threaded hole for collimator
5: Positioning notches
6: Head sensor cord connector
7: Step by step motor
8: Detectors
9: Filter wheel detector
10: 4 quadrant
11: Optical chambers
12: Filter wheel carter

b. Collimator

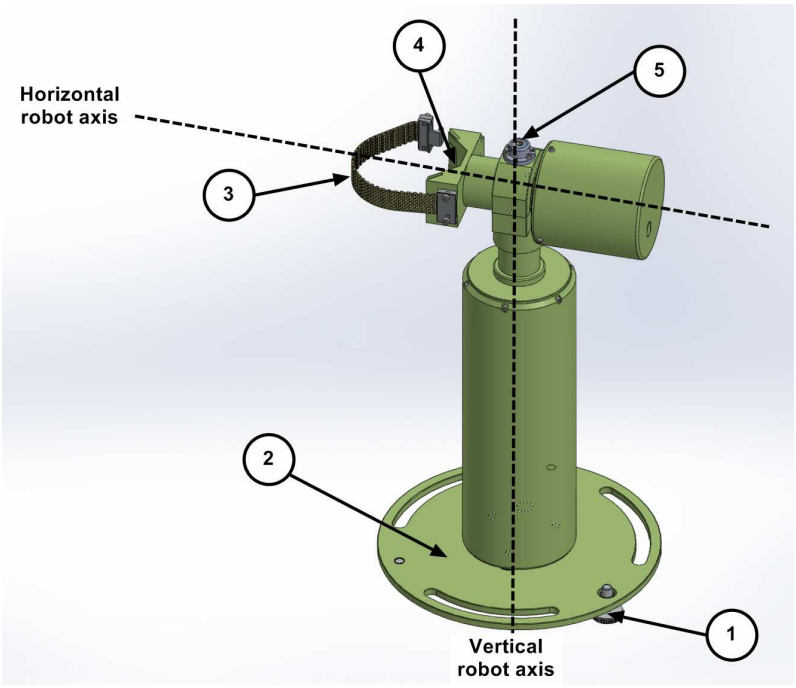
The collimator is a component that enables the light to be guided correctly to the sensor head outside lenses. The collimator helps to reduce the stray light.



1: notch 2: tightening screw 3: alignment hole 4: spot

3. Robot

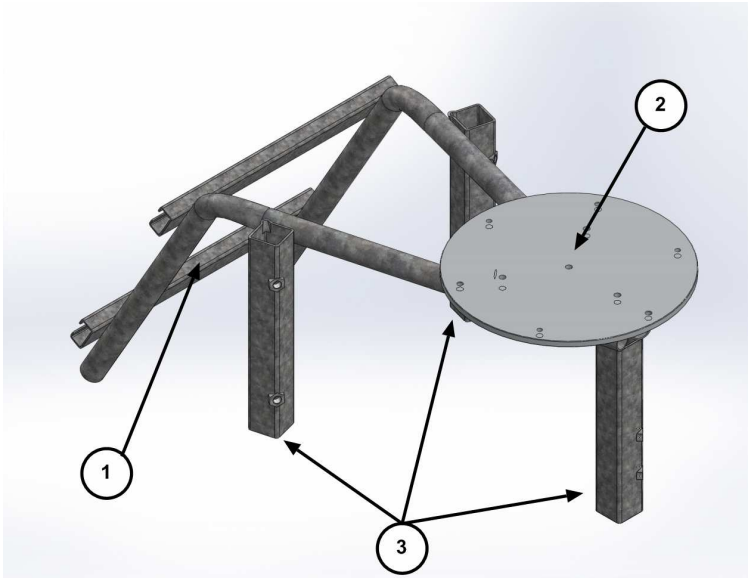
The robot is the component on which the sensor head is attached. Its mechanical design enables it to point on whole directions of the sky on the azimuthal and zenithal angles with a very high accuracy.
It is controlled through 2 cables (with RJ11 connectors), one for each axis.



1: Adjustment wheel (X2)
2: Robot base
3: Strap
4: V-shaped part
5: Spirit level

4. Tripod and tray

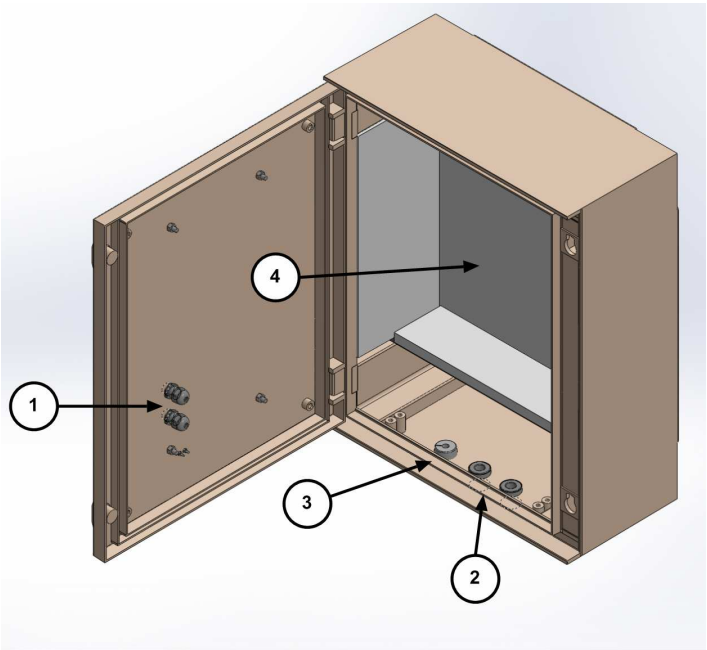
The tripod is the supplied infrastructure where the protection case and the robot are fixed and that enables the whole system to be stably fixed on the ground.
The tray is a part fixed horizontally on the tripod and where the robot will be fixed on.

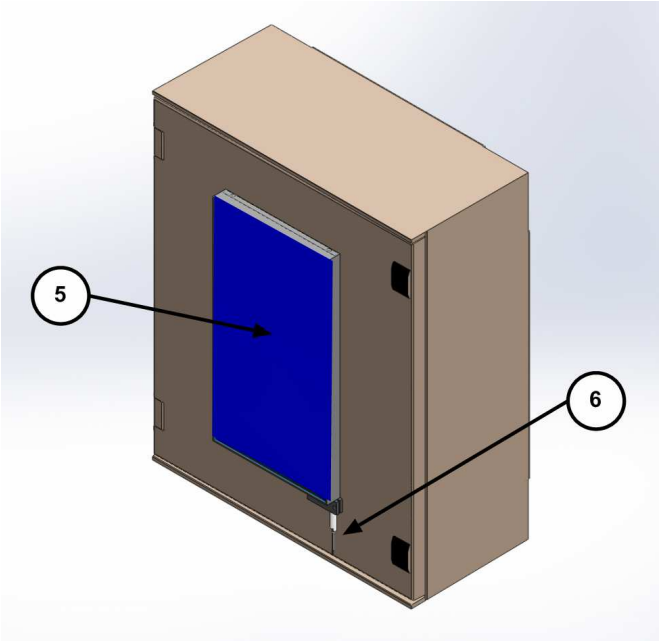


1: Emplacement for the protection case
2: Tray
3: Tripod feet

5. Protection case with solar panel

The case is the component where the CU and the pair of batteries are placed. The solar panel that powers the system is incorporated in the case.
The output plug of the solar panel is a RJ11 connector.

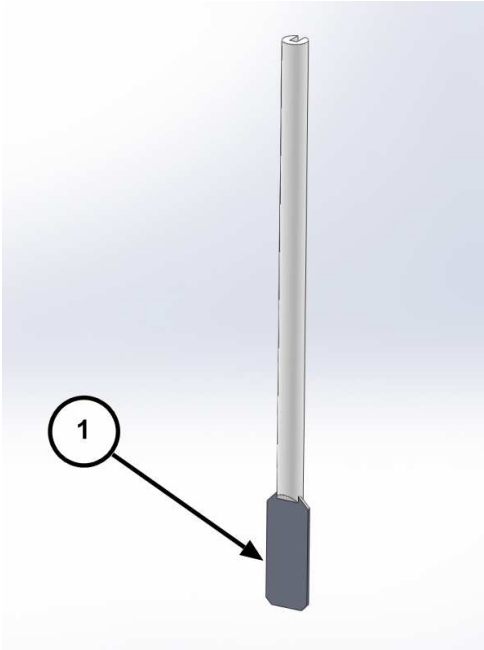




1: Cable gland. The wet sensor and solar panel wires will go through.
2: Cable gland. The robot and computer wires will go through
3: Cap. The sensor head cord will go through
4: Foam
5: Solar Panel
6: Wet sensor

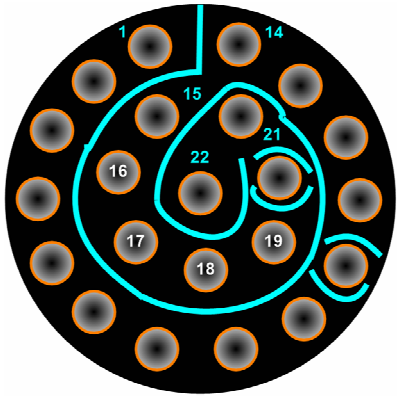
6. Wet sensor

The wet sensor detects rain in order to stop measurements and protect the sensor head from water when it is raining. The output plug of the sensor is a RJ11 connector. Standard length of the wire is 3m.



7. Sensor head cord

The sensor head cord connects the CU and the sensor head. The standard length is 3 meters. One side connector is DB25 (male) type and this other side is Jupiter type with 22 pins (female)



8. Batteries and battery charger

The black batteries supply power to the CU. The battery is 8AH.
The YUASA battery is furnished when the satellite transmitter is used. The battery is 24AH.
The battery charger is used only in case of solar panel breakdown.

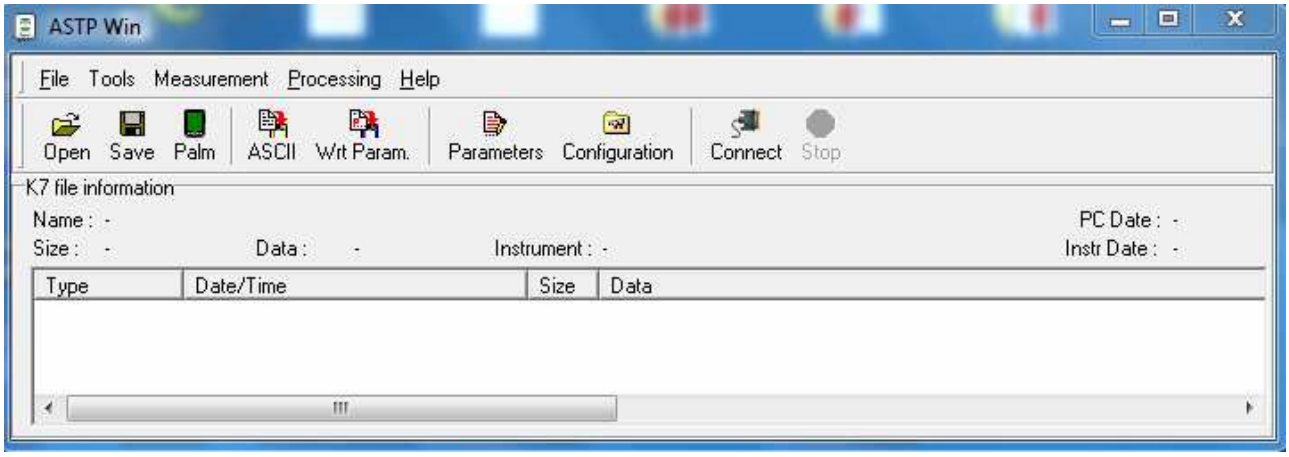
9. Flycase

10. Acquisition PC

The acquisition PC (not supplied) receives the data transmitted by the CU either via RS232.

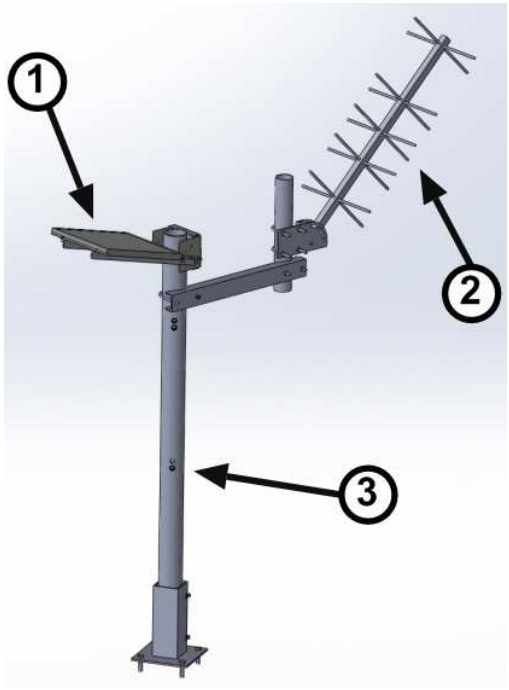
11. ASTPWin software

ASTPWin is the software used to communicate from the acquisition PC to the CU. ASTPwin is not used when having a data transfer by satellite communication protocol.



12. Satellite transmitter (optional)

The satellite transmitter is useful in remote places where no reliable PC is available. It enables to send the data directly to an appropriate geostationary satellite which has a dedicated transmission channel for the CIMEL photometers.



1: Solar Panel Solartek
2: IAGI antenna
3: Mast

1.3. *Sensor head types*

5 different sensor head types exist:

- **Standard:** It uses 340, 380, 440, 500, 675, 870, 937, 1020 and 1640 nm filters
- **Polarized:** A filter wheel containing 3 sets of 3 polarizers operating in infrared (POL1), Ultraviolet (POL2), and visible (POL3) and which are orientated with a 120° angles is added on top of the wheel containing the Standard filters. Additional information about the aerosols nature and shapes can then be retrieved.
- **Seaprism**: It is designed for Ocean Color application. It uses only silicon detectors. It uses 412, 440, 500, 531, 550, 675, 870, 937, 1020 nm filters.
- **BRDF:** it uses 380, 440, 550, 675, 740, 870, 937, 1020 and 1640 nm filters
- **BRDF 12 filters:** It is designed for satellite calibration. It uses 412, 440, 500, 555, 675, 702, 740, 782, 870, 937, 1020, 1640 nm filters.

The sensor head types differs in the presence of an additional wheel filter containing polarisers for the Polarized type, the filters wavelengths mounted in the head sensor, the and the scenario sequence established.
Filters wavelengths are defined in the UV-visible-IR spectrum according to scientific retrieval purposes.

The filters and polarizers curves are delivered with the photometer.

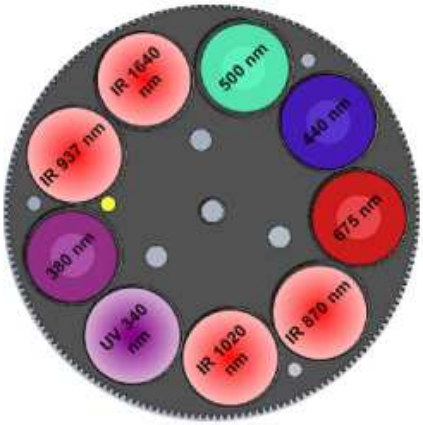


Figure 3: STANDARD option

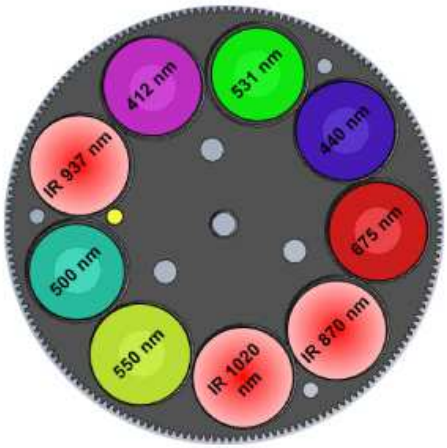


Figure 2: SEAPRISM option

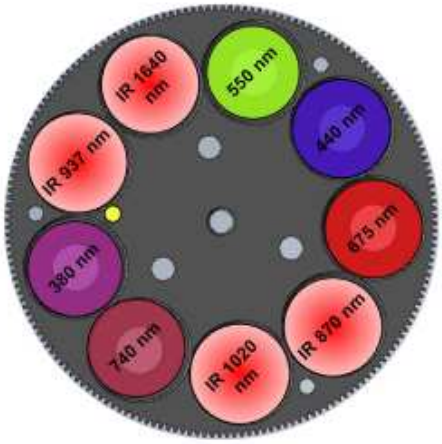


Figure 1: BRDF option

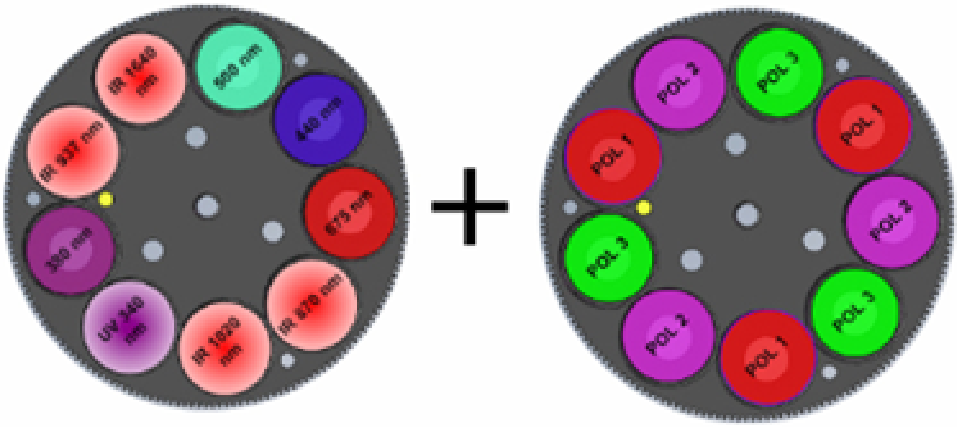


Figure 4: POLARISED option

Figure 5: BRDF 12 filters option

1.4. *Data transmission*

The photometer can use 2 different communication protocols to send its data from the CU.

- PC data transfer using a RS232 link to an acquisition PC. (default data transmission)
- Satellite data transfer using a DCP transmitter module. The proper way to set the module is explained in the Installation chapter.

2 Installation

2.1. *Installation site recommendations*

The site should be chosen carefully in order to comply with the following conditions:

- Easy access to facilitate the weekly maintenance of the device.
- The device should be installed in a clear area where it has the largest field of view as possible so that it can track the sun from sunrise to sunset (no buildings, trees…).
- Less than 100m cable length to a PC (RS232 link mode).
- A support where it can be strongly fixed so that the system is stable (preferably the tripod).

2.2. *Hardware installation and setup*

In this description, notions on how to manually control the photometer via the CU are necessary, it is recommended to read **chapter 3 and 4** to have a better overview of what is done when installing the system.
However the following instructions are detailed enough so that it is not mandatory to read the 2 chapters cited above.
If the tripod system is not used, skip to part 2.2.4.

2.2.1. Needed tools

To install the system, the following tools are needed:

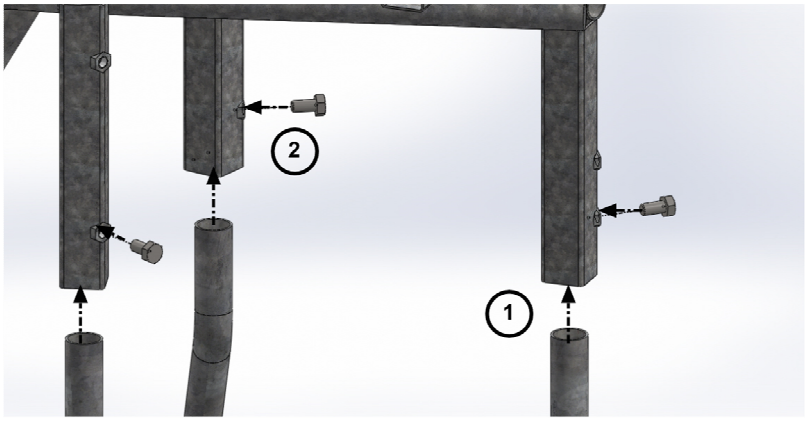
- Open-end wrench size 10.
- Open wrench size 13.

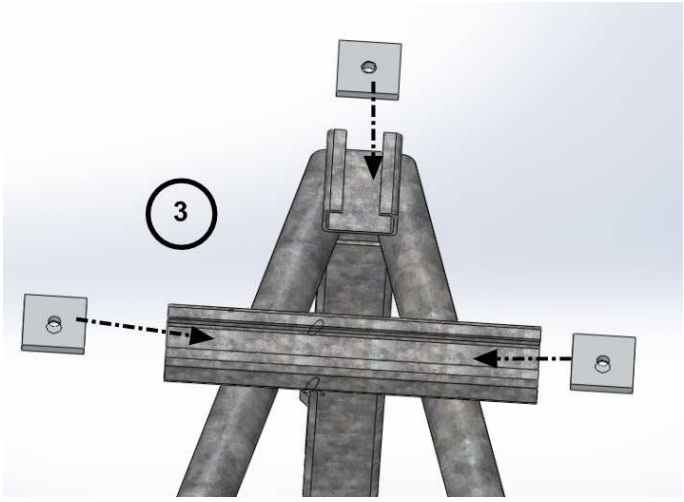
If possible, a tubular spirit level will be used in addition of the robot spirit level to make the installation easier (0.4mm/m accuracy).

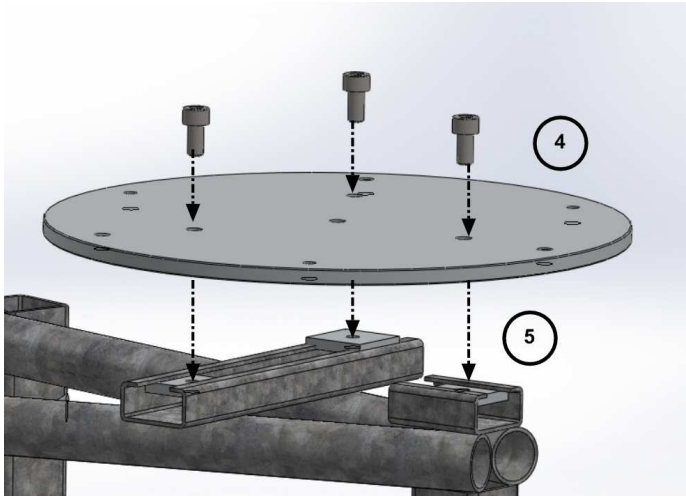
2.2.2. Tripod mounting

The tripod mounting system is designed for easy installation of the photometers in most site conditions.

1. Insert the three photometer tripod feet into the metallic frame.
2. Tight the 3 screws on the tripod feet.
3. Insert the ribs into the slides designed for this.
4. Insert the screw into the tray.
5. Tight strongly the screw into the rib with the tray in between.

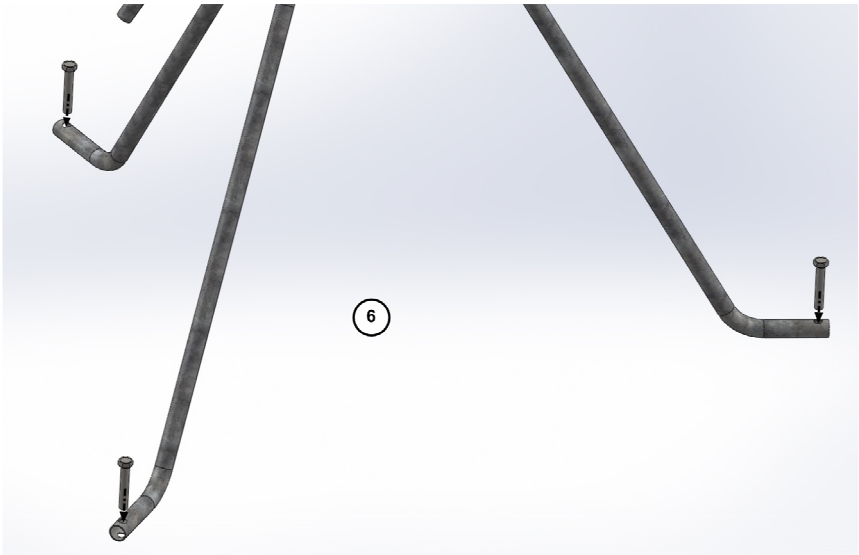


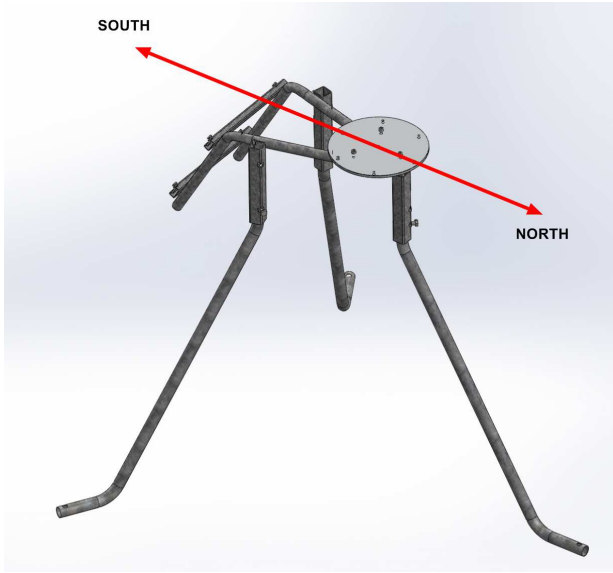




6. Attach the tripod feet to the ground with appropriate screws.

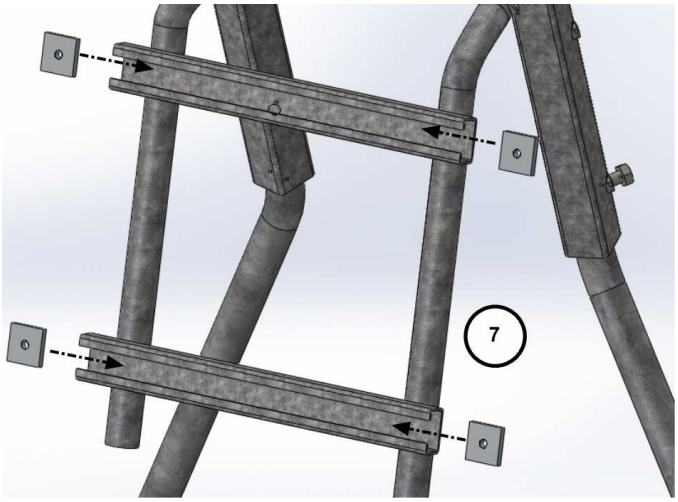
Note: Orientate the protection case emplacement South if the location is in the Northern hemisphere or North if the location is in the Southern Hemisphere.

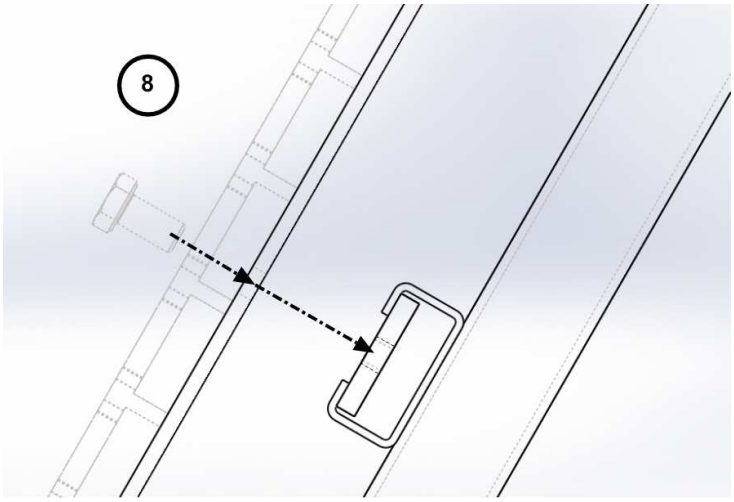




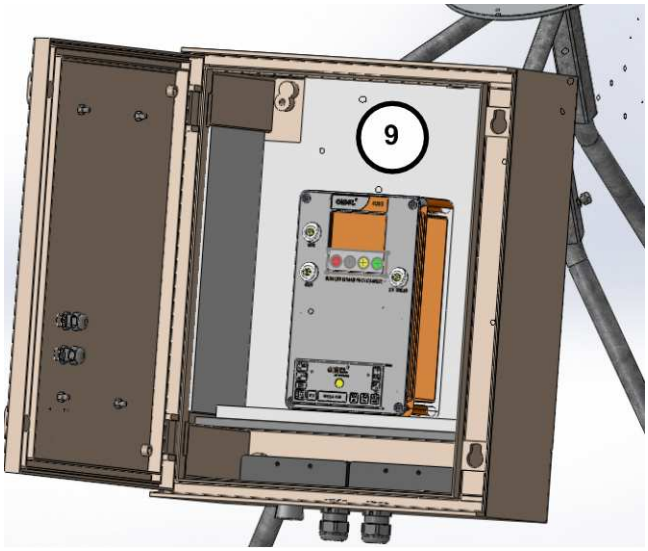
2.2.3. Case mounting

7. Insert the 4 ribs into the metallic frame in order to fix the case.
8. Tight strongly the screw into the ribs with the inside of the case in between.





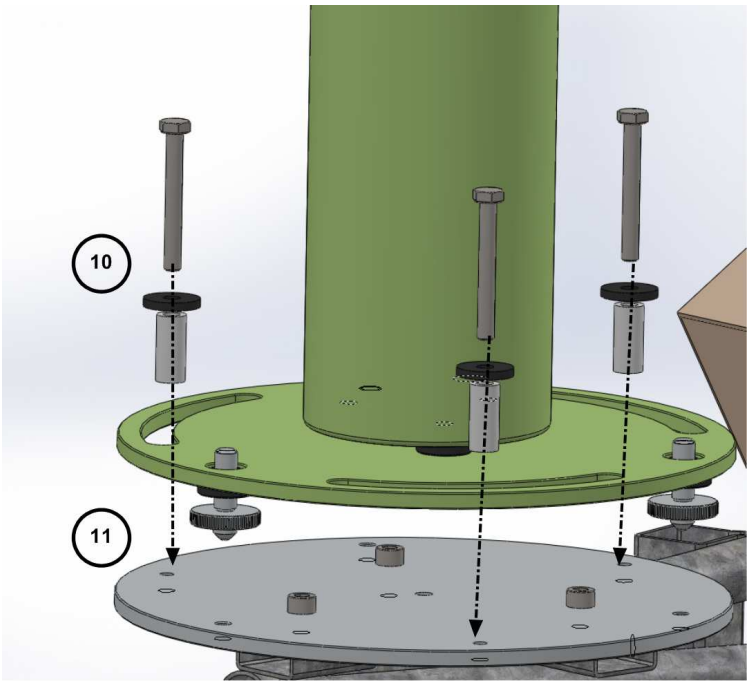
9. Put the foam at the bottom of the case and on the sides, place the batteries and the CU as shown on the picture below.



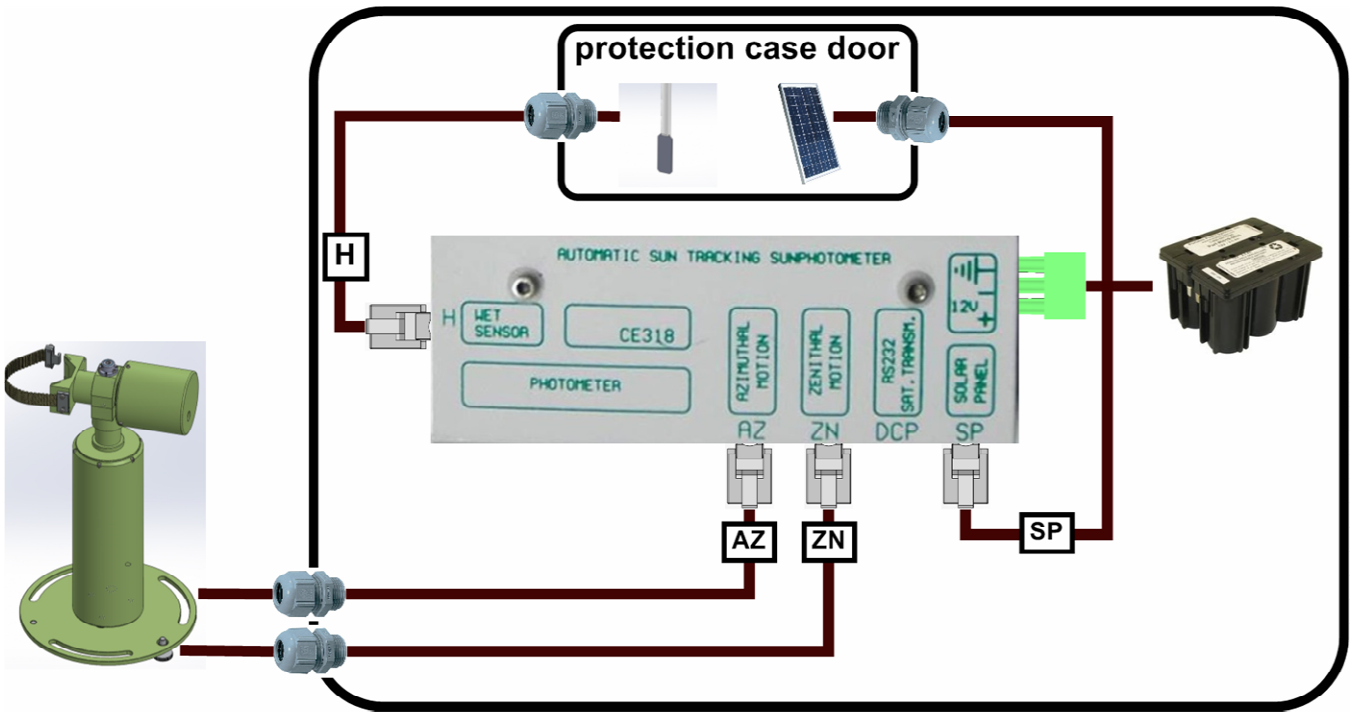
2.2.4. Robot and sensor head mounting

10. Put the screws into white plastic part.

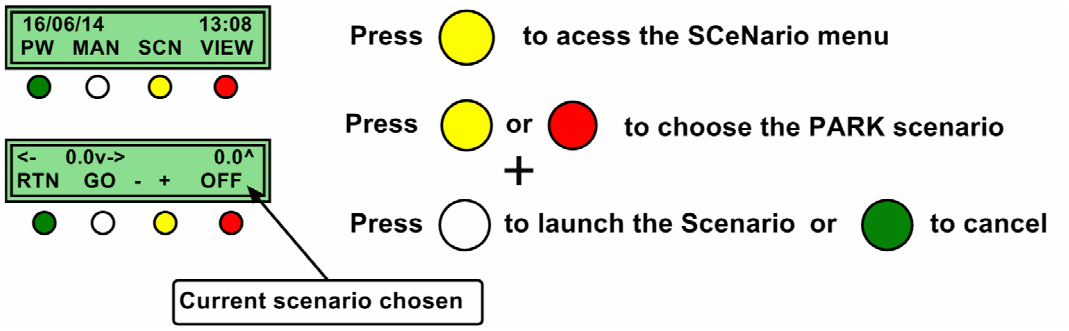
11. Put the screws on the holes trough the robot base but don't tight them to the end, let a 2 or 3 cm backlash so that the leveling that is done in the next part is easier to do.



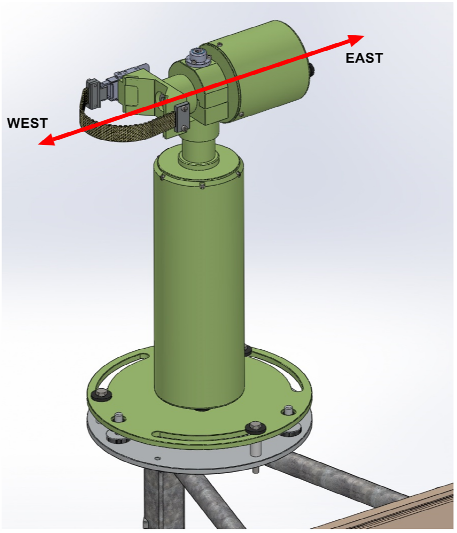
12. Connect AZ (robot AZimuthal motor), ZN (robot ZeNithal motor), solar panel, wet sensor and battery wires to the removable terminal block of the CU passing them going through the cable glands of the protection case.

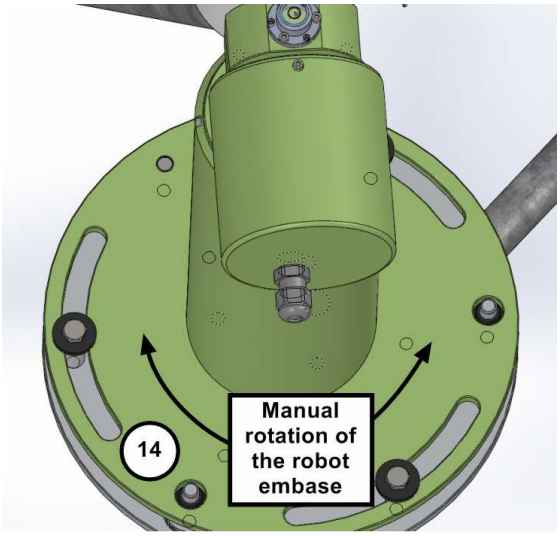


13. Launch a Park scenario in the CU menu. The robot will find its zero position.

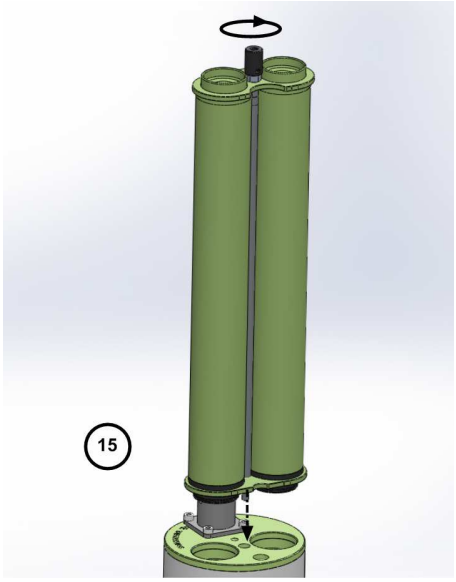


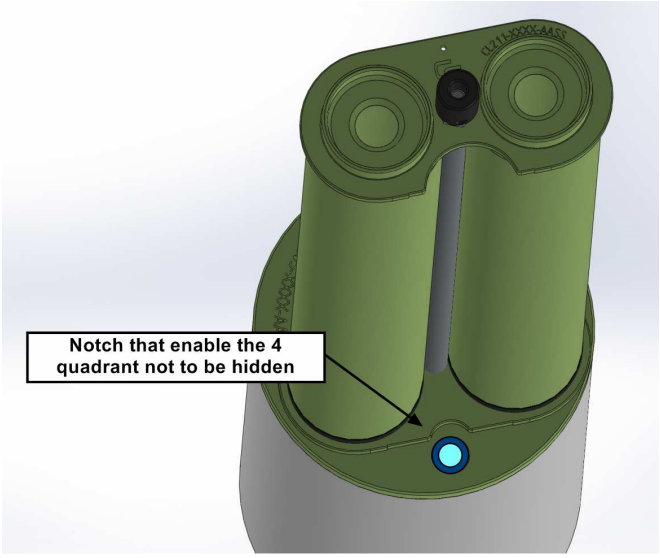
14. Set the horizontal robot axis in the East-West direction by manually turning the whole base of the robot.





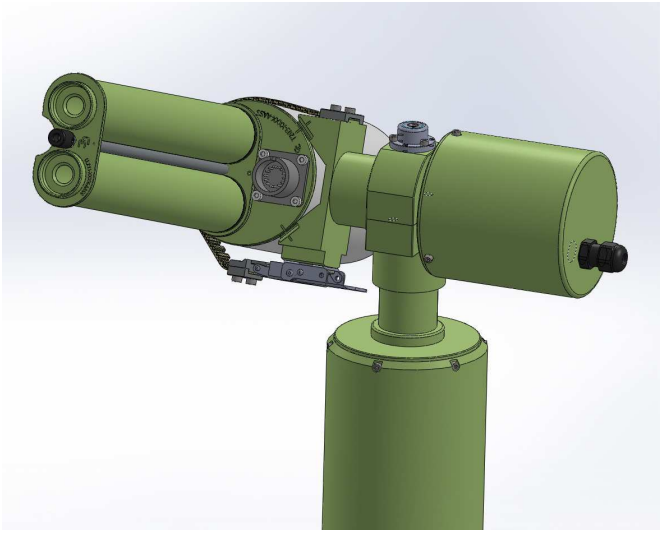
15. Assemble the collimator to the sensor head front plates by tightening the long central threaded rod. The notch must face the 4 quadrants lens on the sensor head frontplate.

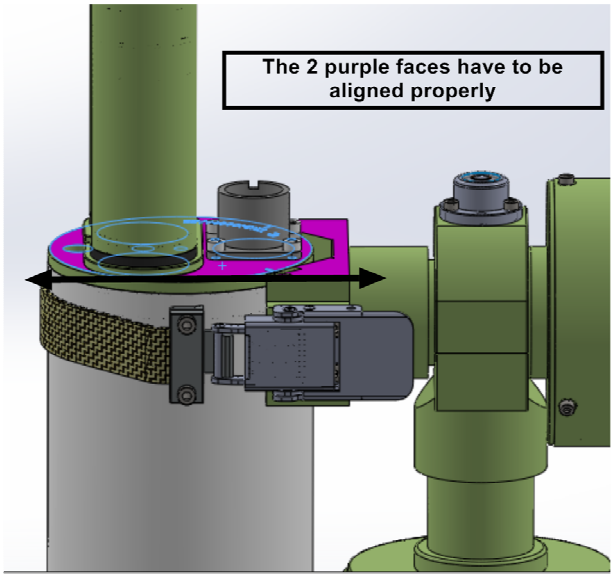


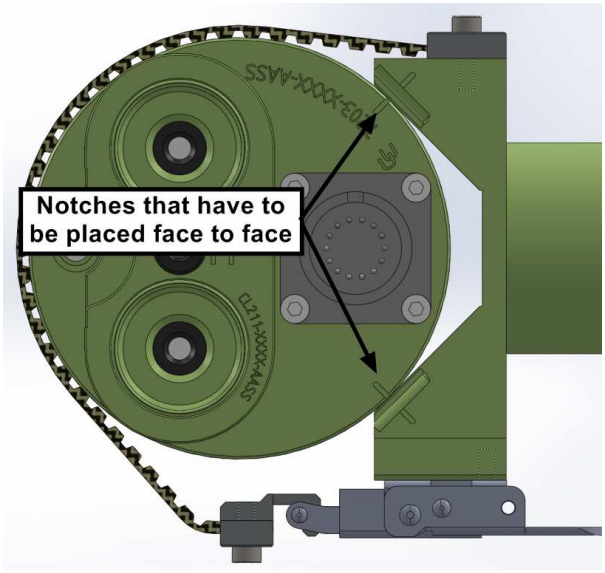


Note: Watch out that the collimator and the sensor head are completely interdependent. There should be no slack while trying to move the collimator after having tightened it.

16. Strap the sensor head on the V-shaped support of the robot. Two things are to be checked. First align the sensor head front plate with the upper surface of the V-shaped support. Then use the notches present both on the robot and the sensor head as a visual indicator to position the sensor head correctly. Notches have to be aligned.

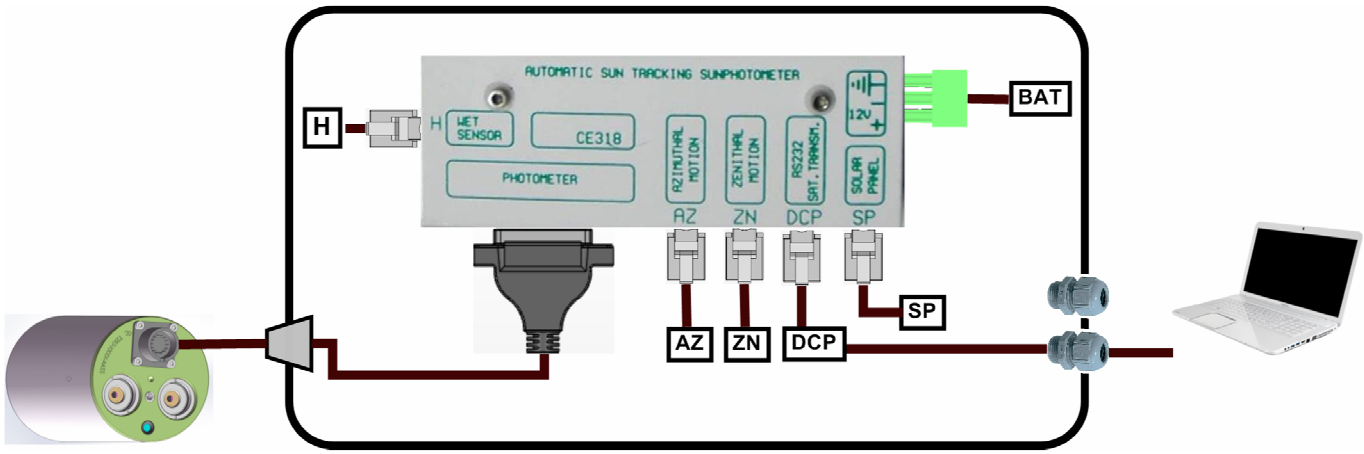


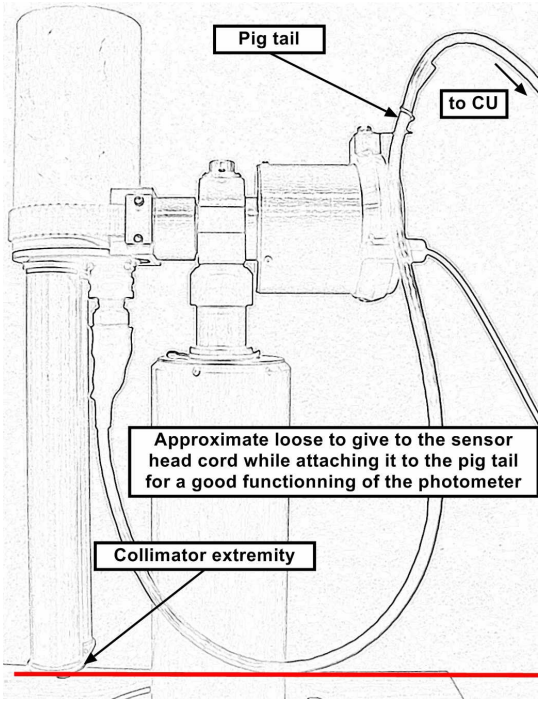




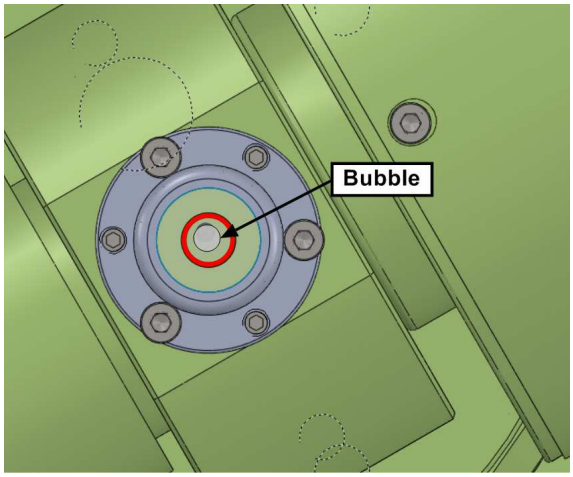
17. Plug the sensor head cord from the CU to the sensor head passing it through the cap and attaching it to the pig tail. Connect the computer or the transmitter to the DCP input on the removable terminal block via a RS232 to RJ11 cable.

Note: A sufficient slack has to be maintained so that the head sensor cord will not be too much extended while the device is operating, which can lead to the malfunctioning of the photometer.





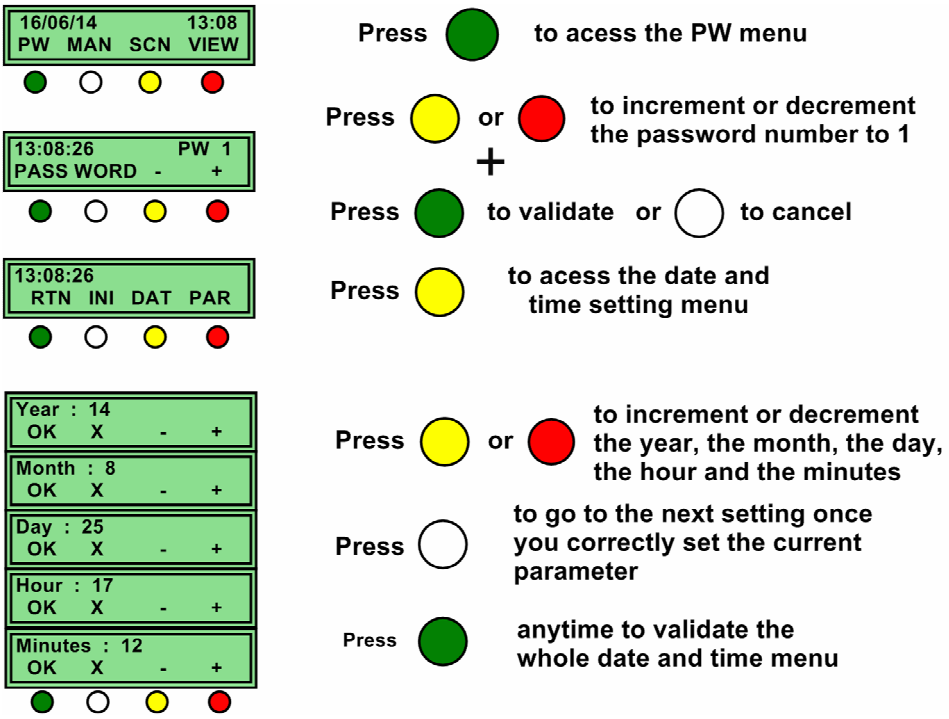
18. Level the robot up so that it's perfectly horizontal by playing on both precision wheels until the spirit level on the top of the robot is centered. This part is a little tricky and may take few trials. Using an additional tubular sprit level may facilitate this step.



19. Setting the date and the time UT in the AU menu

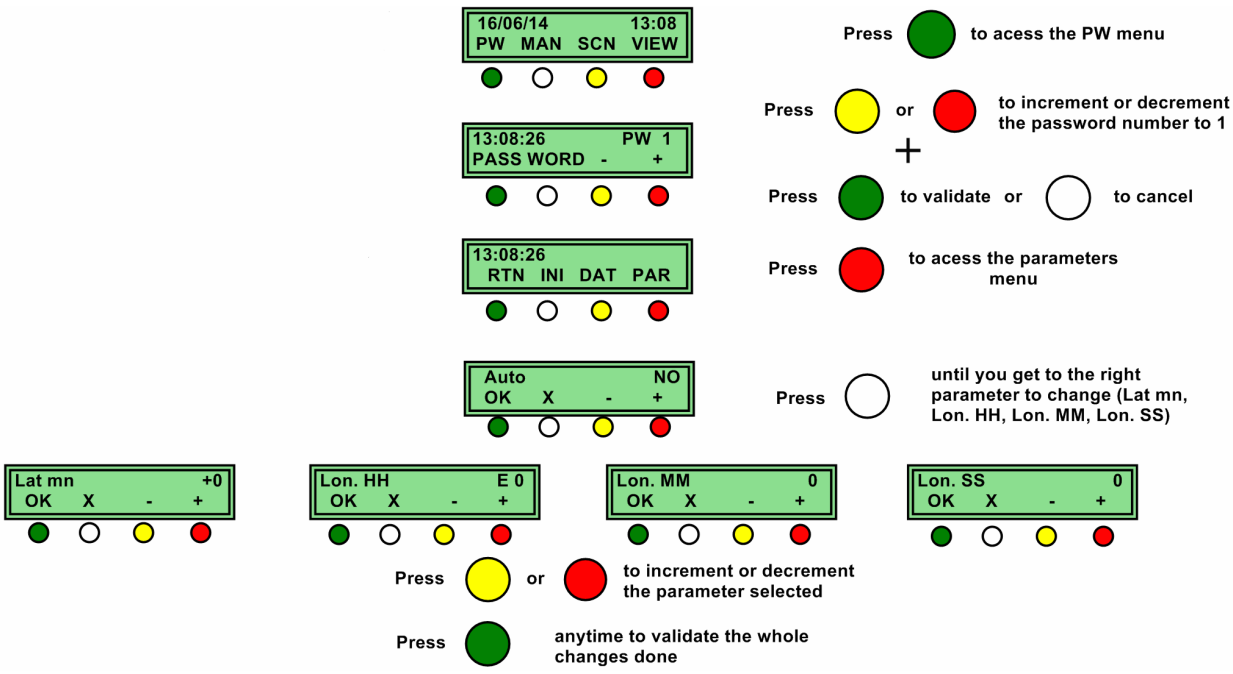
Important note 1: the time set is UT. If you are not sure about it, please visit this website to get it:
http://fr.thetimenow.com/utc/universal_coordinated_time

Important note 2: seconds can not be set, wait until a whole minute is coming and validate the time at this point more or less 2 seconds. For instance, validate the time when it's 14:05:00 or 17:18:00.



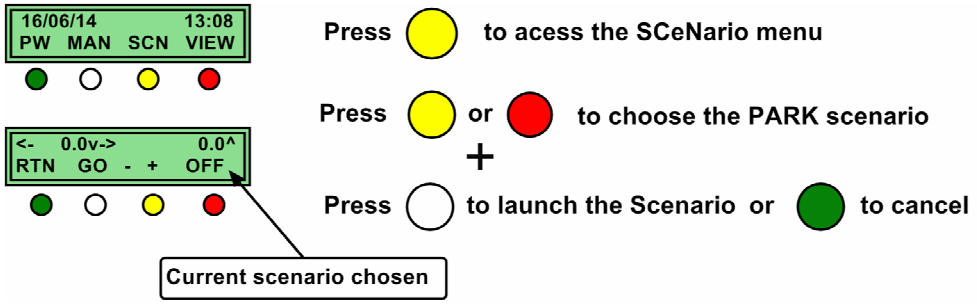
20. Set the GPS coordinates in the CU menu

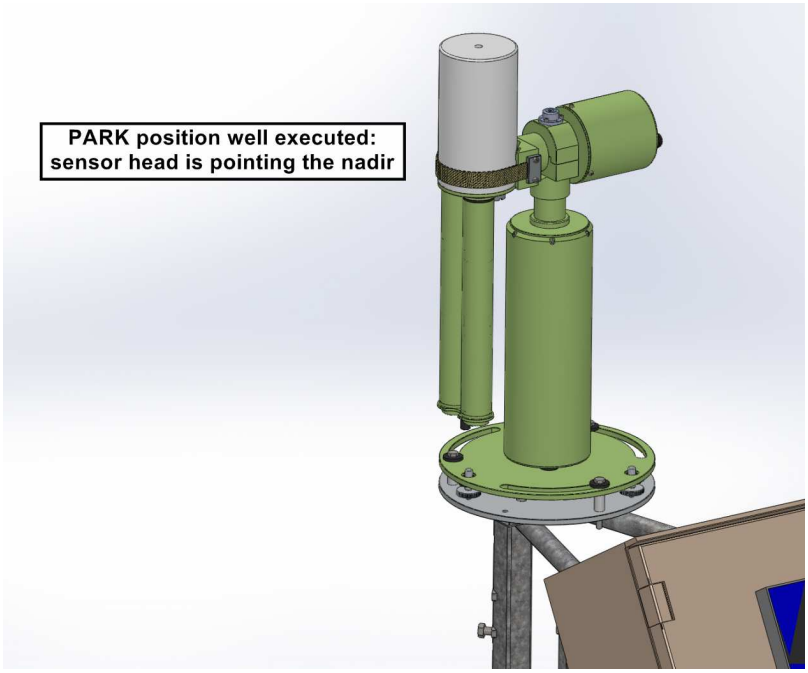
Important note: the coordinates are entered in hours, minutes and seconds. Therefore you may have to convert your GPS position if not into the good units.
This conversion can be done in ASTPWin software. Refer to part 5.



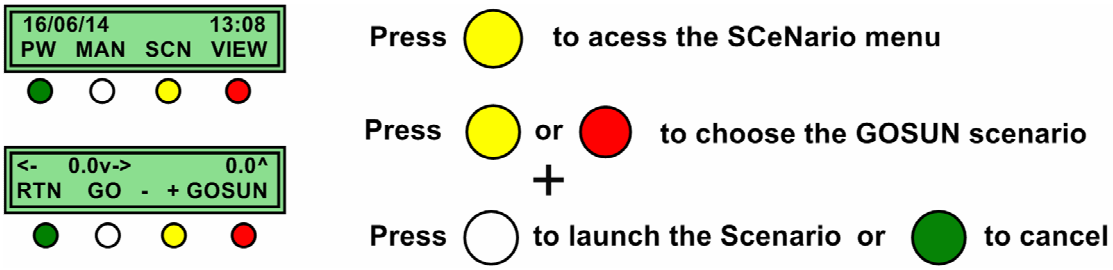
21. Launch a Park scenario in the CU menu. The photometer head will find its PARK position which is the nadir on the zenithal angle (head orientated down).
If the head is pointing to zenith (orientated up), unstrap the sensor head, reposition it in the opposite sense in the straps and do step 13 again.

Note: Place the spirit level on the robot V-shaped part after the PARK scenario. It should be perfectly horizontal, if not refer to part 5.2.2.

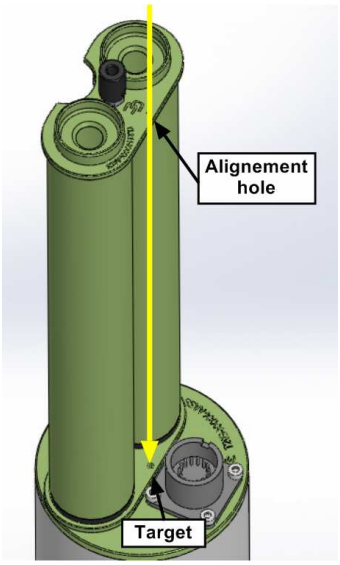


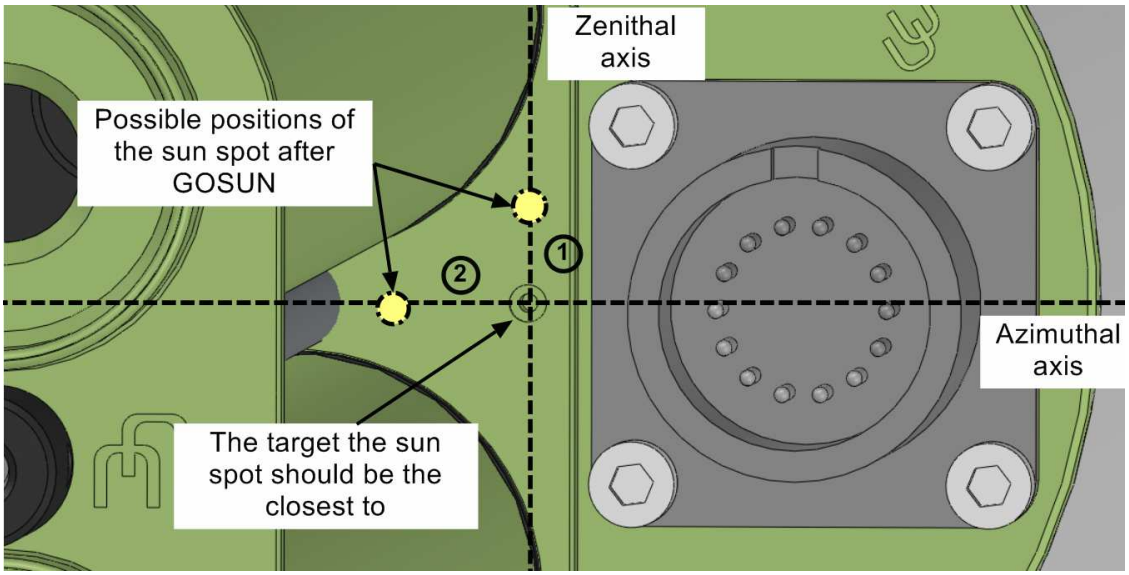


22. Launch a GoSun scenario in the CU menu. The optical head is going to point the sun.



After a GOSUN scenario the sun spot may not be centered on the target.



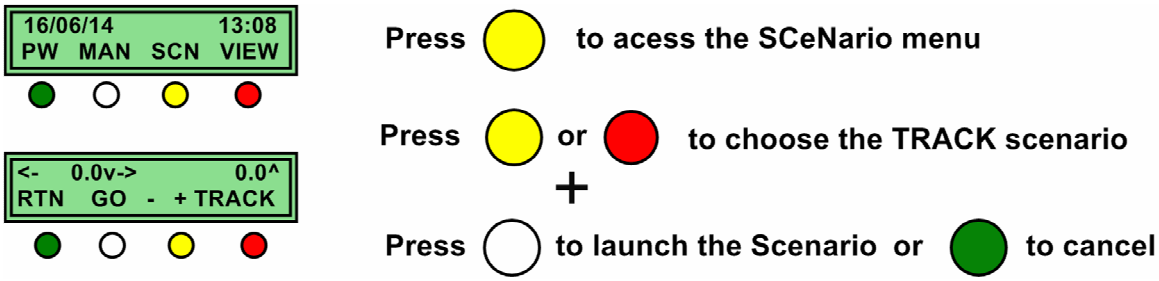


If not correctly centered on the zenithal axis, check the GPS coordinates and the time set, then repeat step 21, 22. The error on the zenithal axis should be inferior to 1 mm as long as the spirit level is well centered (if superior refer to part 5.2.2).
If not centered on the azimuthal axis, refine the manual positioning of the robot base as done in step 14 (the screws being loosen the base can still be moved).

After having done the corrections, repeat steps 20 and 21 to check again the position of the sun spot. Repeat the correction until the sun spot is almost perfectly centered on the target. (few millimeters off maximum)

Note: The centering error will be compensated by the 4 quadrant sensor in the TRACK process described in the next step

23. Launch a TRACK SUN scenario in the CU menu. The robot will follow the sun move. Check that the sun spot is centered on the target at the end of the scenario. If a problem occurs, please read part 5.3.2.



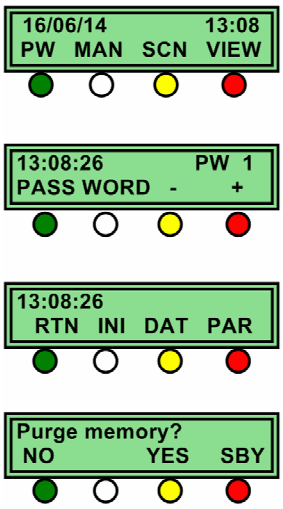
Using a 4 quadrant sensor, the TRACK SUN scenario is guiding the robot to the point where the intensity of the signal on both Silicon and InGaAs channel is the highest. This intensity is corresponding to the center of the sun.

24. When the track is done correctly, repeat step 18, 19 and 20 once or twice to validate the photometer behavior.

25. Tight the screws into the tray to fix the robot without changing its position.

Important note: watch out that the level didn't move. If the level moved, go back to step 18 and after repeat step 20, 21, 22.

26. Purge the memory



Press to acess the PW menu

Press or to increment or decrement the password number to 1

+

Press to validate or to cancel

Press to acess initialize the memory

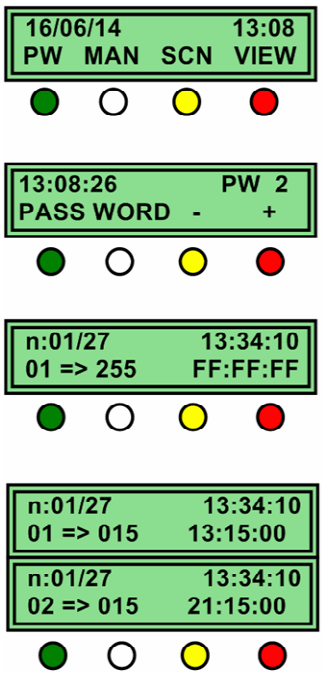
Press validate the purge

Press to cancel

27. Enter the PC scenarios in the CU. It enables the CU to send its data twice a day to the acquisition PC (only in RS232 mode)

You have to affect the action number 015 to the first and second scenario, the number 015 being the data transfer to the acquisition PC and put two different schedules, one in the middle of the day and the other at the end.

Important note: it's better not to enter a whole hour to avoid overload in the data transfer.



Press to acess the PW menu

Press or to increment or decrement the password number to 2

+

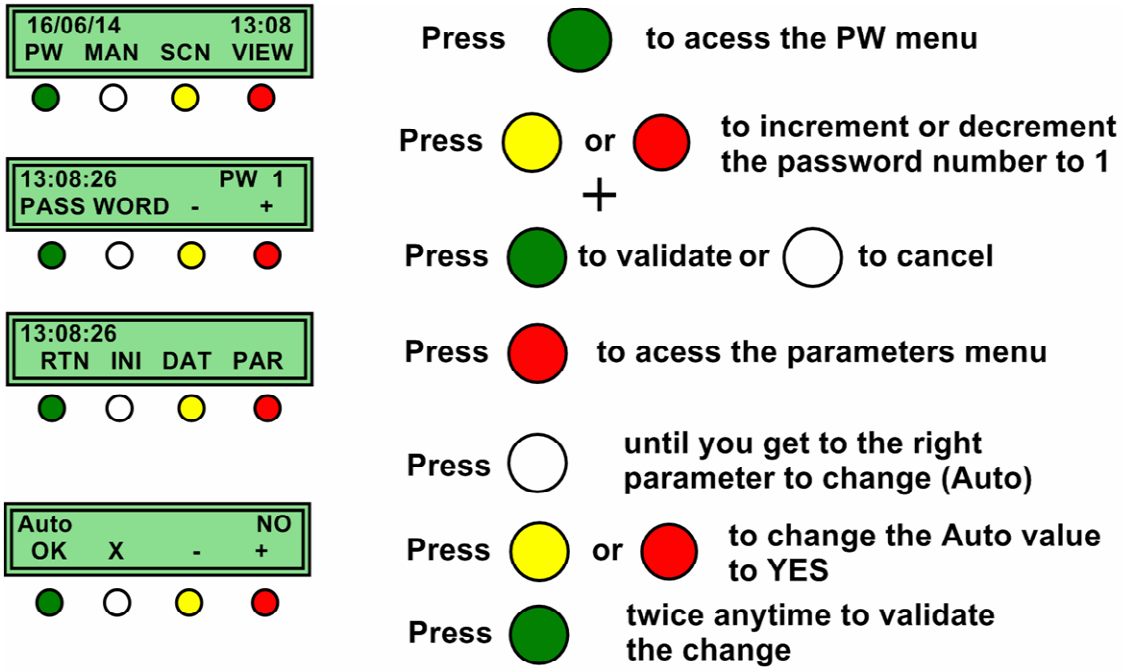
Press to validate or to cancel

Press to modify the parameters (FF:FF:FF and 255)

Press or to increment or decrement the parameter selected

Press anytime to validate the whole changes done

28. Switch the photometer in automatic mode



Your photometer installation is finished for the hardware part. We are now going to describe the software installation and configuration for the FTP mode and the satellite transmitter installation.

2.3. *Communication protocol installation and configuration*

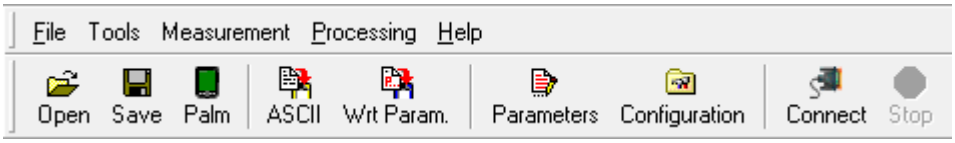
2.3.1. RS232 communication

If you chose to transfer the data from the AU to a PC via a RS232 link, then follow the steps described below:

- Install ASTPWin on the computer

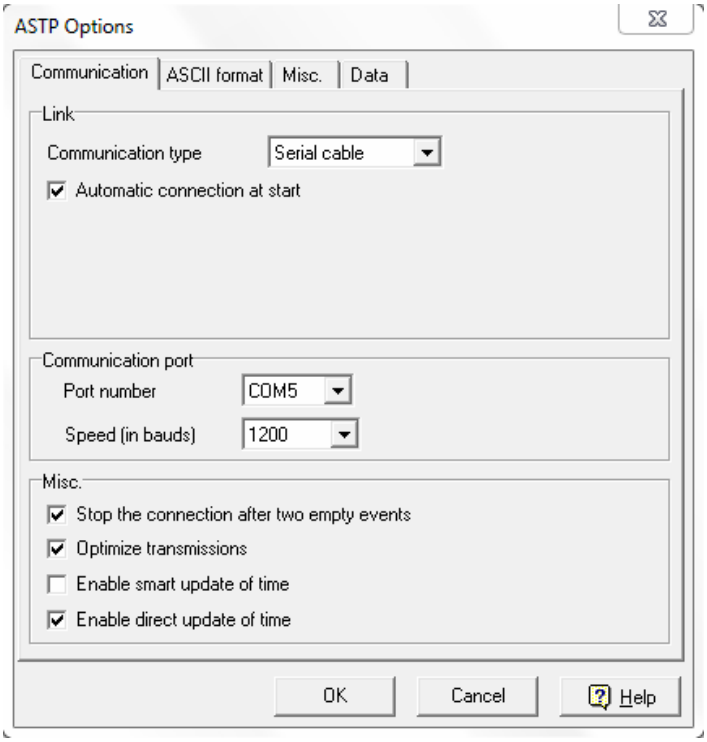
The software is provided on the USB stick sold with the instrument and can be downloaded on Cimel website.

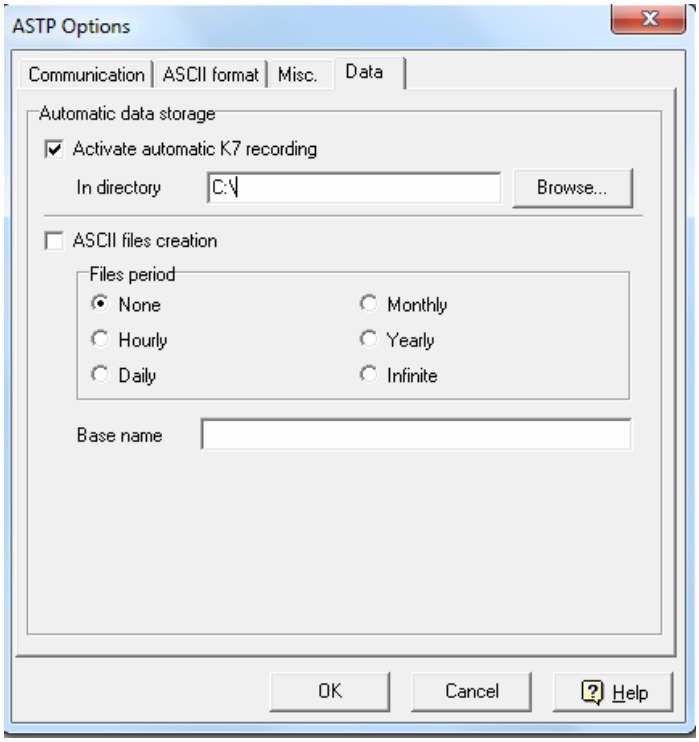
- Launch and configure ASTPWIN in the **tools → general setup** menu



In the **communication tab**:
→ Tick automatic connection when starting.
→ Tick stop connection after two empty events.
→ Tick optimize transmission.
→ Tick allow direct time setting.
→ Choose the right port COM where the photometer is plugged.
→ Set the bauds speed to 1200.

In the **data tab**:
→ Tick automatic data recording
→ Define the folder the data are going to be recorded in





- Click on **connect** to establish the communication with the photometer

The Photometer is set. The first measures will be sent to the PC at the time defined in step number 27 in hardware install and configuration.

The computer has to be configured in order to avoid at the maximum human intervention especially in case of blackout by applying the following changes in the PC setup:

- Put ASTWin icon in the Windows start folder
- Remove any password request while starting the computer

Control panel →User account

- If possible, an uninterrupted power supply (UPS) should be installed and the PC bios configured so that it restarts automatically after a power cut. (see with the local pc expert)

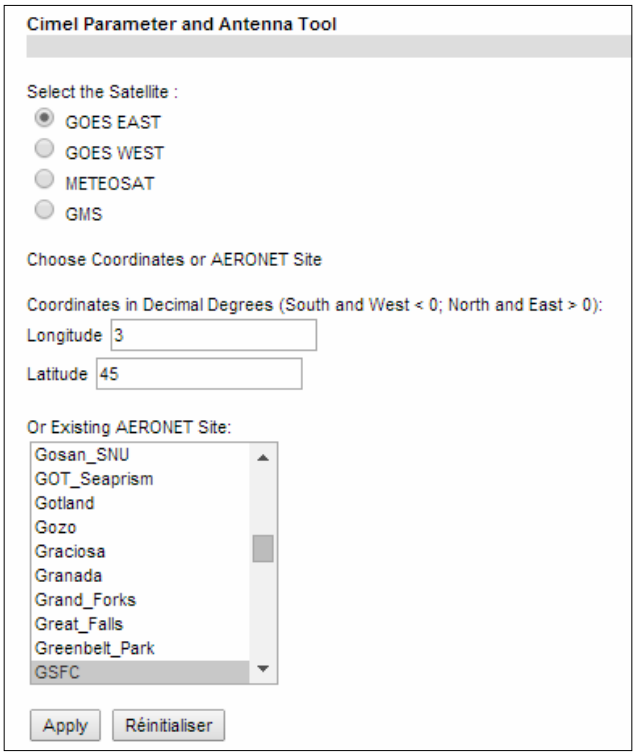
For AERONET members, follow AERONET instructions to install the automatic protocol for data transfer to AERONET central system.

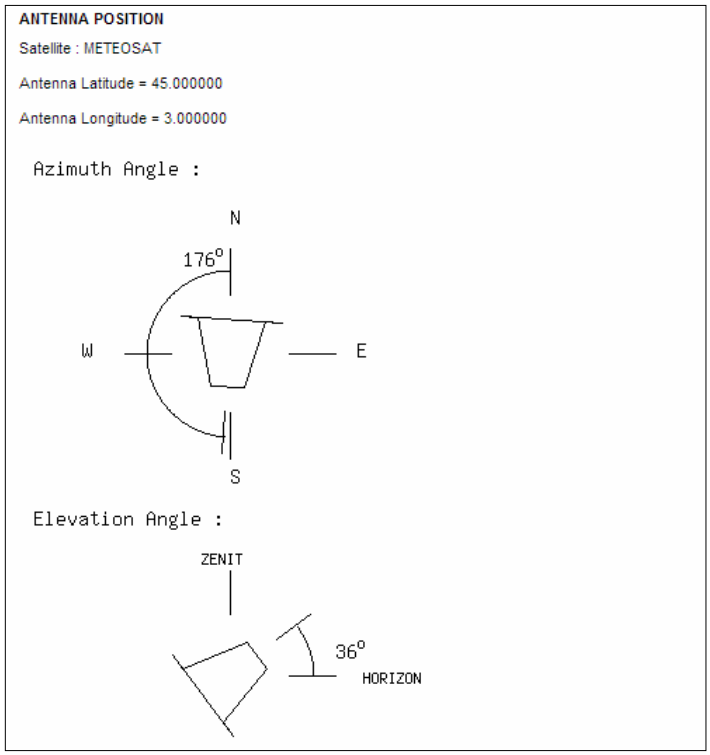
2.3.2. Satellite transmission installation and configuration

The satellite transmission of the data is done using a Satlink 2 logger and transmitter model SL2-G312-1 and a IAGI antenna. The satellite which will receive and transmit the data depends on the geographic location, it can be GOES, MSG… the satellite has dedicated communication channel that can be attributed to the Satlink2.

First of all, to install properly the IAGI antenna, the azimuthal and zenithal angles corresponding to the satellite the antenna will point to must be known.

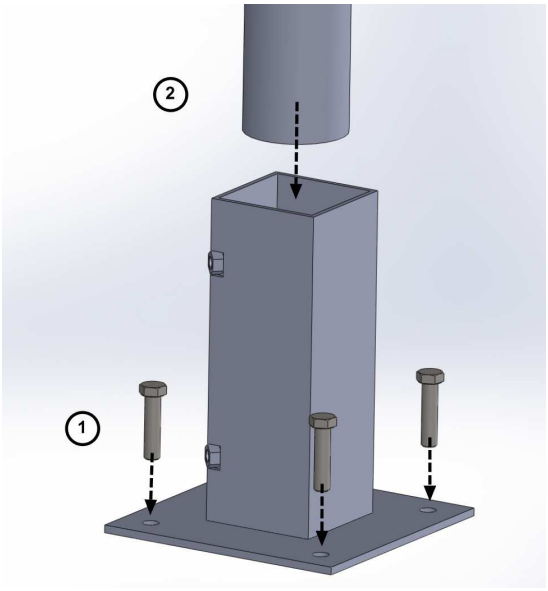
The following website enables to get these angles:
http://aeronet.gsfc.nasa.gov/new_web/antenna.html
Choose the satellite the data will be sent to, the registered AERONET site or the coordinates of the photometer's location if not in AERONET database and click apply. (Here is an example for long 3° and lat 45°)

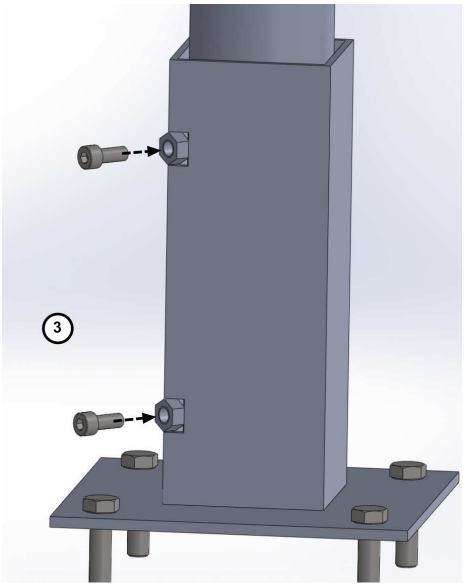




2.3.2.1. Transmitter and antenna installation

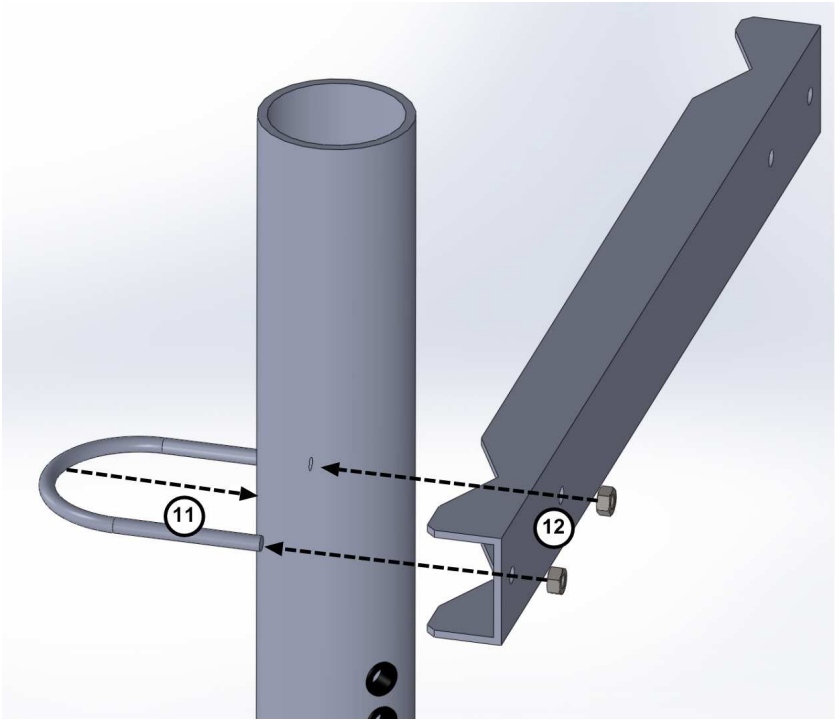
1. Attach the mast support in the ground.
2. Insert the mast into the mast support.
3. Tight the screws to fix properly the mast.

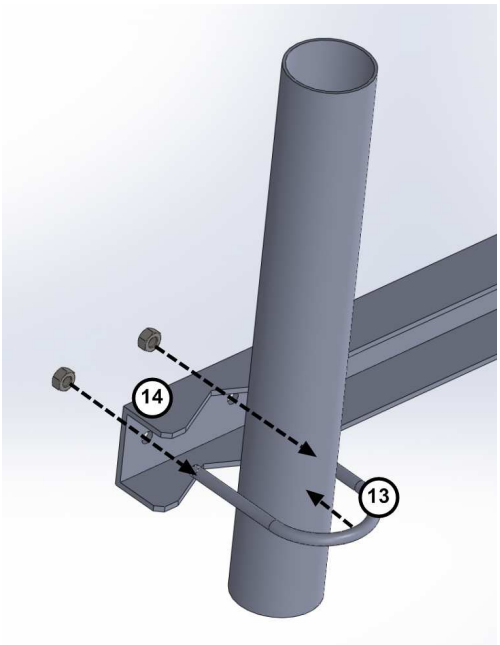




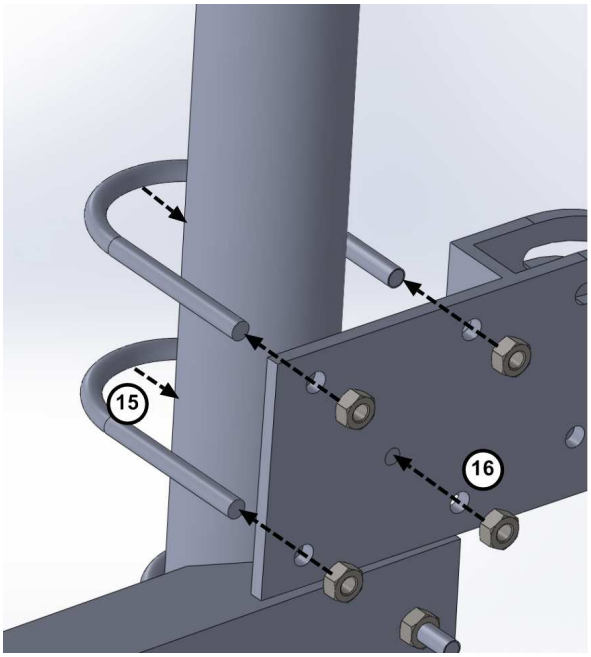
.

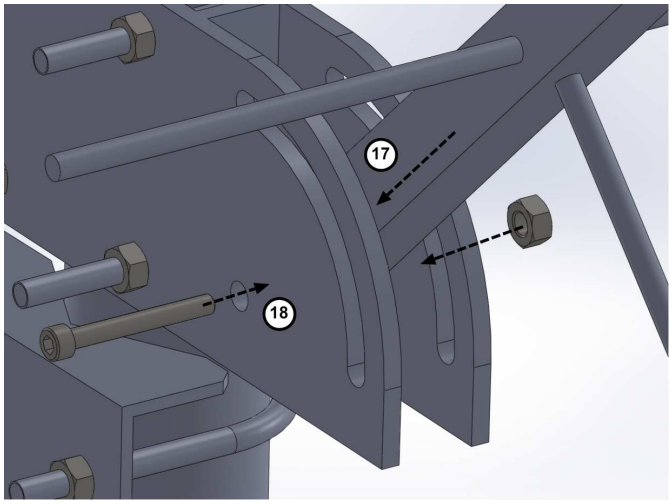
4. Slide the stirrup through the mast until it gets to the end position.
5. Insert the V-shaped part in the stirrup extremities with the mast in between and tight strongly the nuts.



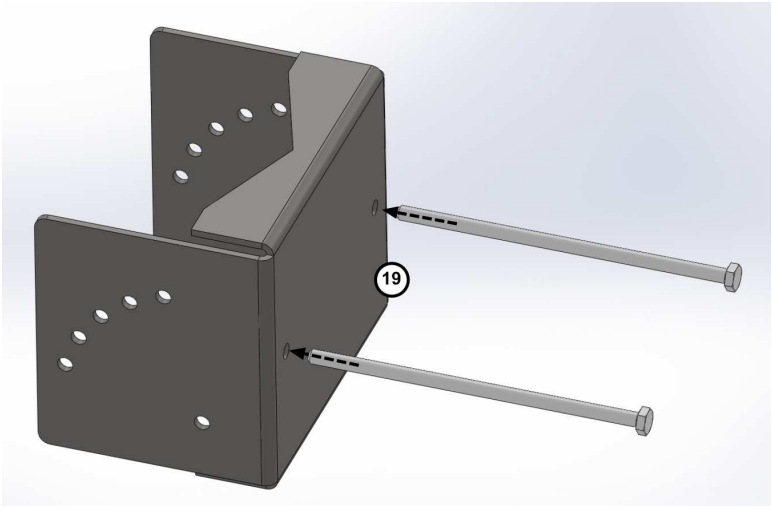


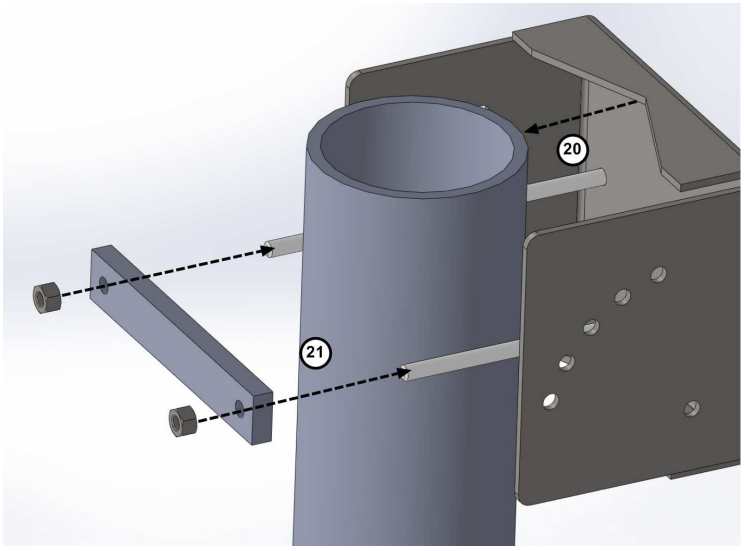
6. Insert the stirrup extremities in the V-shaped part with the tubular metallic part in between to fix it.
7. Tight the 2 nuts slightly.
8. Insert the IAGI antenna support in the stirrups with the tubular metallic part in between.
9. Tight the 4 nuts.
10. Insert the IAGI antenna into its support.
11. Insert the screw in the IAGI antenna support and the Antenna and tight the nut to the opposite side.



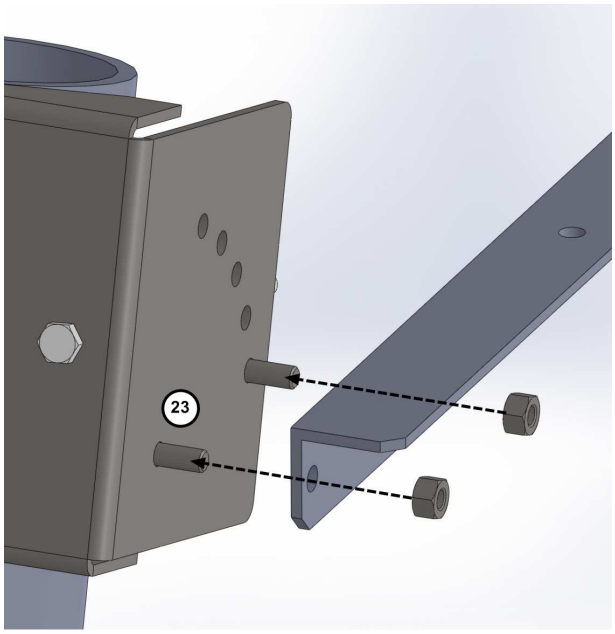


12. Insert the 2 white screws into the V-shaped part.
13. Put the white screws around the mast.
14. Insert the fixing flats into the whites screws until it gets in contact with the mast and tight the 2 nuts.

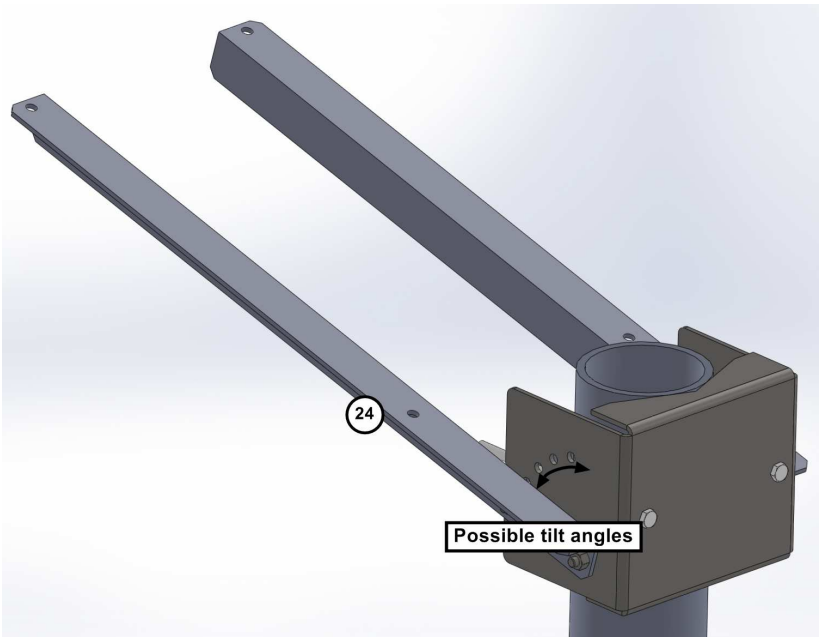


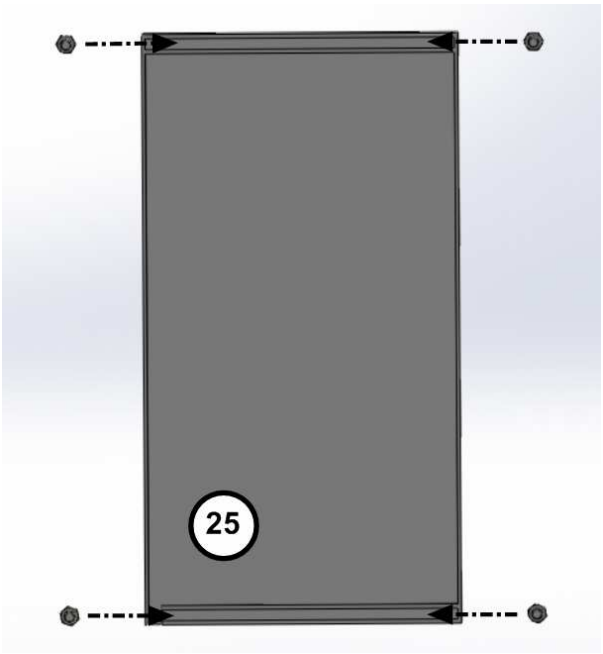


15. Insert the screws in the holes of the V-shaped part according to the tilt angle wished for the solar panel.
16. Insert the panel brace in the screws and tight the bolts strongly.

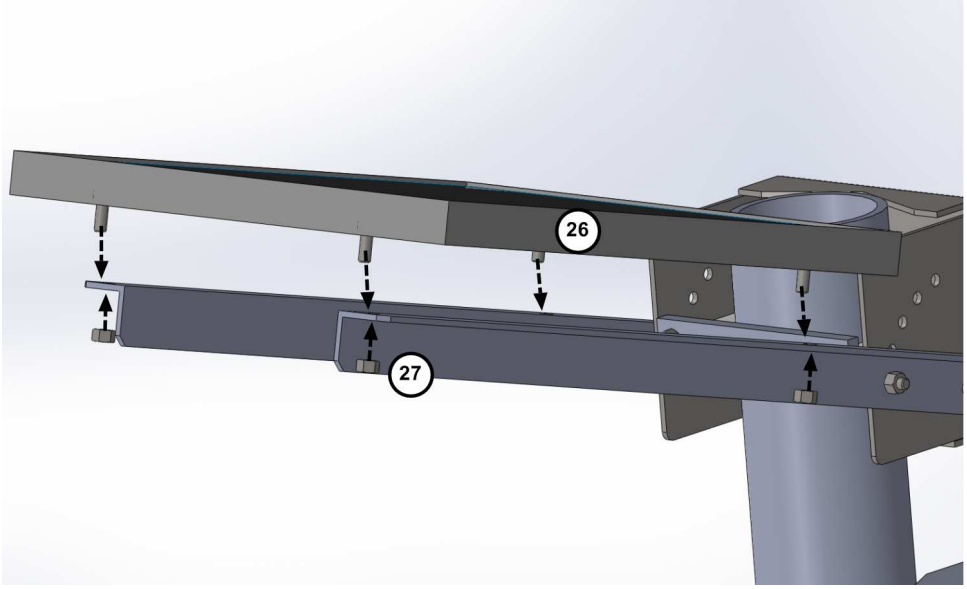


17. Repeat step 22 and 23 with the second panel brace.
18. Insert the screws in the solar panel slides.

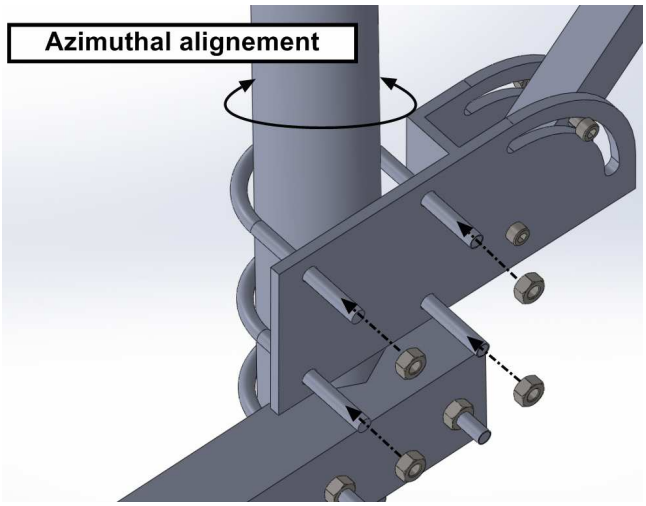


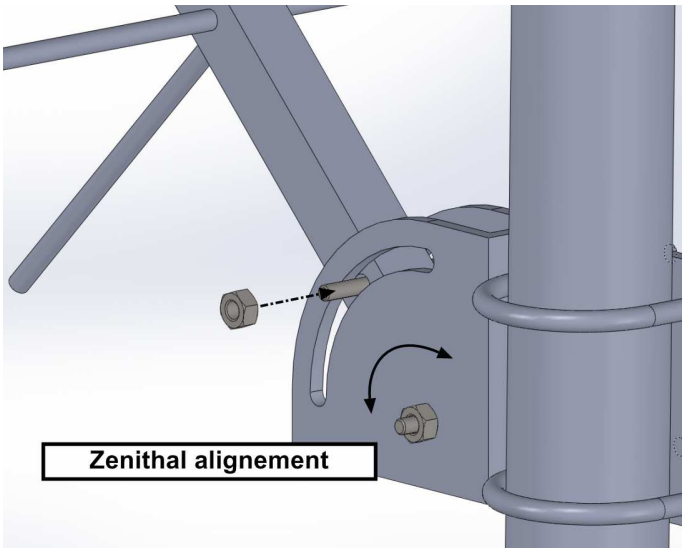


19. Insert those screws in the panel braces.
20. Tight the bolts to fix the solar panel properly.



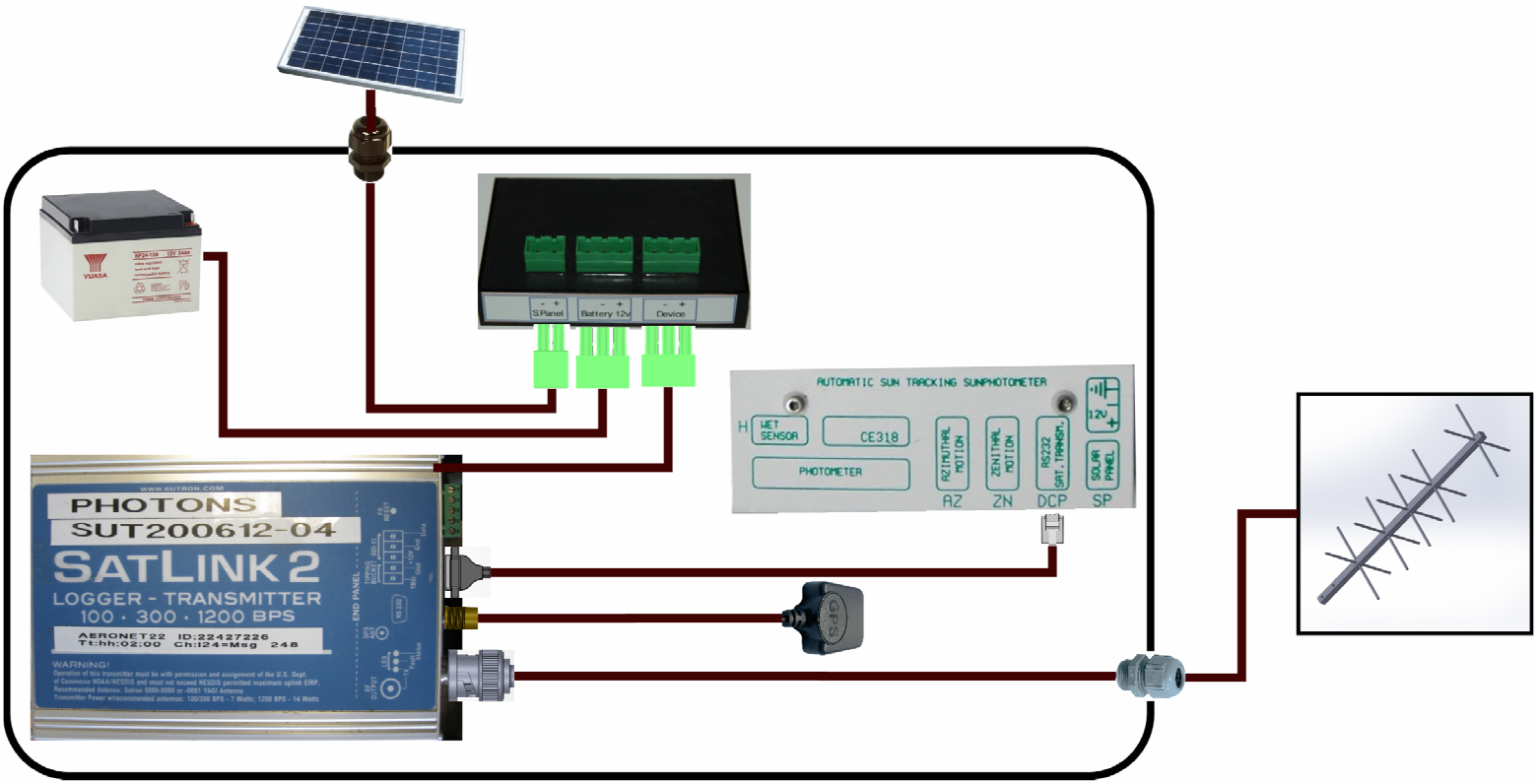
To align correctly the antenna in the azimuthal plan, turn the antenna support to the right direction after having loosen the nuts.
To align correctly the antenna in the zenithal plan, slide it into the support and tight the nut when the direction is right.





21. Connect the transmitter RF Output to the antenna with a RG-8 cable (not provided).
Connect the photometer DCP output to the transmitter RS232 input with the appropriate cable and adaptor.
Power the transmitter using the regulator, the 12 V batteries and the solar panel.
Connect the GPS device to the transmitter GPS antenna input (optional)

Note: It is advisable to buy the cable once the distance there will be between the transmitter and the antenna is approximately known.
Note 2: Check the LED status for a few minutes after having powered the system. If the green led is flashing every 5s, the satellite is correctly set. Otherwise check the Sutron manual to know where the malfunctioning is coming from.
Note 3: A picture showing how the elements are disposed in the protection case is available at the end of the document and is also sticked in the protection case to facilitate the installation.



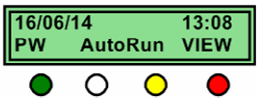
2.3.2.2. Transmitter configuration

The satellite transmitter configuration is already set by the network administrator on which the instrument is declared (AERONET, PHOTON, CSIRO…) when sent.

3 CU navigation menu

3.1. *Basic Display*

There are two basic displays on the CU screen when getting out of the sleep mode, one when in manual mode and one when in automatic mode. 4 colored buttons enables you to navigate in the menu to set, validate, and cancel parameters.

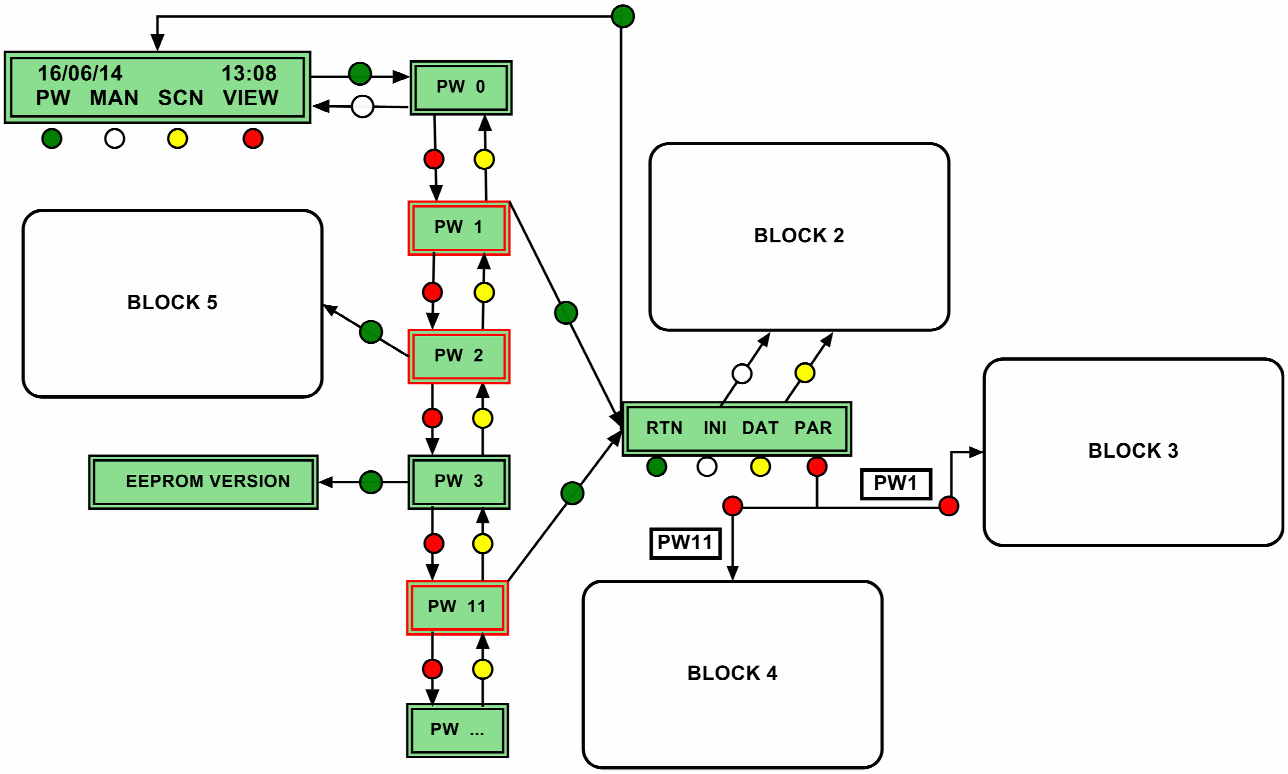


Note: It's very important to know the mode of the device when manipulating. Indeed the photometer should be in Automatic mode anytime except when installing and maintaining the device.

3.2. *PW menu*

The **PW menu** enables to parameterize the photometer. It is accessible in both modes. Here is a full description of the menu.

The **Block 1** shows how to navigate in the PassWord menu. The **PassWord 3 menu** enables to see the EEPROM version of the CU.



The **Block 2** corresponds to the **Password 1 and 11 menu.** It enables to set the following parameters:

- **DAT**: set the year, month, day, hour and minutes in time UT.
- **INI**: purge the memory of the CU.

Note: The customized scenario you entered in PassWord 2 (block 5) will be deleted.

The **Block 3** on the diagram corresponds to the **PassWord 1 PAR menu**. It enables to set the following parameters:

- **Auto**: YES to set the photometer in automatic mode or NO to set it in manual mode.

Note: the photometer can't be set in manual mode when a scenario is running. "*Scen… running…*" will be displayed on the screen if trying. You have to wait until the end of the measurements to modify this parameter.

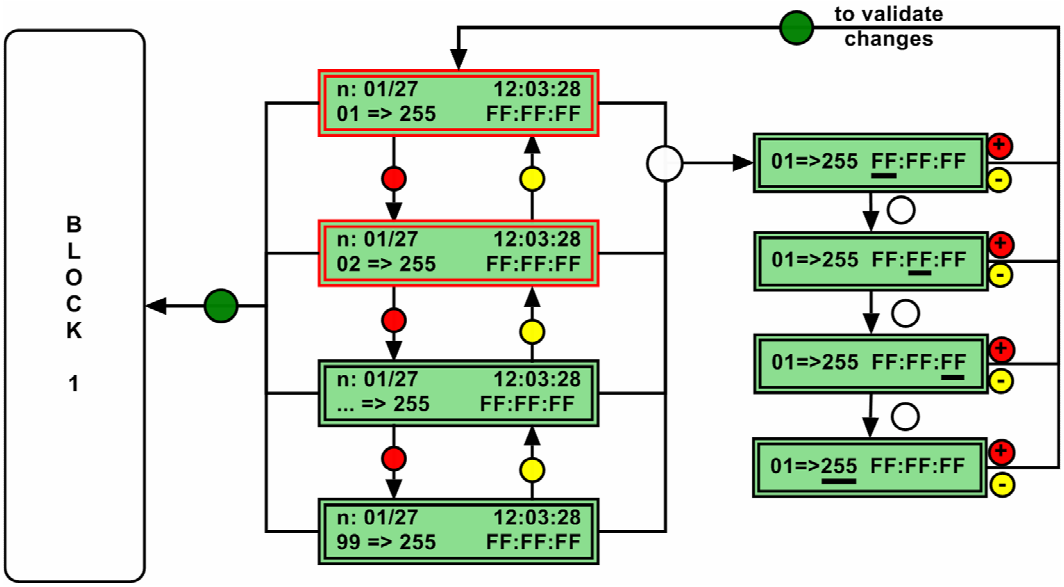
- **Country**: Identification of the photometer by its country code.
- **District**: Identification of the photometer by its district code.
- **Number**: Identification of the photometer by its assigned number.
- **BCL sky**: YES to activate additional sky measurements to the zenith when the cloud cover is important or NO to follow the normal operation.
- **Man => DCP**: YES to authorize the DCP to transmit the measurements carried out in manual mode or NO to transmit only the automatic measurements.
- **DCP max**: set the maximum number of octet transmitted by the DCP.
- **BCLSUN mn**: Set the interval of time between two sun measurements in the BCLSUN scenario (from 0.5 to 63.5 mn).
- **Org.H**: Azimuthal robot offset.
- **Org.V**: Zenithal robot offset.
- **Lat mn**: Set the latitude of your photometer location in minutes of arc.
- **Long. HH**: Set the longitude of your photometer location in hourly angle (Hours), in absolute value with E if you are Eastward of Greenwich meridian or W if you are westward of Greenwich meridian.
- **Long. MM**: set the latitude in hourly angle (Minutes).
- **Long. SS**: set the latitude in hourly angle (Seconds).

The **block 4** on the diagram corresponds to the **PassWord 11 PAR menu**. It enables to set the following parameters:

- **Fu1, Fu2, Fu3, Fu4, Fu5, Fu6**: SUN gain respectively associated to the 1020, 1640, 870, 670, 440, 500 nm filter.
- **Fw7**: SUN gain associated to the 937 nm filter.
- **Fo8, Fo9**: SUN gain respectively associated to the 380, 340nm filters
- **Fi1**: 1020nm measured on the InGaAs detector.
- **FA1, FA2, FA3, FA4, FA5, FA6**: AUREOLE gain respectively associated to the 1020, 1640, 870, 670, 440, 500 nm filter.

- **FK1, FK2, FK3, FK4, FK5, FK6**: SKY gain respectively associated to the 1020, 1640, 870, 670, 440, 500 nm filter.
- **ScanK_500, ScanK_380, ScanK_340 (ONLY with Polarized)**: Yes to activate measurements with the 500 nm, 380 nm or/and 340 nm filters for a Principal Plane and Almucantar scenarios.
- **AlmPol (ONLY with Polarized)**: Yes to activate Almucantar polarized scenario in the photometer scheduler.
- **Remote**: YES to authorize the remote control of the photometer via a computer. This option is mainly used for the sphere calibration.
- **SSK**: activate the 3 sun + sky scenario, if it is set to No the SSK scenario is replaced by the 3sun scenario,
- **TIME DCP**: Used with old Vitel satellite transmitters. It synchronizes the instrument time with the DCP time. To be used only with the Vitel 1004-2 transmitters.
- **Link PC**: YES to send automatically the data acquired after each group of scenario to the PC.
- **M.Oneil**: YES to activate O'Neil mode.
- **P.Oneil**: Set the period of O'Neil mode.
- **Calibr**: YES to activate special group of scenarios in order to make the sun calibration process of the photometer.
- **Hgain340** : Set a high electronic gain for the sun measurements on the 340nm filter.
- **CNV**: Set the offset on the in white box converter. This converter is used only the internal battery measurement. Not to be changed factory set.

The **block 5** on the diagram corresponds to the **PassWord 2 menu.** It enables to set customized group of scenario. Indeed pre-established scenarios are operated by the photometer at specific hours and air mass (see scenario chapter). However the first 26 sequences can be set by the user himself. The first two are generally used to define the data transfer to the acquisition PC when using a RS232 connection. (See installation part).



3.3. *SCN menu*

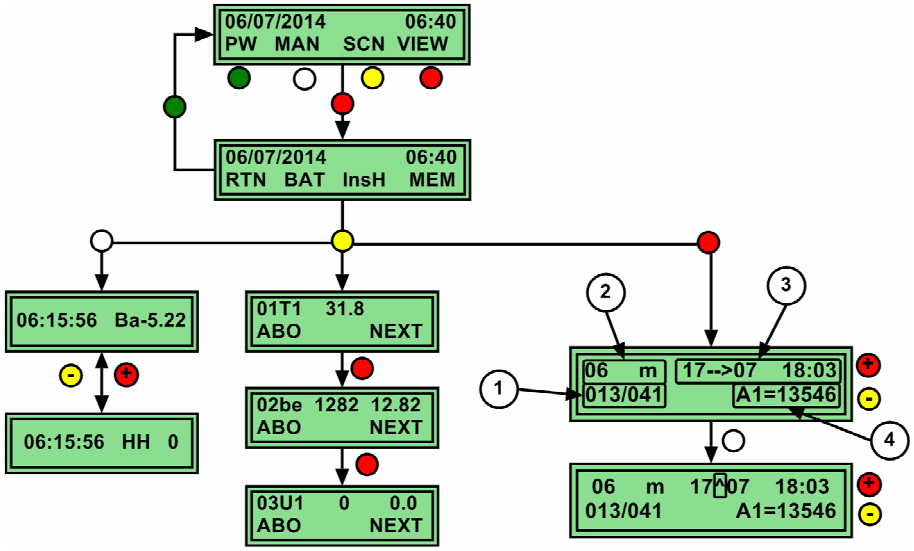
The SCeNario menu is only accessible in manual mode. It enables to launch each scenario individually.

The SCENARIO menu varies according to the photometer sensor head option. The table below lists all scenarios available according to the photometer sensor head used. These scenarios are described in part 4.1.

Photometer sensor head option		
Standard	**Polarized**	**BRDF / BRDF 12 filters**
OFF	OFF	OFF
PARK	PARK	PARK
GOSUN	GOSUN	GOSUN
TRACK	TRACK	TRACK
ORIGI	ORIGI	ORIGI
ALMUC	ALMUC	ALMUC
PPLAN	PPLAN	PPLAN
BLACK	POL. ALMUCANTAR	CIRCLE
SUN	POL. PPLAN	BLACK
SKY	BLACK	SUN
LTRACK	SUN	SKY
BCLSUN	SKY	LTRACK
BCLSKY	LTRACK	BCLSUN
GO&SUN	BCLSUN	BCLSKY
LANGL	BCLSKY	GO&SUN
PC	GO&SUN	LANGL
Calibr	LANGL	PC
	PC	Calibr
	Calibr	

3.4. *VIEW menu*

The view menu can be access both in automatic or manual mode. It enables the user to see and check basic parameters returned by the photometer.



In the **BAT menu**:

- **Bat**: It displays the current value of the internal battery.
- **HH**: it displays the status of the wet sensor.

If the status=0, the sensor is dry. The photometer is running in normal operation.
If the status=1, the sensor is wet. The photometer is stopped and is going to its ORIGI position in order to protect the optical head from water.

In the **insH menu**, the values displayed are:

- **01T1**: Current value of the head temperature.
- **02be**: Displays the value of the external battery.
- **03U1**: Display the value of head humidity.

In the **MEM menu**, you can access and see all the values that have been acquired by the instrument automatically and manually.

- **1**: Display the code number of the scenario that has been launched (see part scenario to see the code number).

If m is displayed, it means that the measures have been done in manual mode.
If M is displayed, it means that the measure have been done in automatic mode.

- **2**: Display the date and time of the measures.
- **3**: Display the measure number / total number of measures of the scenario launched.
- **4**: Filter used and numeric count acquired for the measure.

3.5. *Man menu*

The Man menu enables to launch SKY and SUN scenario manually and to display the numeric counts on the screen. All the different scenarios can also be launched from this menu.
Note: While launching SUN or SKY scenario via this mode, measurements will be done from the photometer current position.

- **SUN**: enable to launch manual measurements with the predefined electronic gain associated to SUN.
- **SKY**: enable to launch manual measurements with the predefined electronic gain associated to AUREOLE or SKY.
- **SEL**: enables to launch all the predefined scenarios. Refer to part 3.3

Once launching a SUN or SKY scenario in manual mode, 3 actions are possible:

- **RUN**: will activate a measurement sequence with all the filters.
- **NEXT**: change manually the filter.
- **ABO**: enables to abort the measurements anytime.

On the screen are displayed in real-time:

- **m1**: maximum instantaneous value recorded by the sensor.
- **m2**: Display of instantaneous value.
- **OxXx**: Filter measured.

4 Description of the scenarios measurements proceedings

4.1. *Scenario description and sequencing*

Scenarios may be launched either automatically via the scheduler or in manual mode via the SCN menu (see part 3.5).

OFF: launch OFF scenario.

PARK: Launch PARK scenario. The photometer optical head is going to park at the nadir position.

GOSUN: launch GOSUN scenario. The photometer is going to theoretical position of the sun.

TRACK: The TRACK scenario consists in tracking the sun using the 4 quadrant sensor.

LTRACK: The LTRACK scenario consists in tracking the SUN permanently. It also measures signal on both channels.

ORIGI: launch ORIGI scenario. The photometer goes to its ORIGIN position which is +7.5° on both azimuthal and zenithal axes compared to the PARK position.

SUN: The SUN scenario consists in measuring the sun irradiance for all the wavelengths. SUN gains are used and the measures are done in the following order:

Filters used and their sequence (i for InGaAs channel)		
Standard	**BRDF**	**BRDF 12 filtres**
1020 nm	1020 nm	1020 nm
1640**i** nm	1640**i** nm	1640**i** nm
870 nm	870 nm	870 nm
675 nm	675 nm	675 nm
440 nm	440 nm	440 nm
500 nm	550 nm	500 nm
1020**i** nm	1020**i** nm	555 nm
937 nm	937 nm	1020**i** nm
380 nm	380 nm	937 nm
340 nm	740 nm	782 nm
Head sensor temperature	Head sensor temperature	740 nm
		702 nm
		414 nm
		Head sensor temperature (°C)

.

BCLSUN: The BCLSUN scenario consists in launching in continue TRACK/SUN scenario with a time interval defined in SETTINGS menu with **BCLSUN mn** parameter.

SKY: The SKY scenario consists in measuring the sky radiance for several wavelengths. SKY or AUREOLE gains are used and the measures are done in the following order:

Filters used and their sequence (i for InGaAs channel)			
Standard	**Polarized**	**BRDF**	**BRDF 12 filters**
1020 nm AUREOLE	1020 nm AUREOLE	1020 nm AUREOLE	1020 nm AUREOLE
1640**i** nm AUREOLE	1640**i** nm AUREOLE	1640**i** nm AUREOLE	1640i nm AUREOLE
870 nm AUREOLE	870 nm AUREOLE	870 nm AUREOLE	870 nm AUREOLE
675 nm AUREOLE	675 nm AUREOLE	675 nm AUREOLE	675 nm AUREOLE
440 nm AUREOLE	440 nm AUREOLE	440 nm AUREOLE	440 nm AUREOLE
500 nm AUREOLE	500 nm AUREOLE	550 nm AUREOLE	500 nm AUREOLE
380 nm AUREOLE	380 nm AUREOLE	380 nm AUREOLE	555 nm AUREOLE
1020 nm SKY	340 nm AUREOLE	740 nm AUREOLE	782 nm AUREOLE
1640**i** nm SKY	1020 nm SKY	1020 nm AUREOLE	740 nm AUREOLE
870 nm SKY	1020 nm SKY POL IR 1-2-3	1640**i** nm SKY	702 nm AUREOLE
675 nm SKY	1640**i** nm SKY	870 nm SKY	414 nm AUREOLE
440 nm SKY	1640**i** nm SKY POL IR 1-2-3	675 nm SKY	1020 nm SKY
500 nm SKY	870 nm SKY	440 nm SKY	1640**i** nm SKY
380 nm SKY	870 nm SKY POL IR 1-2-3	550 nm SKY	870 nm SKY
Head sensor T (°C)	675 nm SKY	1020**i** nm SKY	675 nm SKY
	675 nm SKY POL VIS 1-2-3	380 nm SKY	440 nm SKY
	440 nm SKY	740 nm SKY	500 nm SKY
	440 nm SKY POL VIS 1-2-3	Head sensor T (°C)	555 nm SKY
	500 nm SKY		1020i nm SKY
	500 nm SKY POL VIS 1-2-3		782 nm SKY
	380 nm SKY		740 nm SKY
	380 nm SKY POL UV 1-2-3		702 nm SKY
	340 nm SKY		414 nm SKY
	340 nm SKY POL UV 1-2-3		Head sensor T (°C)
	Head sensor T (°C)		

BCLSKY: The BCLSKY scenario consists in performing 10 SKY scenario at the zenith if the sun is hidden.

BLACK: The black scenario consists in measuring the electronic noise of the device. The filter-wheel is positioned in between two filters so that the signal coming through the two channels is cut.

Important note: The signal measured is the dark current. It is not substracted to the full signal measured. It is also an indicator for a possible electronic failure if too big.

Measures are done in the following order:

- AUREOLE gain, silicon channel (canal 1)
- AUREOLE gain, InGaAs channel (canal 2)
- SKY gain, silicon channel
- SKY gain, InGaAs channel

ALMU (Standard, BRDF) / ALMUP (Polarised): The almucantar technique consists in measuring the sky radiance in aerosol channels, keeping a constant zenithal angle equal to the zenith solar angle with varying azimuthal angle.

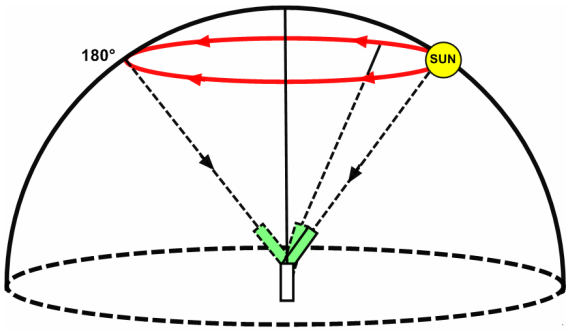
In the ALMU scenario, azimuthal angles vary from 0° to +180° for a almucantar right and 0° to -180° for an almucantar left using:

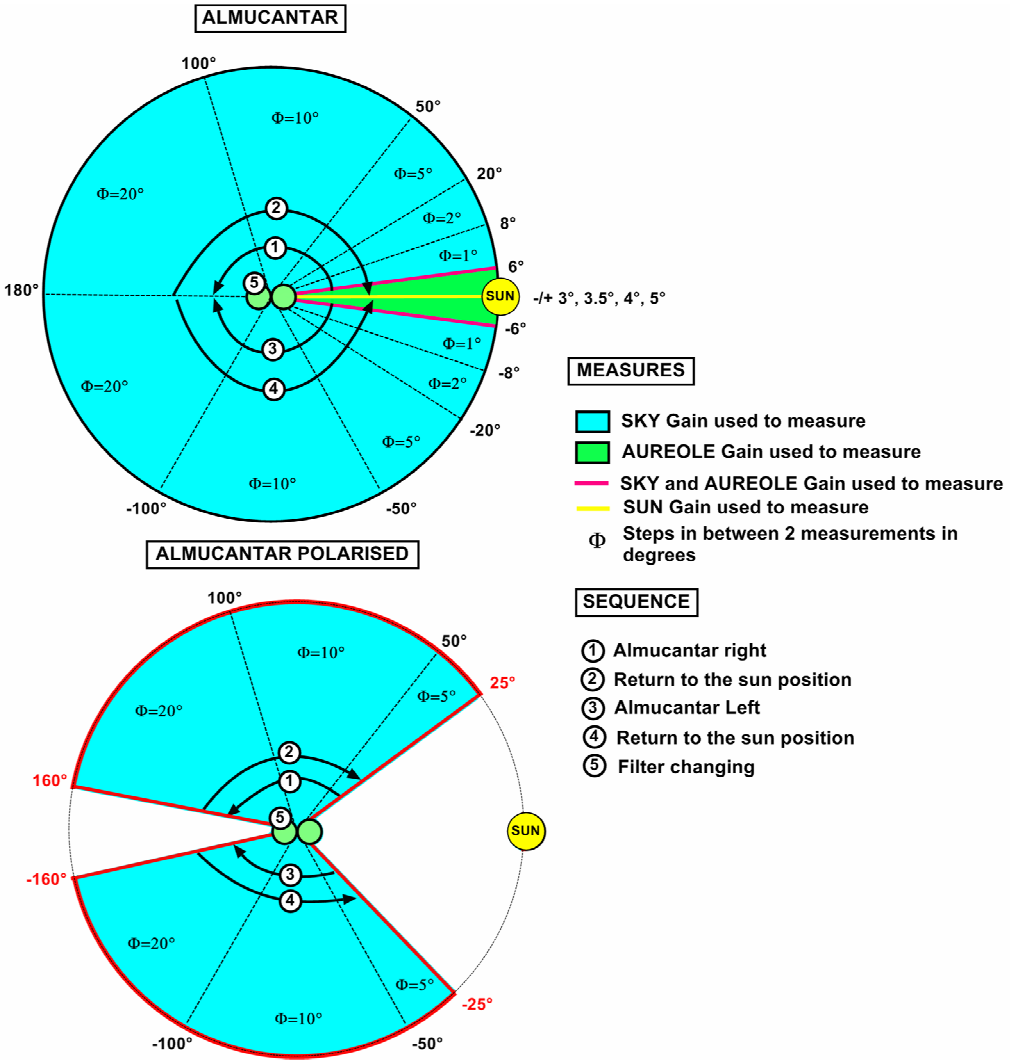
- SUN gain on the sun
- AUREOLE gain between -6° and +6°
- AUREOLE and SKY gain for 6° and SKY gain between 6° and 150°

In the **ALMU**cantar **P**olarised scenario, azimuthal angles vary from 25° to +160° for a almucantar right and -25° to -160° for an almucantar left using SKY gain only.

Important Note: The Almucantar Polarised scenario is only done if the **AlmPol** parameter in PassWord 11 is activated to “yes”

Below is a visual description of the Almucantar and Polarised Almucantar.





Filters used and their order in the sequence			
Standard	**Polarized**	**BRDF**	**BRDF 12 filters**
1020 nm	1020 nm SKY POL IR 1-2-3	1020 nm	1020 nm
1640**i** nm	1640i nm SKY POL IR 1-2-3	1640i nm	1640i nm
870 nm	870 nm SKY POL IR 1-2-3	870 nm	870 nm
675 nm	675 nm SKY POL VIS 1-2-3	675 nm	675 nm
440 nm	440 nm SKY POL VIS 1-2-3	550 nm	500 nm
500 nm	(500 nm SKY POL VIS 1-2-3)	380 nm	550 nm
Sensor head T (°C)	(380 nm SKY POL UV 1-2-3)	740 nm	1020i nm
	(340 nm SKY POL UV 1-2-3)	1020i nm	782 nm
	Sensor head T (°C)	Sensor head T (°C)	740 nm
			702 nm
			714 nm
			Sensor head T (°C)

Note for polarised photometers: The measurements with the 500, 380, 340nm filters are only done if ScanK_500, ScanK_380, ScanK_380 parameters in PassWord 11 are activated to “Yes”

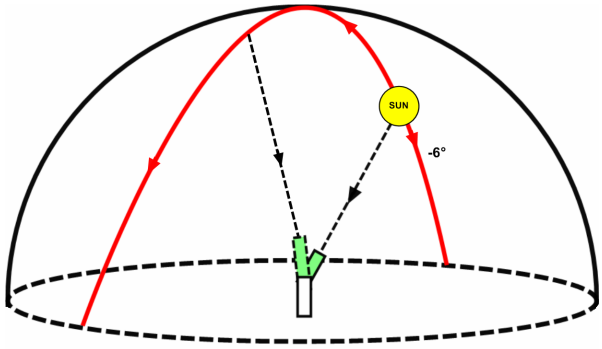
PP (Standard, BRDF) / PPP (Polarised): The **P**rincipal **P**lan technique also consists in measuring the sky radiance in the aerosol channels. Unlike the almucantar, a constant azimuthal angle is kept with varying zenithal angle to make measurements.

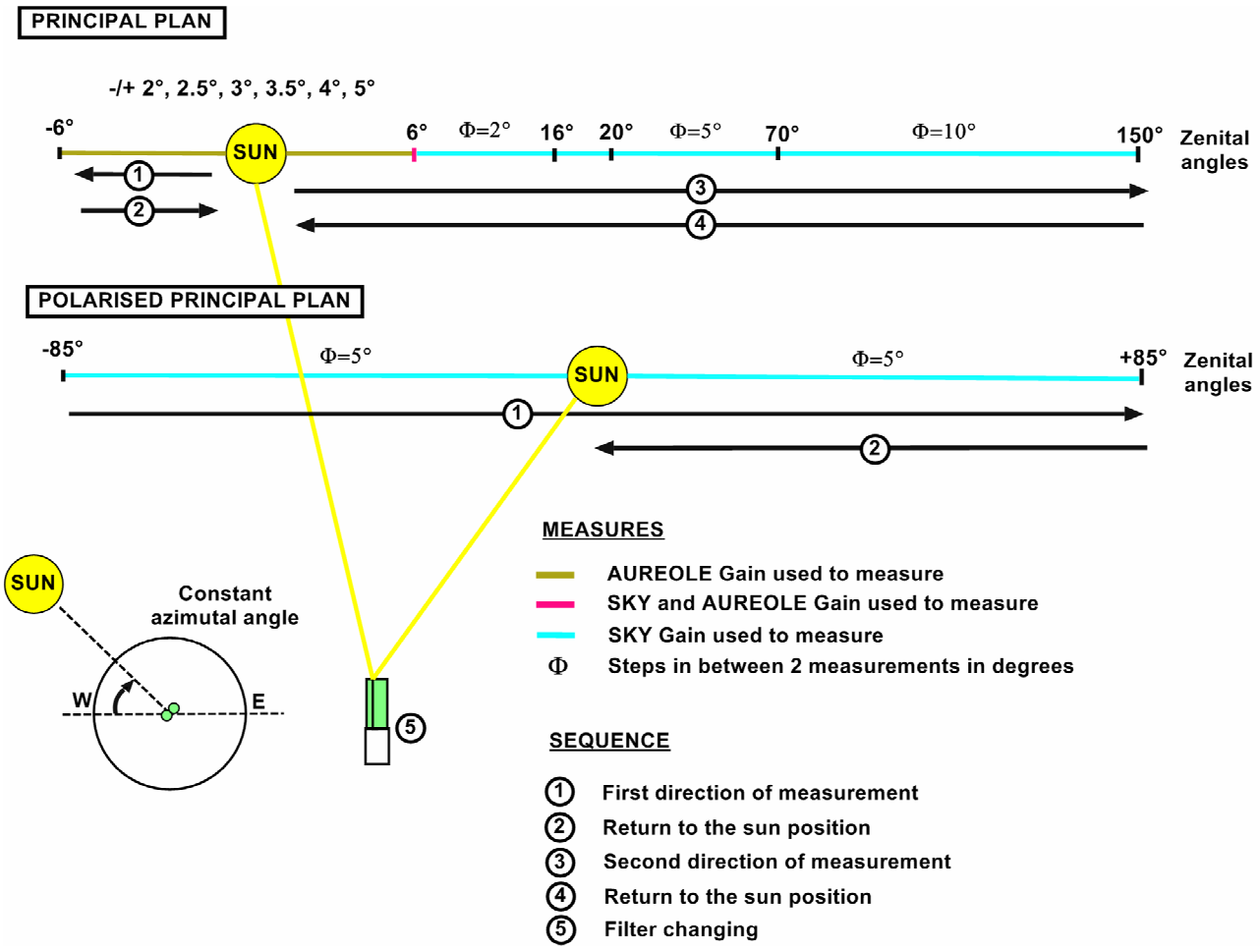
In the PP scenario, zenithal angles vary from -6° to +150° using:

- SUN gain on the sun
- AUREOLE gain between -6° and +6°
- AUREOLE and SKY gain for 6° and SKY gain between 6° and 150°

In the **P**rincipal **P**lane **P**olarized scenario, zenithal angles vary from -85° to +175° using SKY gain only.

Below is a visual description of the Principal Plan and Polarised Principal Plan.





Filters used and their order in the sequence			
Standard	**Polarized**	**BRDF**	**BRDF 12 filters**
1020 nm	1020 nm SKY POL IR 1-2-3	1020 nm	1020 nm
1640**i** nm	1640**i** nm SKY POL IR 1-2-3	1640i nm	1640i nm
870 nm	870 nm SKY POL IR 1-2-3	870 nm	870 nm
675 nm	675 nm SKY POL VIS 1-2-3	675 nm	675 nm
440 nm	440 nm SKY POL VIS 1-2-3	550 nm	500 nm
500 nm	(500 nm SKY POL VIS 1-2-3)	380 nm	550 nm
Sensor head T (°C)	(380 nm SKY POL UV 1-2-3)	740 nm	1020i nm
	(340 nm SKY POL UV 1-2-3)	1020**i** nm	782 nm
	Head sensor T (°C)	Sensor head T (°C)	740 nm
			702 nm
			714 nm
			Sensor head T (°C)

Note for polarised photometers: The measurements with the 500, 380, 340nm filters are only done if ScanK_500, ScanK_380, ScanK_380 parameters in PassWord 11 are activated to “Yes”

CIRCLE (only with BRDF photometers): The CIRCLE scenario consists in measuring at the constant zenithal with varying azimuthal angles from 0 to 360° with 5° steps using SKY gains.

Filters used and their sequence	
BRDF	**BRDF 12 filters**
1640 nm (InGaAs channel)	1640 nm (InGaAs channel)
870 nm	870 nm
675 nm	675 nm
440 nm	440 nm
550 nm	500 nm
740 nm	550 nm
	782 nm
	740 nm
	702 nm
	414 nm

BRDF (only with BRDF photometers): The BRDF scenario consists in launching successive CIRCLE scenarios, starting from a zenithal angle of 5° and finishing with a zenithal angle of 60°.
Filters used and the sequence is the same than CIRCLE scenario

GO&SUN: The GO&SUN scenario consists in combining GOSUN/TRACK/SUN scenario.

LANGL: The LANGL scenario consists in compelling the scheduler update. This scenario is automatically launched at 1AM and each time than the coordinates or the date is updated.

Calibr: The SKY CALIBRATE scenario consists in performing 3 SKY and 1 BLACK scenario.

PC: The PC scenario consists in sending the photometer data acquired to the acquisition PC via the RS232 link.

4.2. *Group of measurement scenarios*

In auto mode, the photometer follows a schedule and automatically launches both individual scenarios and group of measurement scenarios.

Each scenario or group of scenario is defined by a code. These codes are useful when:

- Looking at the photometer memory. (view part 3.4)
- Programming your own measures. (view part 4.5)

Code	Scenario or group of scenario	Measures and group of measures
00	OFF	--
01	PARK	--
02	GOSUN	--
03	TRACK	--
04	ORIGI	--
05	ALMUC	--
06	PPLAN	--
07	BLACK	--
08	SUN	--
09	SKY	--
10	LTRAK	--
11	BCLSUN	--
12	BCLTRK	--
13	GO&SUN	--
14	LANGL	--
15	PC	--
17	Group A	3 SUN ; 3 SKY
18	Group B	3 SUN; 3SKY; ALMU; BLACK
19	Group C	3 SUN; 3SKY; ALMU; PP; **PPP**; BLACK
20	Group D	3 SUN;
21	Group E	3 SUN; PP; **PPP**
22	Group F	3 SUN; ALMU; PP; **PPP**; BLACK;

Note 1: **In bold**, measures that are done only with the polarised photometers.

4.3. *Measurement schedule in Auto mode*

4.3.1. Standard and polarized

The photometer follows a daily schedule of automatic actions. Some actions are triggered by the time of the day and some by the air mass which is related to the thickness of atmosphere the sun light has been through to get to the photometer (Langley times). The Langley times depend on both the site where the photometer is located and the date. They are automatically calculated and set in the photometer sequence list each day at 1AM.

Automatic actions done by the photometer in Auto mode:

Air mass	Equivalent zenith angle (0°: Zénith ; 90°: Horizon)	Group
Air mass 7.0	81.8°	Group A
Air mass 6.5	81.15°	Group A
Air mass 6.0	80.40°	Group A
Air mass 5.5	79.52°	Group A
Air mass 5.0	78.46°	Group A
Air mass 4.5	77.16°	Group A
Air mass 4.0	75.52°	Group B
Air mass 3.8	74.74°	Group A
Air mass 3.6	73.87°	Group A
Air mass 3.4	72.89°	Group A
Air mass 3.2	71.79°	Group A
Air mass 3.0	70.53°	Group C
Air mass 2.8	69.07°	Group A
Air mass 2.6	67.38°	Group A
Air mass 2.4	65.37°	Group A
Air mass 2.2	62.96°	Group A
Air mass 2.0	60°	Group B
Air mass 1.7	53.97°	Group B

Morning times	Afternoon times	Group
09H00	15H00	Group F
09H15	14H45	Group D
09H30	14H30	Group D
09H45	14H15	Group D
10H00	14H00	Group F
10H15	13H45	Group D
10H30	13H30	Group D
10H45	13H15	Group D
11H00	13H00	Group F
11H15	12H45	Group D
11H30	12H30	Group D
11H45	12H15	Group D
12H00		Group F

Note: If air masses measurements times come after 9H00 or before 15H00, they are skipped. The defined times scheduler gets the priority.

An empty period without any measurements may exist between air mass 1.7 and 9H00 in the morning and between 15H00 and air mass 1.7 in the afternoon. If it is the case, the following scheduler is executed:

Morning times	Afternoon times	Group
07H30	15H15	Group D
07H45	15H30	Group D
08H00	15H45	Group E
08H15	16H00	Group D
08H30	16H15	Group D
08H45	16H30	Group D

4.3.2. BRDF and BRDF 12 filters

The BRDF Photometer executes **Group S** scenario every day from sun air mass 5 in the morning to sun air mass 5 in the evening. (A group S scenario is around 2h long). The group S scenario automatically starts at a round True Solar Time minute if no other scenario is running.

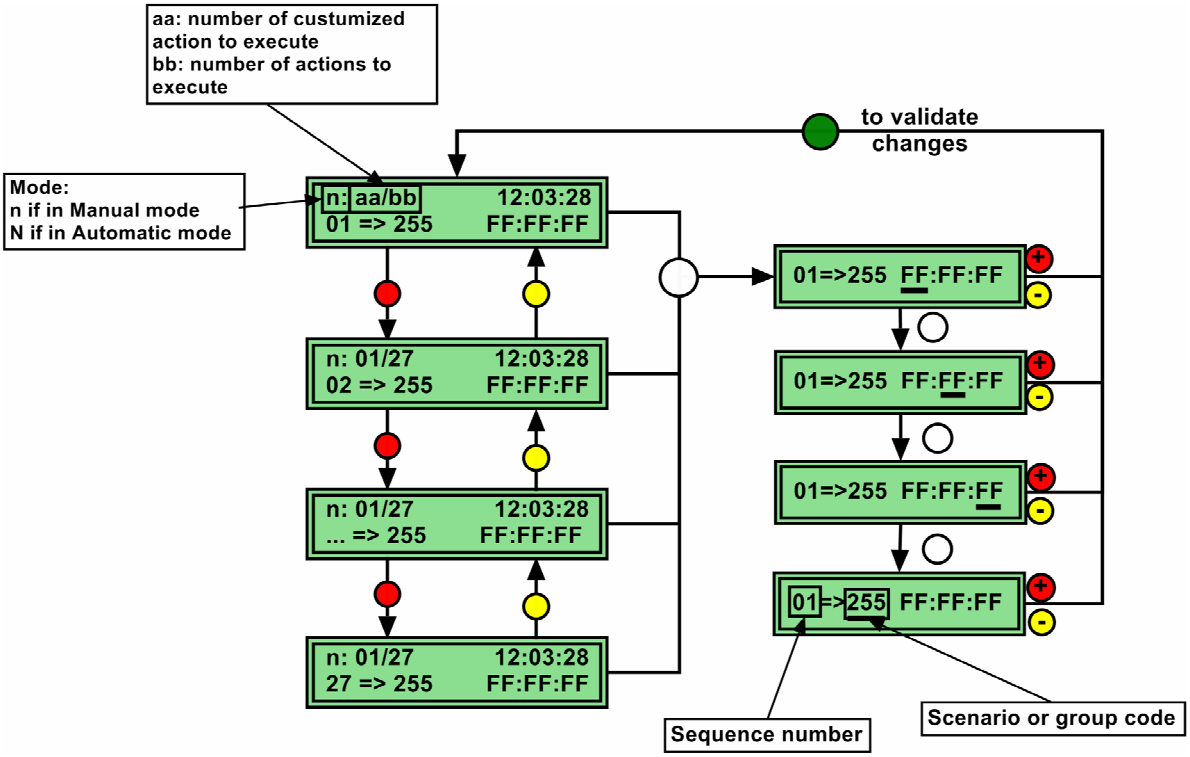
Note 1: The Almucantar is executed only if the sun zenith is between air mass 4.0 and air mass 1.5.
Note 2: A PARK, GOSUN and 3SUN are done between each zenith angle change.

4.4. *Customized scenario programming*

The first 26 actions can be set by the user himself. The others actions are automatically defined. Go in the PassWord 2 menu to define your own actions (see part 3.2).

Important note:

- The actions programmed by the user have to be classified in the hourly order.
- The actions are executed at the HH:MM:SS time exactly
- If several user actions are programmed at the same time, the actions will be executed in the order of their scenario or sequence code.

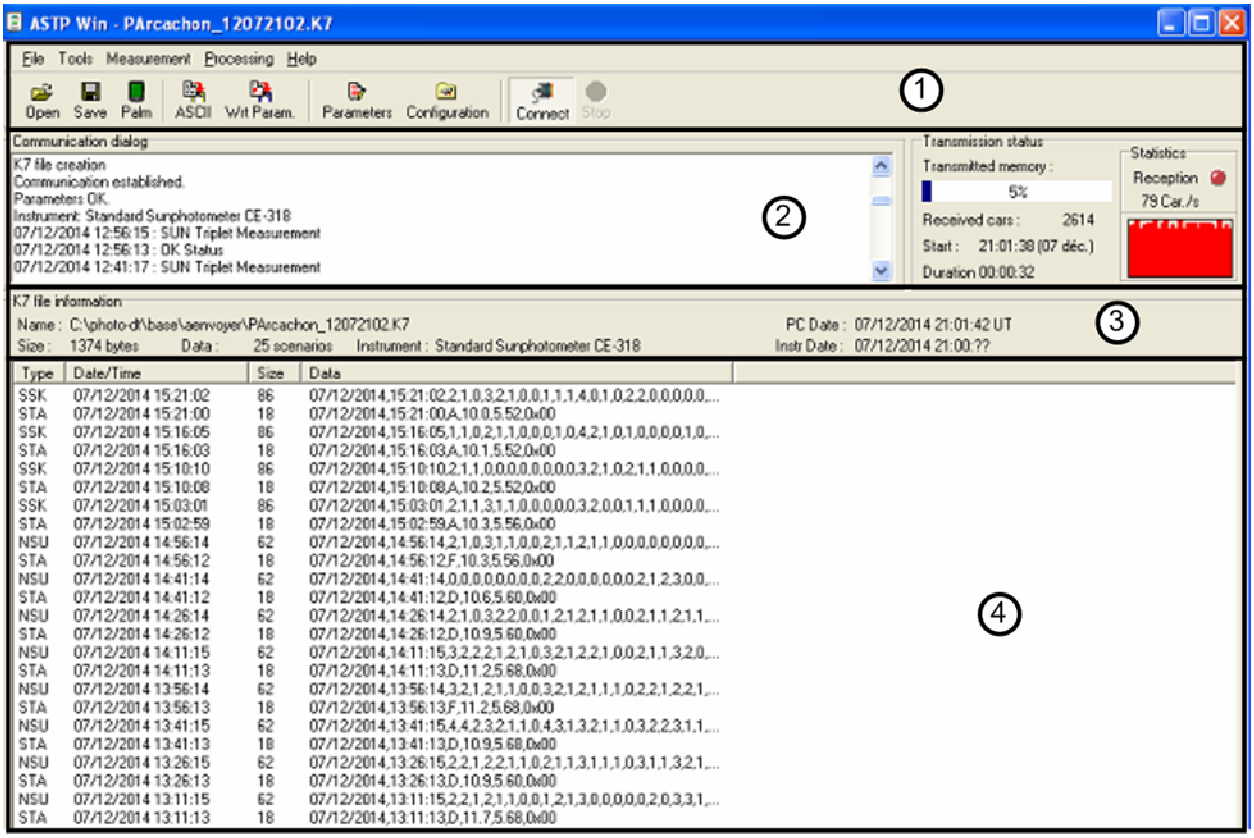


5 ASTPWin software

ASTPwin is the software that enables to establish the communication with the photometer when using the RS232 link. It has to be installed on the acquisition PC and it has to run permanently to receive the data from the photometer. Moreover the software offers many data processing and visualisation tools.
A special configuration has to be done to avoid undesired effects due to power cuts and to avoid human intervention as much as possible when the device is operating. Refer to part 2.3.1.

5.1. *General*

The main screen is explained below:



1: menu

2: communication dialog box. It enables to see:

- The reception speed
- Star time and duration of the transmission
- Percentage of the memory transmitted and number of received cars
- Date, time and type of scenario transmitted

3: k7 file visualisation and information such as:

- The recording folder.
- The file size.
- The scenarios number.
- The instrument type (standard, BRDF, polar).
- The PC date.
- The instrument date.

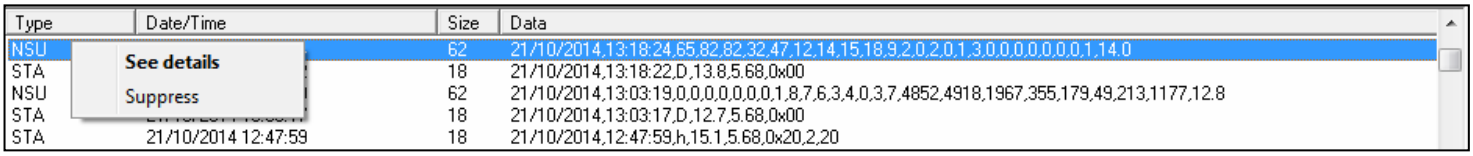
Note: the instrument date and the PC date should not have more than a 2 minutes shift. If the shift is more, check that the PC and the photometer times are correctly set.

4: data visualisation and information. It is divided into 4 different columns

- **Type**. It displays the scenario extension done. Refer to scenario for the extension explanations.
- **Date of the measure.**
- **Size.**
- **Data.** It displays the numeric count acquired for the different filters and gain.

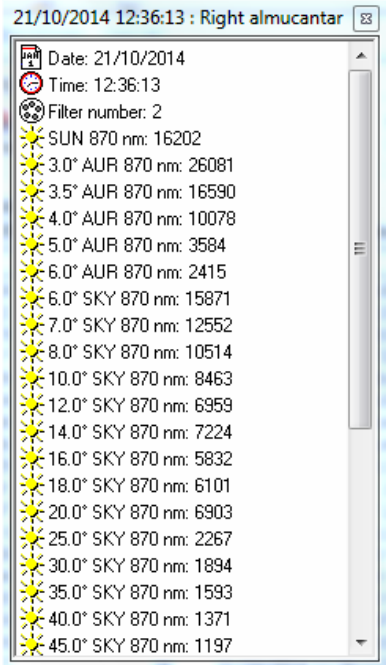
When selecting the data, 2 actions are possible:

- Single or multiple lines deletion.
- Detailed data visualisation.



The detailed data show:

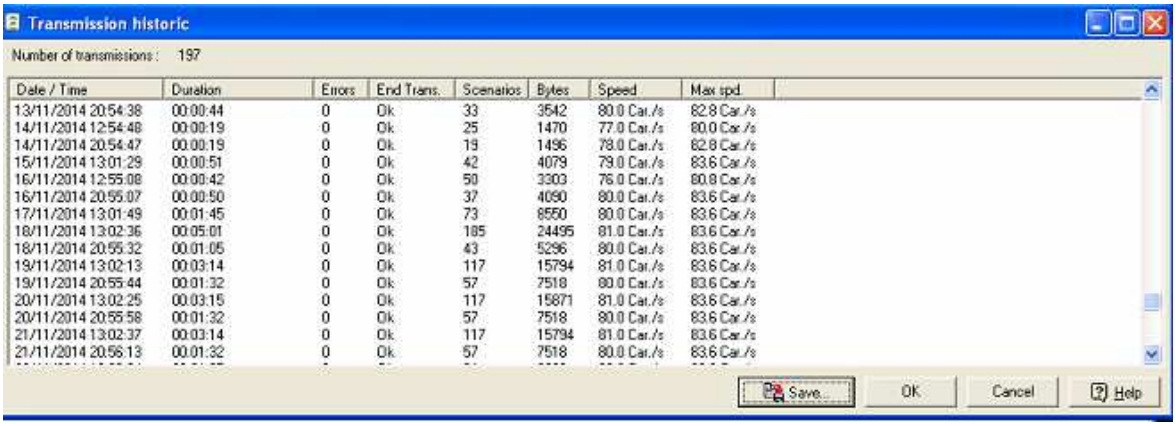
- The sequence done.
- The gain used for the measure.
- The numeric count acquired by the photometer.



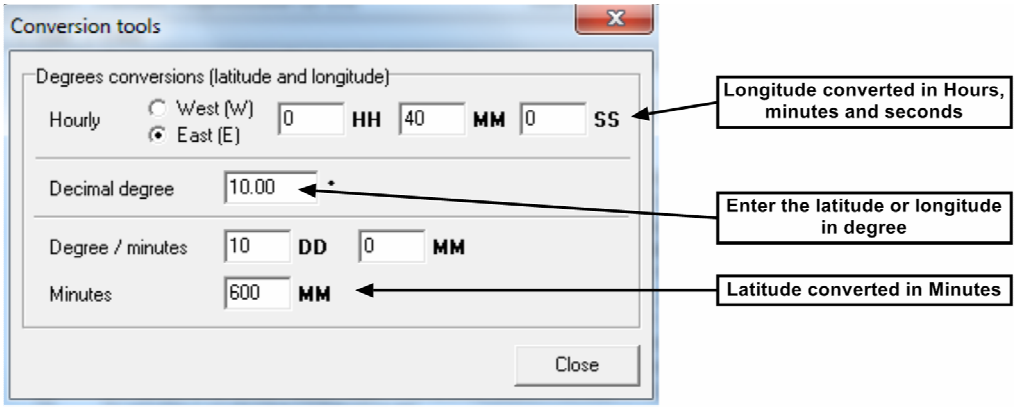
5.2. *Tools*

The Tools rolling menu enables to:

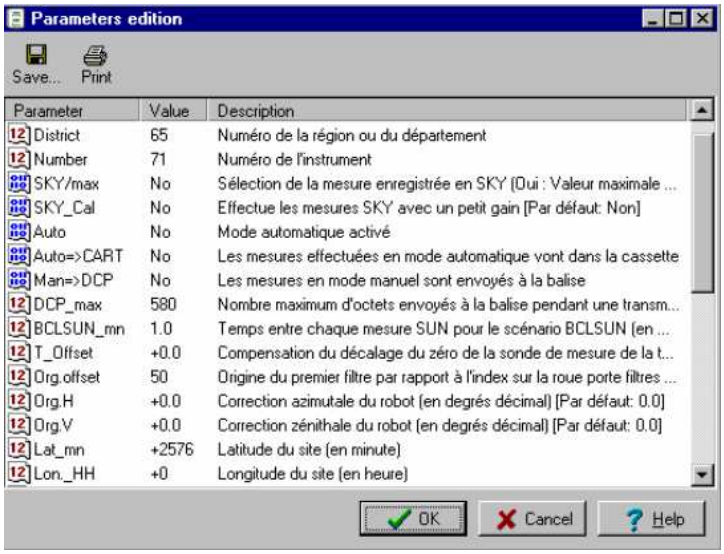
- Connect/disconnect to the photometer
- See the transmissions historic (duration, date, speed…)



- Use the conversion tool for GPS coordinates. The conversion tool is useful to convert GPS coordinates in degrees to GPS coordinates in hours.



- Edit the photometer parameters



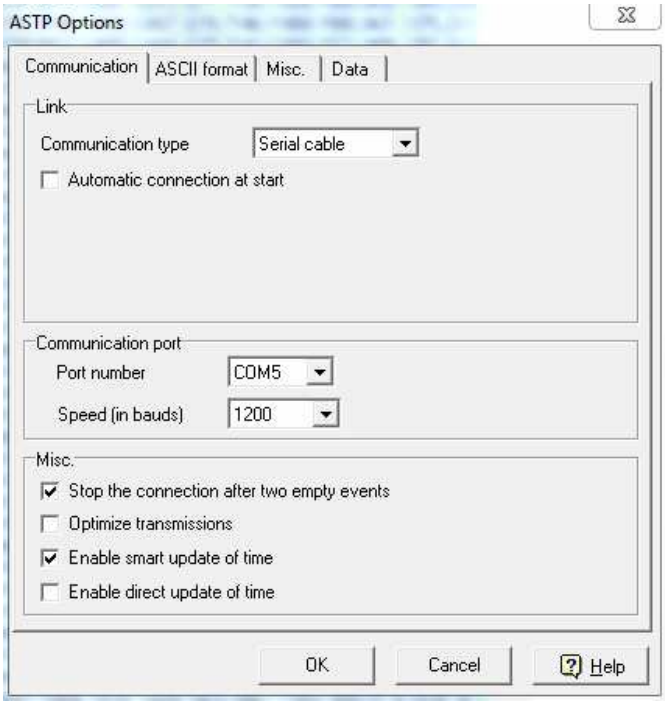
- Acess the configuration menu

5.3. *Configuration menu*

The configuration menu is divided into 4 tabs:

- Communication

Communication type: MODEM, serial cable, USB loop, IP. **[Serial cable]**
Automatic connection at start: tick to launch ASTPWin when the PC starts. This option should be activated.
Port number: Select the right port number corresponding to the photometer.
Speed in Baud: 1200, 9600, 19200. **[1200]**
Stop the connection after two empty events:
Optimize transmissions: this option enables to transmit only the data that have no been transferred yet. If not ticked the full photometer memory will be transmitted each time.
Enable smart update of time:
Enable direct update of time:

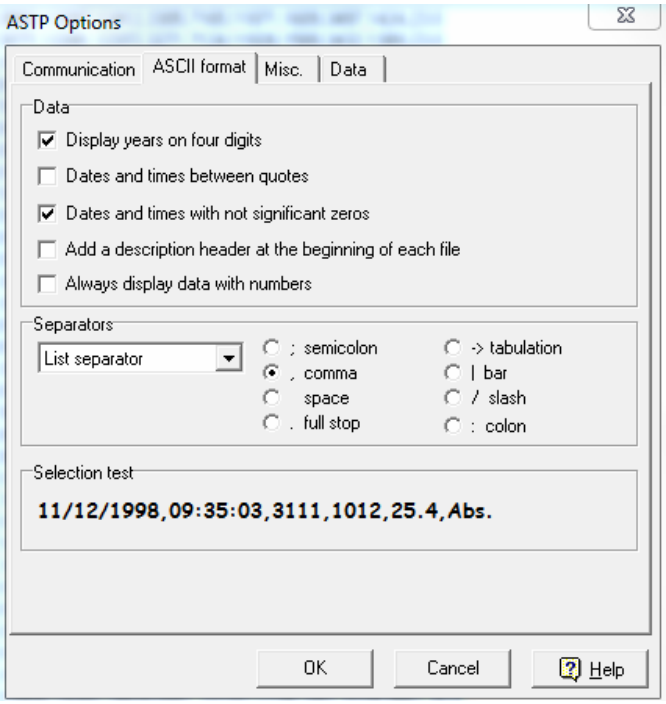


- ASCII format

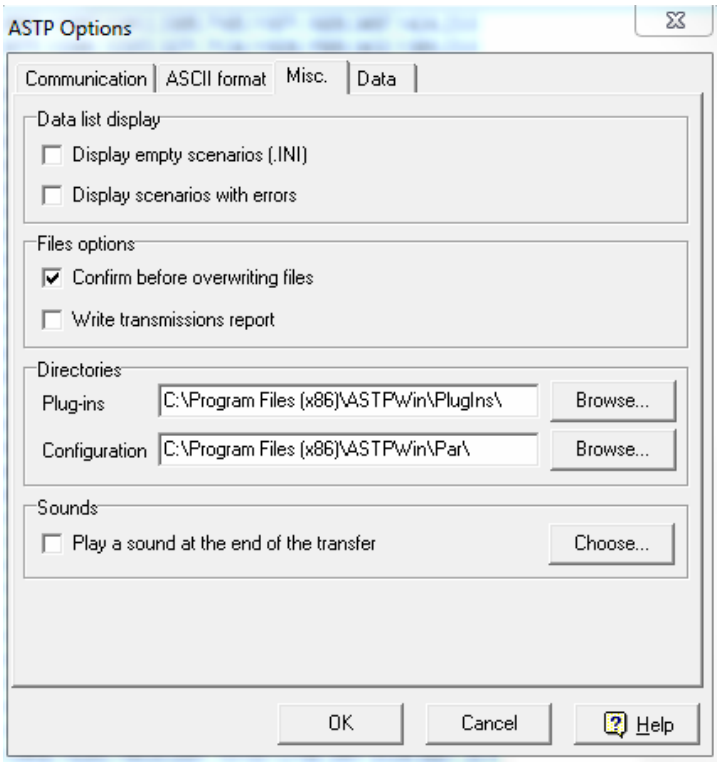
Different options can be chosen to get customized ascii format files created from the k7 file:

- Display year on 4 digits
- Dates and times between quotes
- Date and time with no significant zero

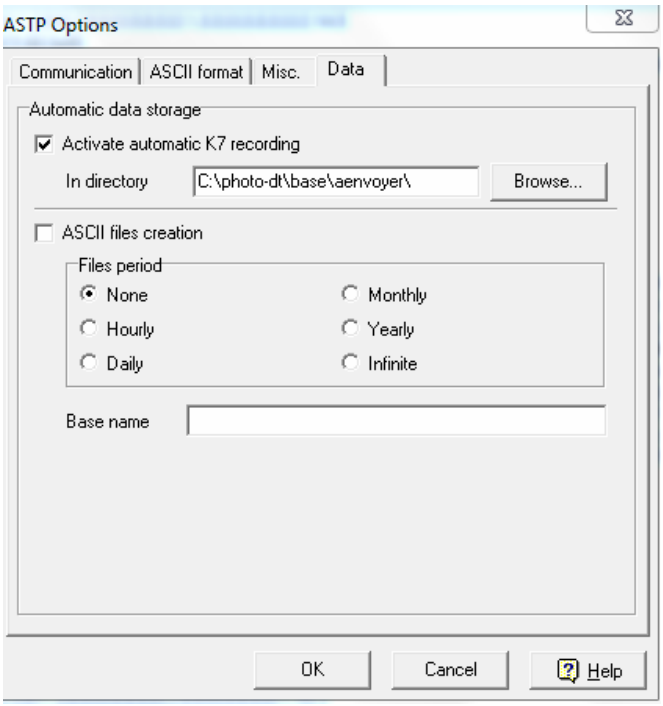
- Add a description header at the beginning of each file
- Always display data with numbers
- List, decimal, time and date separator



- Misc



- Data

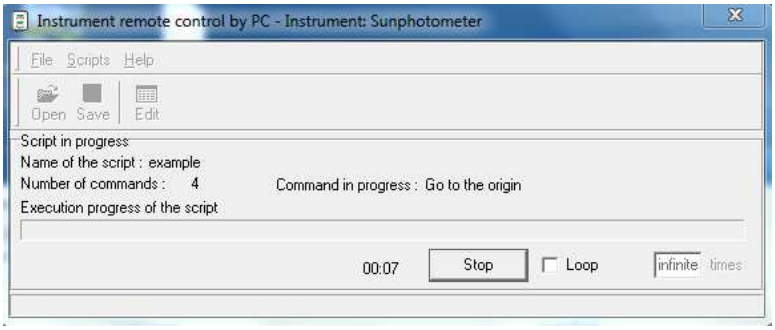


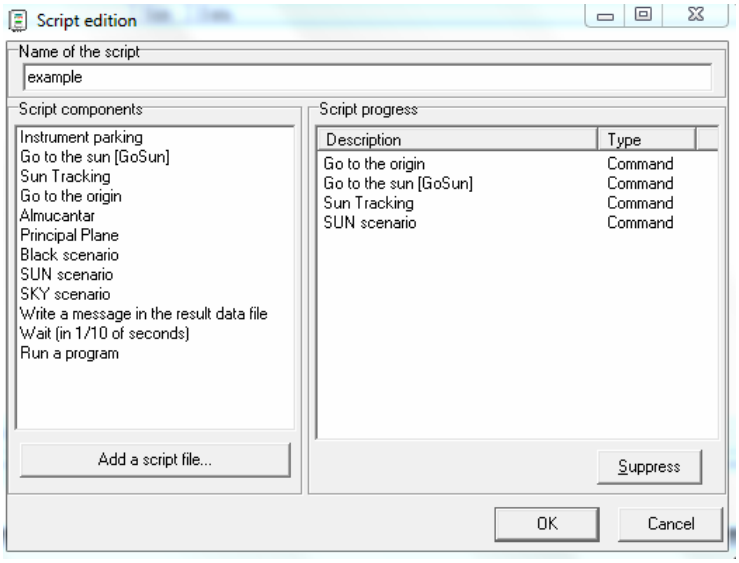
5.4. *Processing*

These processing tools are mainly used for calibration of the instrument and are not useful for customers.

However a remote control of the photometer can be done.

The instrument remote control by PC enables the user to edit and run its own scripts from a computer via an easy click and drag system. Most of the basic scenarios are available.





6 Maintenance / Troubleshooting / FAQ

6.1. *Preventive maintenance*

Before making any preventive maintenance, switch the CU in manual mode. (see part 3.2)

Here is a procedure that should be done every week in order to prevent the occurrence of measurement, electronic or mechanical problems on the photometer. If correctly done this procedure will avoid most of the problems that may occur:

1. Check all the connections, especially the ones on the battery (rust). Check the sensor head cable. Check that the AZ and ZN cables are not wrapped around the robot.

2. Check that the communication between the acquisition PC and the photometer is still OK. If used, check that the satellite transmitter is still running and does not have any errors by checking the leds.

If a problem is encountered, please refer to the troubleshooting part.

3. Check that the wet sensor functions correctly. Clean it lightly with a non-abrasive tissue and demineralised water.

→Go in the View menu and look at the HH value (see part 3.4)
If raining the value should be 1, if not 0. In order to test the sensor if it is not raining, wet it with water and wait around 20s, the value of HH displayed should go from 0 to 1.

If a problem is encountered, please refer to the troubleshooting part.

4. Check that the robot is correctly levelled

→ Check that the level spirit of the robot is well centered.

If not, please check step 18 of the installation guide to solve the problem.

5. Check the voltage of external batteries and the DCP battery if used

→ Check the photometer external battery measuring the voltage of the battery terminals. The voltage should be over 12 Volts.
→ Same process for the DCP battery if used

Check the batteries general state. There must be no rust, leak and so on.

6. Disassemble the collimator from the sensor head. Check each channel inside the collimator for possible obstruction. If necessary, clean it with dry air or a bottlebrush. It should be perfectly clean.

7. Check the four quadrant sensor. If dirty clean it with a cotton swab.

Warning: Never clean the 2 main lenses on the front plate, except after a dust event when they can be cleaned with dry air.
The effect of increasing dirt on the lenses due to time deposition can be corrected at the data processing stage. Cleaning them will distort the calculations.

8. Check if the GOSUN and the TRACK are correct.

→ Launch a GOSUN scenario and look at the position of the sun spot compared to the target on the collimator base. (<1 mm)
If a large shift is visible on the azimuthal axis, please watch step 14 in the installation part.
→ Launch a TRACK scenario and look if the sun spot is perfectly centred on the target on the collimator.

If a problem is encountered, please refer to the troubleshooting part.

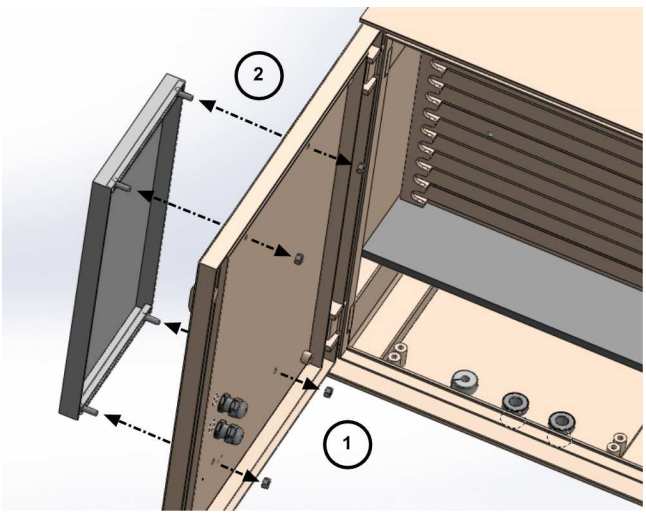
6.2. *Corrective maintenance*

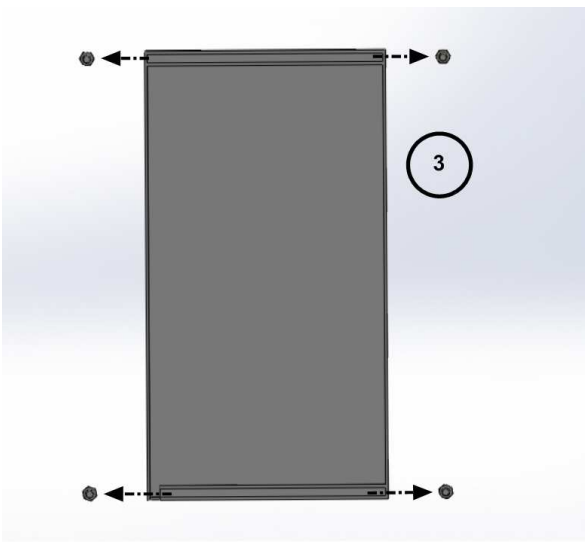
6.2.1. Solar panel and wet sensor replacement

The wet sensor and the solar panel on the case are already mounted. They might be replaced in case of breakdown.

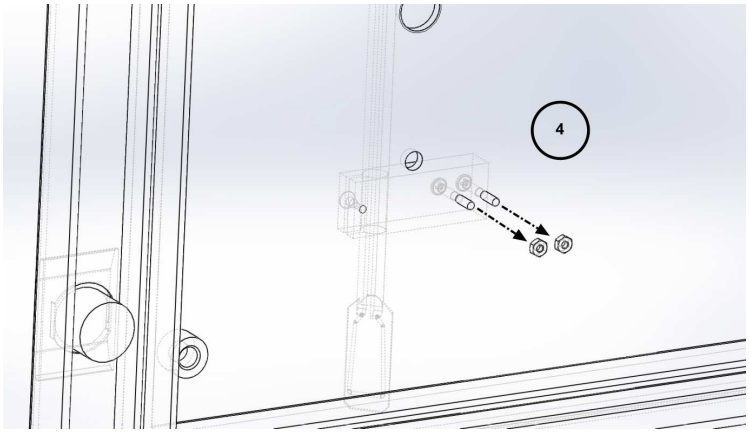
1. Loosen the 4 nuts.
2. Withdraw the solar panel with its wire cautiously from the protection case.
3. Get back the 4 screw which are inserted in the solar panel slides and replace the solar panel.

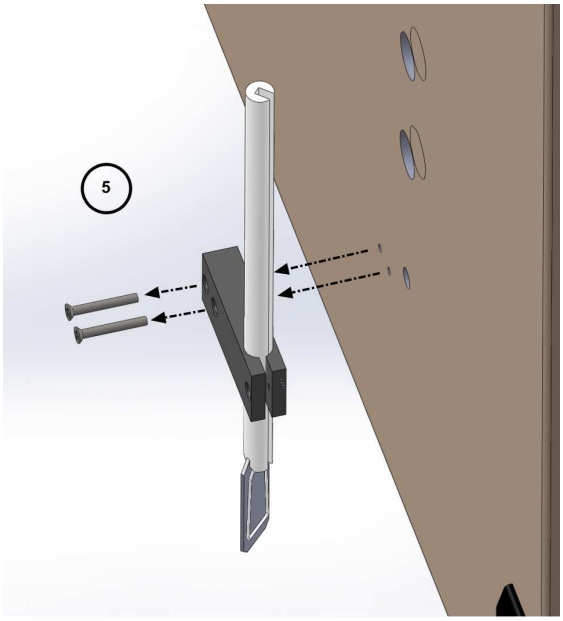
Note: To replace the wet sensor, the solar panel needs to be uninstalled.





4. Loosen the 2 nuts maintaining the pince-sonde
5. Withdraw the screw and the wet sensor with is wire from the protection case
6. Slide the wet sensor to get it back and replace it.

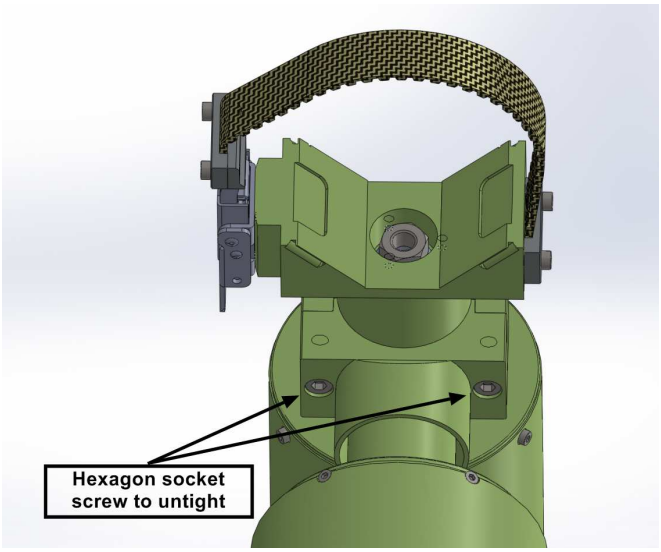


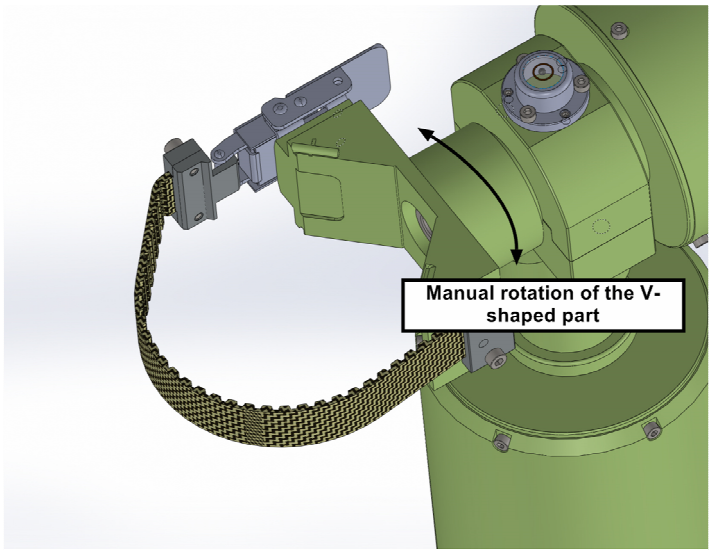


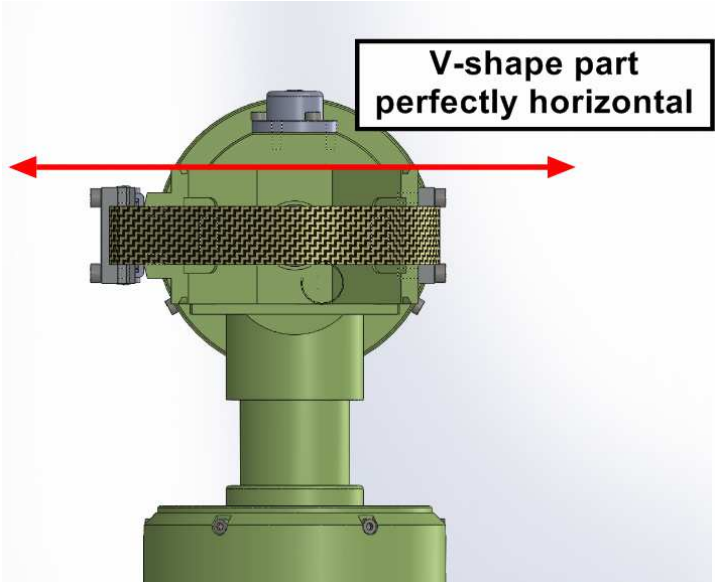
6.2.2. Robot leveling adjustment

After a PARK scenario, even if the spirit level is well-centered, it might happen that the V-shape part of the robot is not perfectly horizontal. You can check with a leveler. If the case happens:

1. Loosen the 2 hexagon socket screws.
2. Rotate the V-shape part so that it is perfectly horizontal. Check with the leveler.
3. Tighten the screws and check is the V-shape part is perfectly horizontal after having launched a PARK scenario.







6.3. *Troubleshooting*

6.3.1. Communication and data transfer is down

6.3.1.1. Using serial port transfer protocol

The possible causes that may interrupt the communication between the PC and the photometer are:

- A power cut happened and the PC restart has not been executed properly.
- ASTPWin application is not running or has quit unexpectedly.
- The serial wire is not correctly plugged.
- The serial port is down.
- The data transferring scenarios are not well configured.

The procedure to follow:

- Check that the computer is switched on.
- Check that ASTPwin is launched.
- Check in the configuration menu that you have selected the right port COM.
- Check that the connection button is activated and that the communication is well established with the photometer.
- Check that the serial cable is well plugged on both computer and photometer side.
- Test manually the data transfer by launching a PC scenario (see part 3.3).

If the manual test is working:

- Check that the data transferring scenario are well configured. Look at the step 24 in the installation guide.

If the communication is still not working:

- Try another cable.
- Try another port COM on the acquisition computer if possible.

If this procedure does not solve your problem, please contact CIMEL technical support.

6.3.1.2. Using satellite transmitter

The possible causes that may interrupt the communication between the photometer and the satellite are:

- The battery voltage is too low to transfer the data to the satellite.
- The satellite transmitter is no more finding the satellite.
- The antenna is not correctly set.

The procedure to follow:

- Check that the DCP voltage battery is over 12V.
- Check that the cable is correctly plugged between the transmitter and the photometer.
- Check the transmitter functioning status LED and up to the status, follow the transmitter documentation.
- Check that the GPS plugged on the transmitter have a good view of the sky
- Make sure that the CIMEL and DCP time are correctly set plus minus 10 seconds compared to UT time.

6.3.2. Bad sun tracking

If the photometer is declared in AERONET “bad sun tracking” warning flags may be emitted. They will be emitted on this website:
http://aeronet.gsfc.nasa.gov/cgi-bin/weekly_report_v2

The possible causes that may lead to a bad sun tracking are:

- The sun spot is too far from the target after a GOSUN scenario (see step 11 and 16 in the installation part).
- The external battery is too low.
- The sensor head cord is damaged.
- The four quadrants sensor is too dirty.
- The four quadrants sensor is broken.
- The collimator is not correctly assembled to the sensor head.
- The collimator is deformed.
- The robot base is not horizontal.

Procedure to follow:

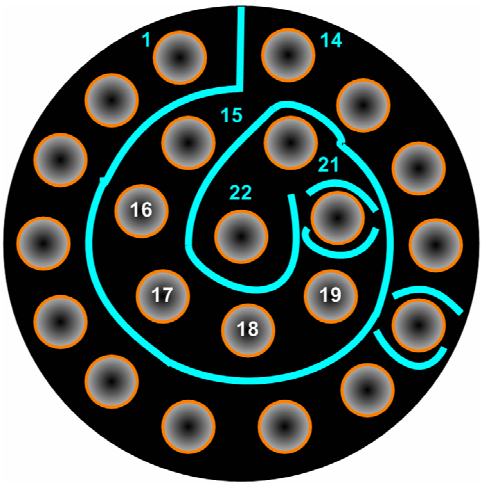
- Make sure that the sun spot after a GOSUN scenario is not too far away from the target on the collimator.
- Check the battery voltage, it must be over 12V.
- Clean the four quadrant sensor with a cotton swab.
- Check visually the external state of the sensor.
- Check if the collimator is correctly assembled.
- Check the spirit level.

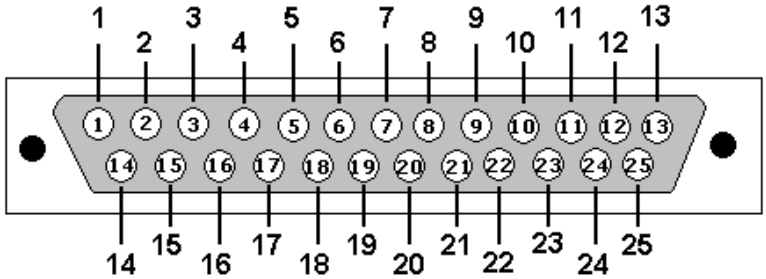
If this procedure does not solve the problem, it means that the sensor head cord is probably damaged.

Follow the procedure to see so:

- Unplug the sensor head cord cable.
- Test the 4 connections linked to the 4 quadrant sensor.

On the jupiter plug (round plug), pins linked to the TRACK system are the 16, 17, 18, 19. Pins numbers are quite easily readable.
On the DB25 plug side, pins linked to the TRACK system are 9, 10,21, 22.





With an ohmmeter, check the resistance between the following pins:

pin 16 jupiter ←→ pin 21 DB 25
pin 17 jupiter ←→ pin 9 DB 25
pin 18 jupiter ←→ pin 22 DB 25
pin 19 jupiter ←→ pin 10 DB 25

If the resistance is almost null or null, the connection is OK, if it is tending to infinity, then the connection is broken.

Please contact cimel technical support for any damaged sensor head cord or if the procedure is not solving the problem.

6.3.3. InGaAs / silicon and A / K discrepancy

If the photometer is declared in AERONET network, “InGaAs / Silicon” and “A / K” discrepancy warning flags may be emitted (depending on the photometer version). They will be emitted on this website:
http://aeronet.gsfc.nasa.gov/cgi-bin/weekly_report_v2

If not declared, it is difficult to detect this discrepancy easily. A measure with the 1020 nm is done either on the silicon and the InGaAs channel. Algorithms are checking the ratio in between the two measures and it should be constant.

The main cause that may lead to these discrepancies is:

- One of the channel or both channels are obstructed by something (spider web, insects…).

Procedure to follow:

- Clean the collimator with dry air or very carefully with a bottlebrush and make sure that nothing is obstructing the channels.

If this procedure does not solve the problem, please contact CIMEL technical support.

6.3.4. High dark current

If the photometer is declared in AERONET network, “high dark current” warning flags may be emitted. They will be emitted on this website:
http://aeronet.gsfc.nasa.gov/cgi-bin/weekly_report_v2

The dark current is regularly measured when a BLACK scenario is done on both IngaAs and silicon channel with AUREOLE and SKY gain.

The dark current should always be low, and under a certain threshold.

The main cause that may lead to a high dark current:

- An electronic component is damaged, defective or not correctly plugged.

Procedure to follow:

- Make sure that all the connectors on the card inside the CU are correctly plugged.
- Check all external cables and wires especially the connections.

If this procedure does not solve the problem, please contact CIMEL technical support.

6.3.5. Constant humidity

If the photometer is declared in AERONET network, “constant humidity” warning flags can be emitted. They will be emitted on this website:
http://aeronet.gsfc.nasa.gov/cgi-bin/weekly_report_v2

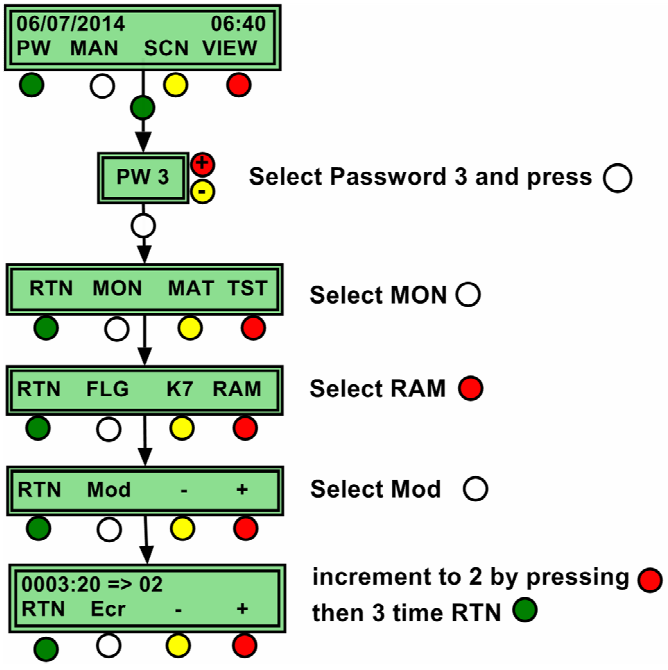
The possible causes that may lead to a constant humidity:

- Continuous rain which means 4 days a week with rain the full day or rain until air mass=2.5.
- The wet sensor is close to the sea or the ocean and the wind carries on regularly marine spray on its direction.
- Dew in the morning takes a long time to evaporate.
- The wet sensor is damage, time worn or broken. The wet sensor is quite sensitive, especially the resistive part on its head which can be deteriorated with rough meteorological conditions.

Procedure to follow:

- Try to slightly orientate the sensor to the West, it will then be exposed quicker to the morning sun and the dew will evaporate faster.
- Try to protect the wet sensor from possible marine spray.

If it hasn’t solved the problem, please make sure that the wet sensor is dry and follow this procedure:



Then display the wet sensor value via the VIEW menu.
A special screen appears:

- Check the value on the second line of the screen (23 in the example above).
- Unplug the wet sensor and check the value on the second line of the screen.

If the value when the sensor is plugged is below 18 please contact cimel technical support, the sensor is probably time-worn or damaged.

6.3.6. Robot errors

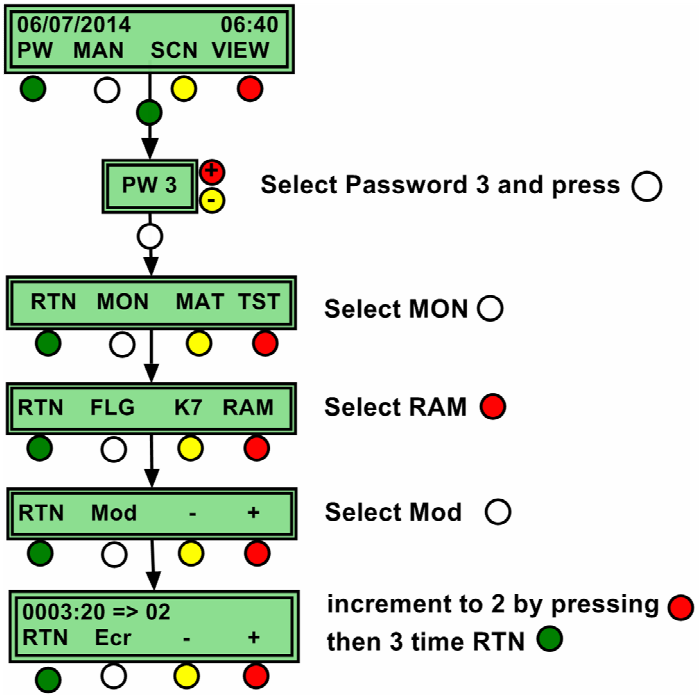
The possible causes that may lead to robot errors:

- The cables are wrapped around the robots.
- The battery is low.
- The switches are damaged.

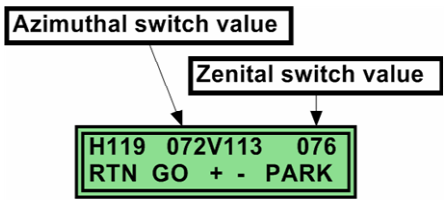
Procedure to follow:

- Check if the cables are wrapped around the robots.
- Unplug and replug the the azimuthal (AZ) and zenital (ZN) cables.
- Launch a PARK scenario.

If the PARK is not well effectuated and if it has not solved the problem, the mechanical switches might be damaged or broken. To see so, follow the procedure:



Launch a PARK scenario and look at the screen:



The azimuthal and zenital switch values should be included in between 70 and 90. If below or above this values, please contact cimel technical support.

6.3.7. Dissymmetric Almucantar

If the photometer is declare on the AERONET network, dissymmetric almucantar warning flags can be emitted. They will be emitted on this website: http://aeronet.gsfc.nasa.gov/cgi-bin/weekly_report_v2

The main cause that may provoke dissymmetric Almucantar is an incorrectly levelled robot.

Procedure to follow:

- Redo step 18 in the installation part.

6.3.8. Battery low

The possible causes that may lead to a low battery:

- The solar panel is down and the battery is not reloaded.
- A long period without any sun.
- The connections are not plugged correctly.
- Connections are rusted (marine spray).
- The battery is too old or broken.

Procedure to follow:

- Check if the cables are correctly plugged and the cables are not damaged.
- Check if the battery has no leakage and is powerful enough (over 12V).

If this has not solved the problem, you can use if possible the battery charger, otherwise please contact cimel support.

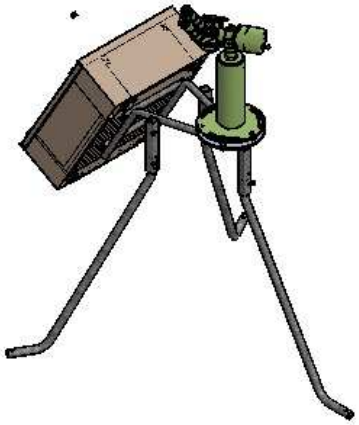
7 Technical specifications

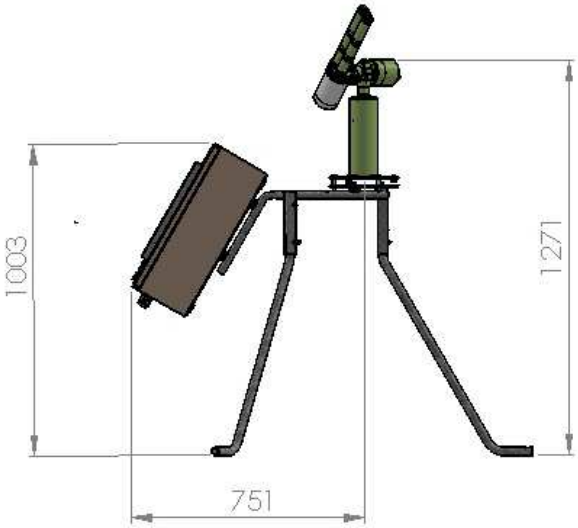
7.1. *General*

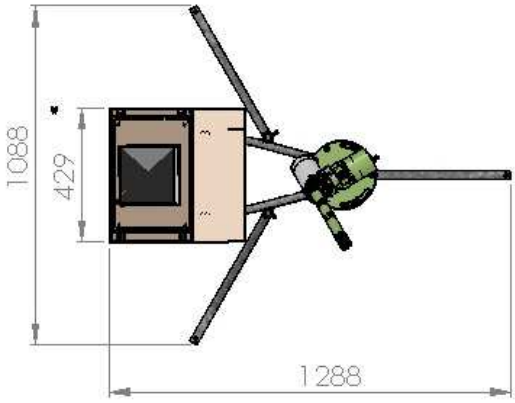
Specification	value
Irradiance precision	< 0.1%
Field of view	1.3°
Minimal scaterring angle from the sun	2°
Spectral range	340 to 1640 nm
Optical filter derivation	< 1% / year
Automated mount	Azimuth and zenith motors
Sky angular scanning	Whole sky : Azimuth: 0 – 360° Zenith: 0 – 180°
Mechanical precision spot	0.003°
Solar tracking precision	0.01°
Power consumption	< 2W
Interferential filter bandwidth	< 30 nm
Total weight without support	25 kg
Power supply	Autonomous through solar panel
Mode	Sun, Sky, Lunar
memory	32 GB on SD card
Solar and moon scanning	4 quadrant sensor
Temperature	-30 to 70° C
humidity	0 to 100 %
RS232 (up to 100 m cable)	9600 baud/s
Numeric count dynamic	0 to 2 097 152

7.2. *Dimensional drawings*

Poids total (total weight): 22kg



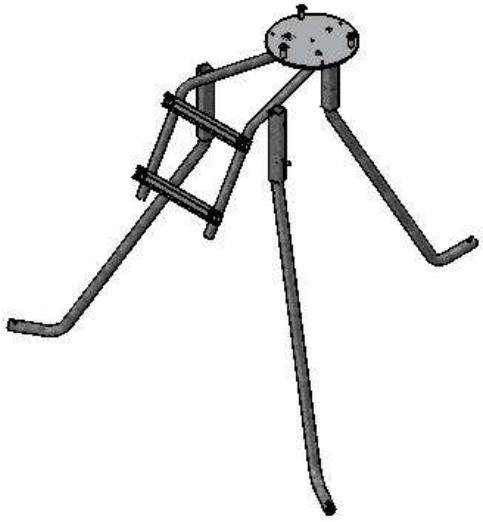


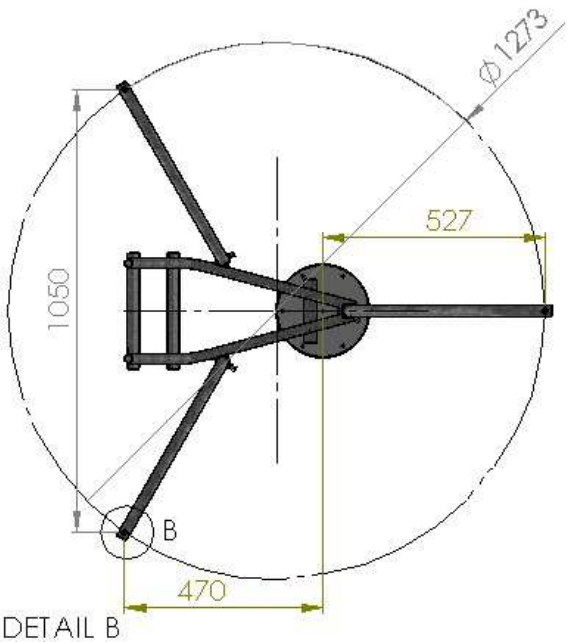


	ind. C	
	ind. B	
30/05/13	ind. A	Création

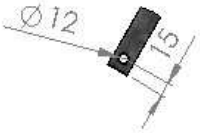
Protection :			Description :	CIMEL ADVANCED MONITORING
Matière :			Désignation : Encombrement photomètre (photometer dimensional space)	
Echelle : 1/20	Format : A4V	Tol. Gén : +/-	Code article :	

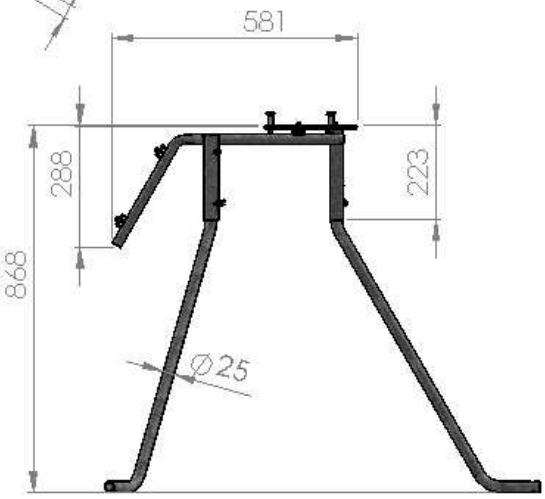
Poids total (total weight): 6kg





DETAIL B
Scale 2 : 15

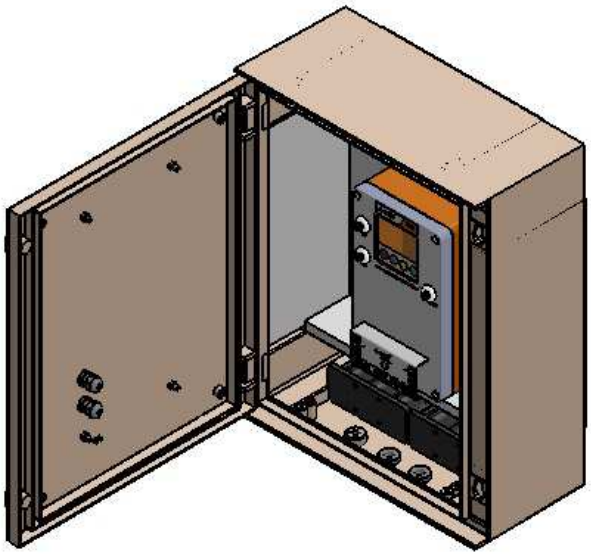


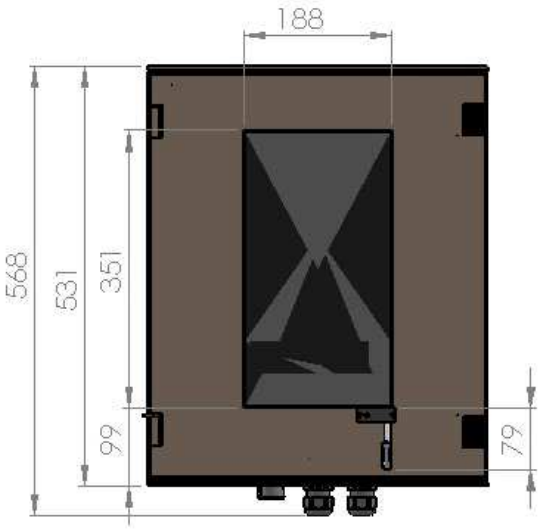


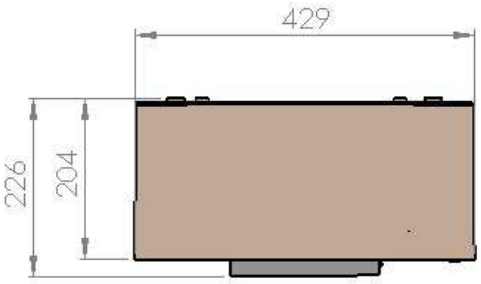
	ind. C	
	ind. B	
30/05/13	ind. A	Création

Protection :			Description :	CIMEL ADVANCED MONITORING
Matière :			Désignation : Encombrement tripode (tripod dimensional space)	
Echelle : 1/15	Format : A4V	Tol. Gén : +/-	Code article :	

Poids total (total weight): 8kg



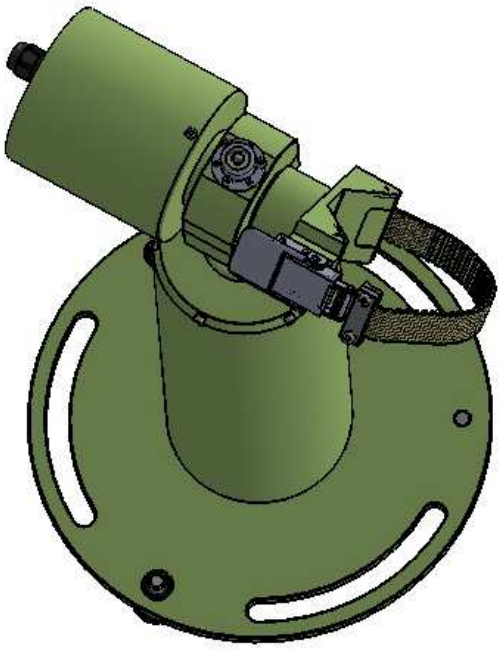


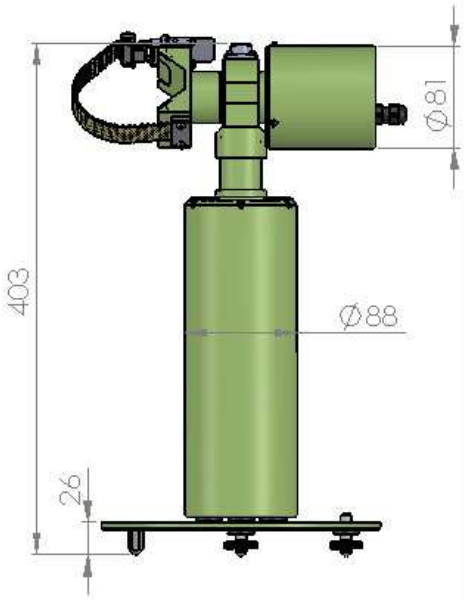


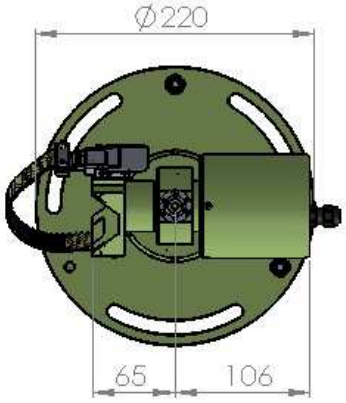
	ind. C	
	ind. B	
30/05/13	ind. A	Création

Protection :				Description :	CIMEL ADVANCED MONITORING
Matière :				Désignation : Encombrement boitier (case dimensional space)	
Echelle : 1/8	Format : A4V	Tol. Gén : +/-		Code article :	

Poids total (total weight): 6kg



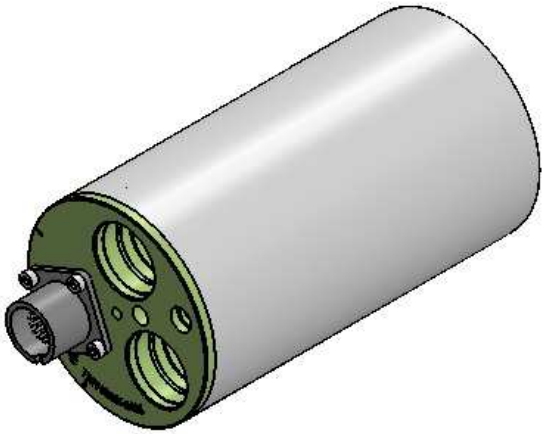


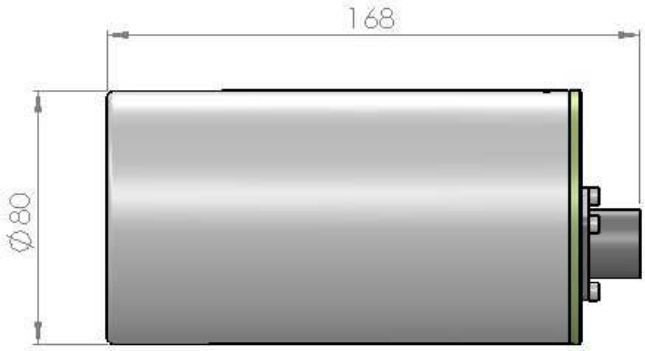


	ind. C	
	ind. B	
30/05/13	ind. A	Création

Protection :				Description :	CIMEL ADVANCED MONITORING
Matière :				Désignation : Encombrement robot (robot dimensional space)	
Echelle : 1/15	Format : A4V	Tol. Gén : +/-		Code article :	

Poids total (total weight):1 kg

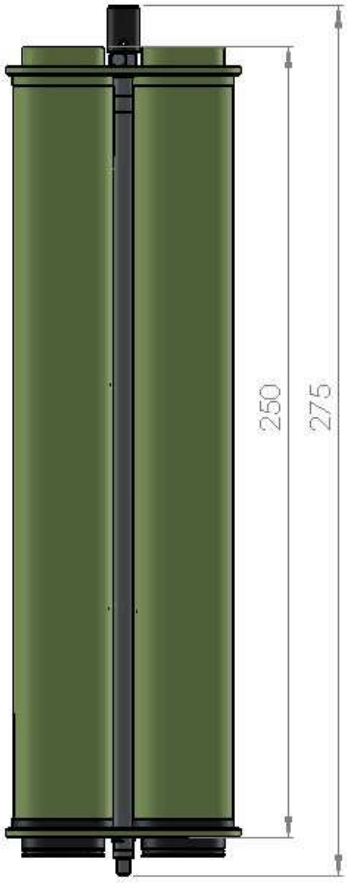


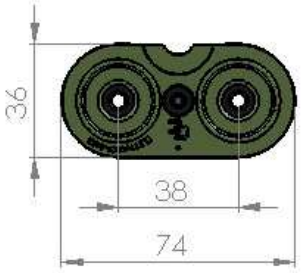


	ind. C	
	ind. B	
30/05/13	ind. A	Création

Protection :			Description :	CIMEL ADVANCED MONITORING
Matière :			Désignation : Encombrement tête (head dimensional space)	
Echelle : 1/2	Format : A4V	Tol. Gén : +/-	Code article :	

Poids total (total weight): 0.36 kg

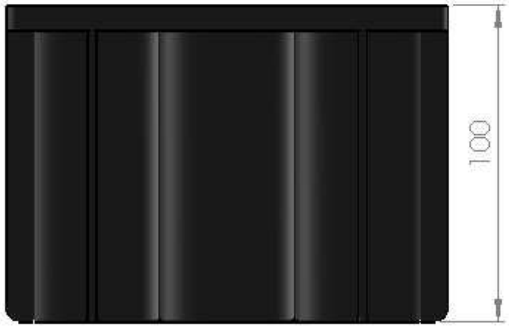


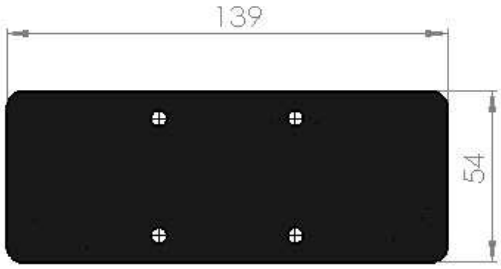


	ind. C		
	ind. B		
30/05/13	ind. A	Création	

Protection :				Description :	CIMEL ADVANCED MONITORING
Matière :				Désignation : Encombrement collimateur (collimator dimensional space)	
Echelle : 1/2	Format : A4V	Tol. Gén : +/-		Code article :	

Poids total (total weight): 1.4 kg x 2





	ind. C	
	ind. B	
30/05/13	ind. A	Création

Protection :				Description :	CIMEL ADVANCED MONITORING
Matière :				Désignation : Encombrement batterie (battery dimensional space)	
Echelle : 1/2	Format : A4V	Tol. Gén : +/-		Code article :	

8 After-Sales Service and Customer Relations

For any problem with the instrument, for use, or for technical information please contact Cimel Electronique at:

Cimel Electronique
172 rue de Charonne
75011 Paris
FRANCE

Phone: (+33) 143 487 933
Fax: (+33) 143 486 261
Email: support@cimel.fr

Cimel Electronique can use Skype and Team Viewer to provide technical support. When contacting us please indicate:

- The reference and the serial number of your product.
- Your email.
- Optional: Skype and/or Team Viewer address.