INGECON SUN MANAGER

User Software Manual

Ref: AAX2005IKL01 Rev: _A

Ingeteam Energy

05/2010

Note: In its commitment to ongoing product improvement, Ingeteam Energy S.A. reserves the right to amend this document with no prior notice.

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Related documentation

CATALOGUES

Ingecon® Sun
Commercial Catalogue

PC00ISA01_A

MANUALS

Ingecon® Sun LITE
Installation Manual

AAY2000IKI01

Ingecon® Sun POWER
Installation Manual

AAS2000IKI01

Three-Phase IP54
Ingecon® Sun
Installation Manual

AAS2000IKI03

Ingecon® Sun SMART
Installation Manual

AAS2000IKI02

Ingecon® Sun
POWERMAX
Installation Manual

AAV2000IKI01

Communication
Accessories
Installation Manual

AAX2002IKI01

Ingecon® Sun Manager
User's Manual

AAX2005IKL01

Single-phase
Ingecon® Sun Hybrid
Installation Manual

AAR2000IKI01

Ingecon® Sun Hybrid MS
Installation Manual

AAR2000IKI01

Ingecon® Sun
String Control
Installation Manual

AAS2002IKI01

1 INTRODUCTION

PV plants incorporating Ingecon® Sun inverters and accessories require a software program to enable all the system variables to be controlled from a single computer.

This document refers to the following PC program:

Ingecon®Sun Manager

1.1 Hardware and Software Requirements.

In order to use the Ingecon® Sun Manager, the following is required:

- A PC with either Windows® XP, Windows® Vista or Windows® 7.

And, depending on the type of communication system used:

- A vacant serial or USB port
- Ethernet communication board.
- Internet connection for communication via GPRS.
- Connection through an external modem via GSM.

1.2 Usage regulations

Copyright

The Ingecon® Sun Manager software is the property of Ingeteam Energy, S.A.

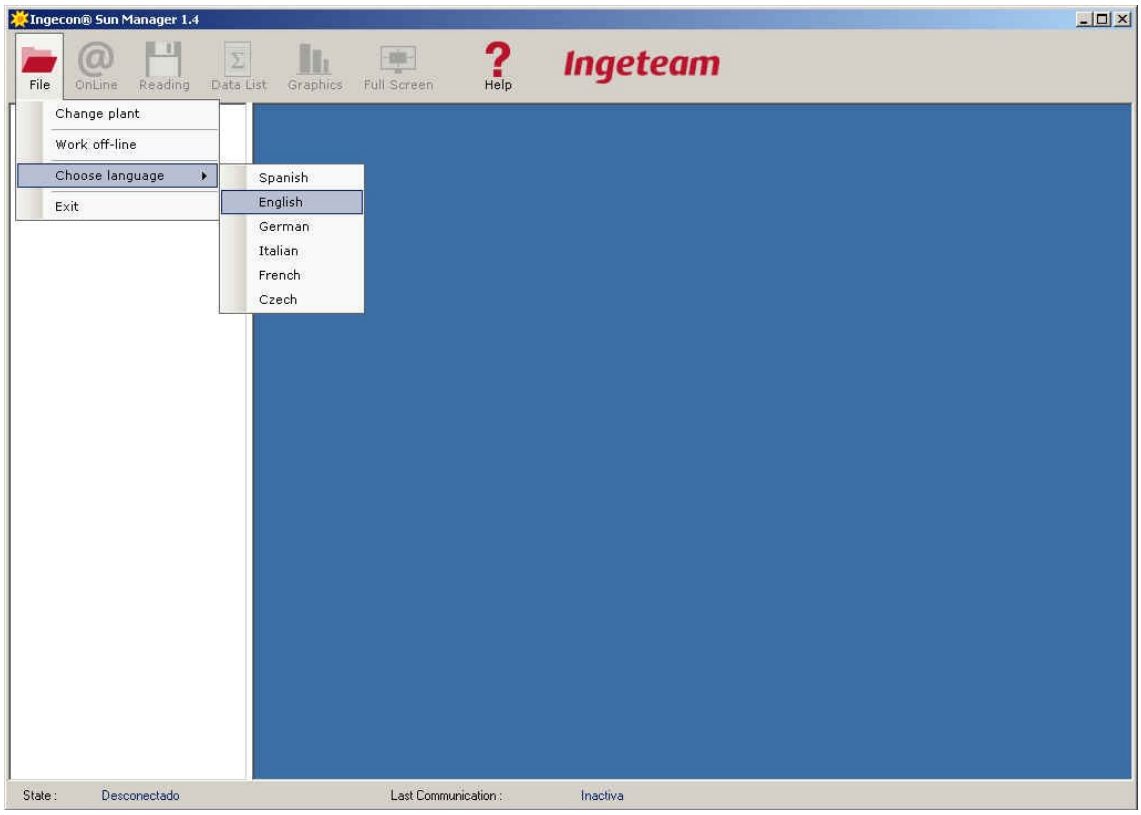
2 INSTALLATION

- Download the software from the Ingeteam website at **www.ingeteam.es** or **www.ingeteam.com**
- Execute the Setup.exe file and start the installation procedure.
- Follow the installation instructions**.**

3 START-UP

3.1 Language

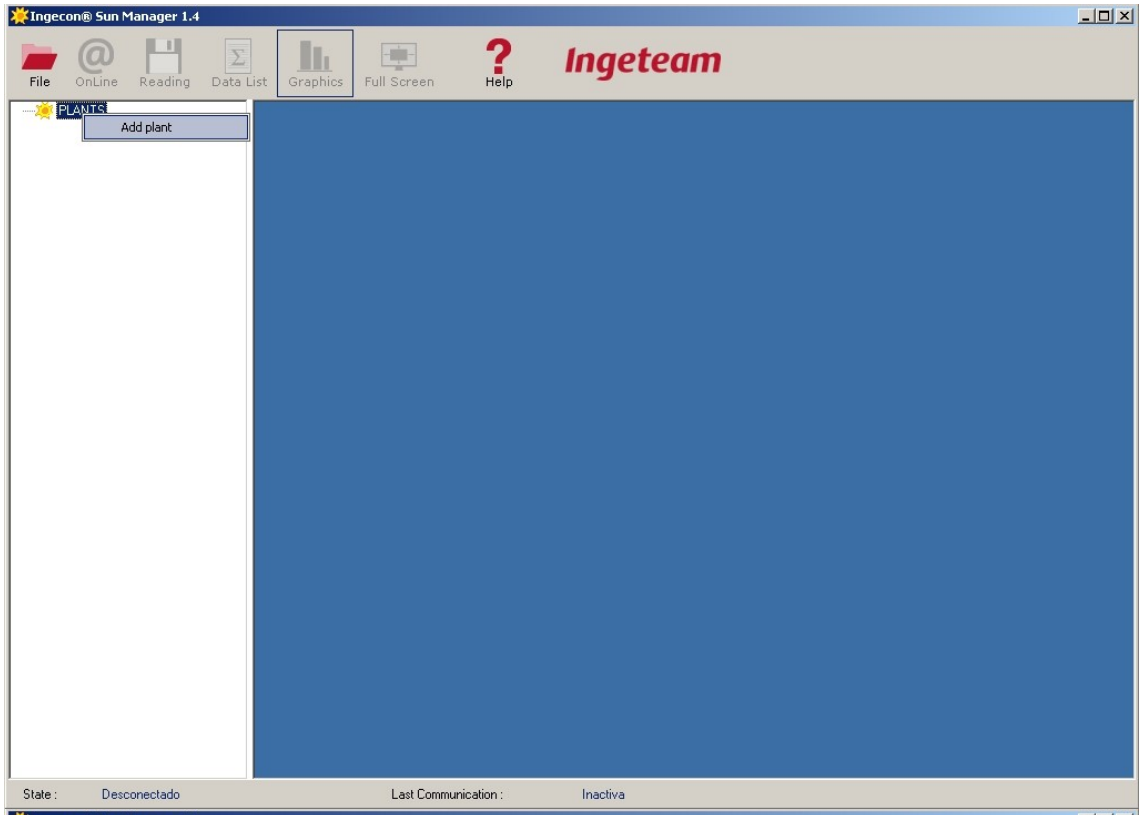
From the file menu "**File**", go to select language "**Choose language**" to select one of the languages available: Spanish, English, German, Italian, French or Czech.

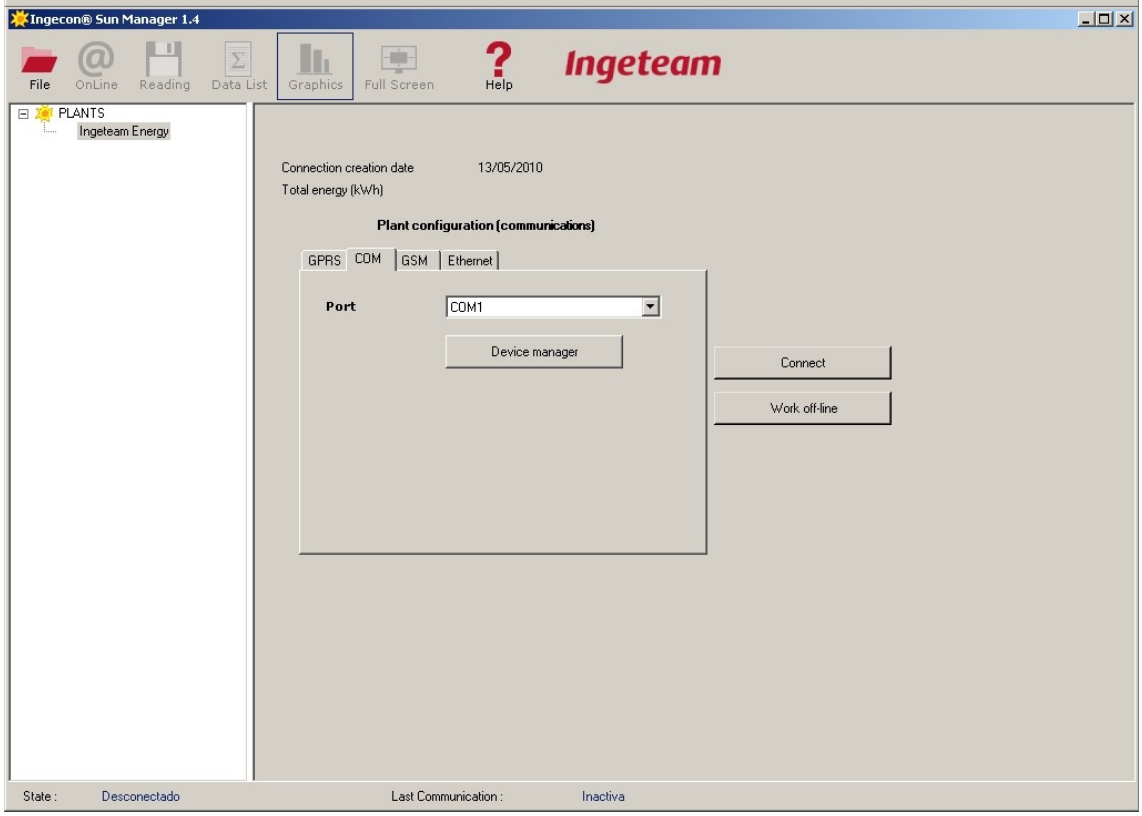


3.2 Plant selection.

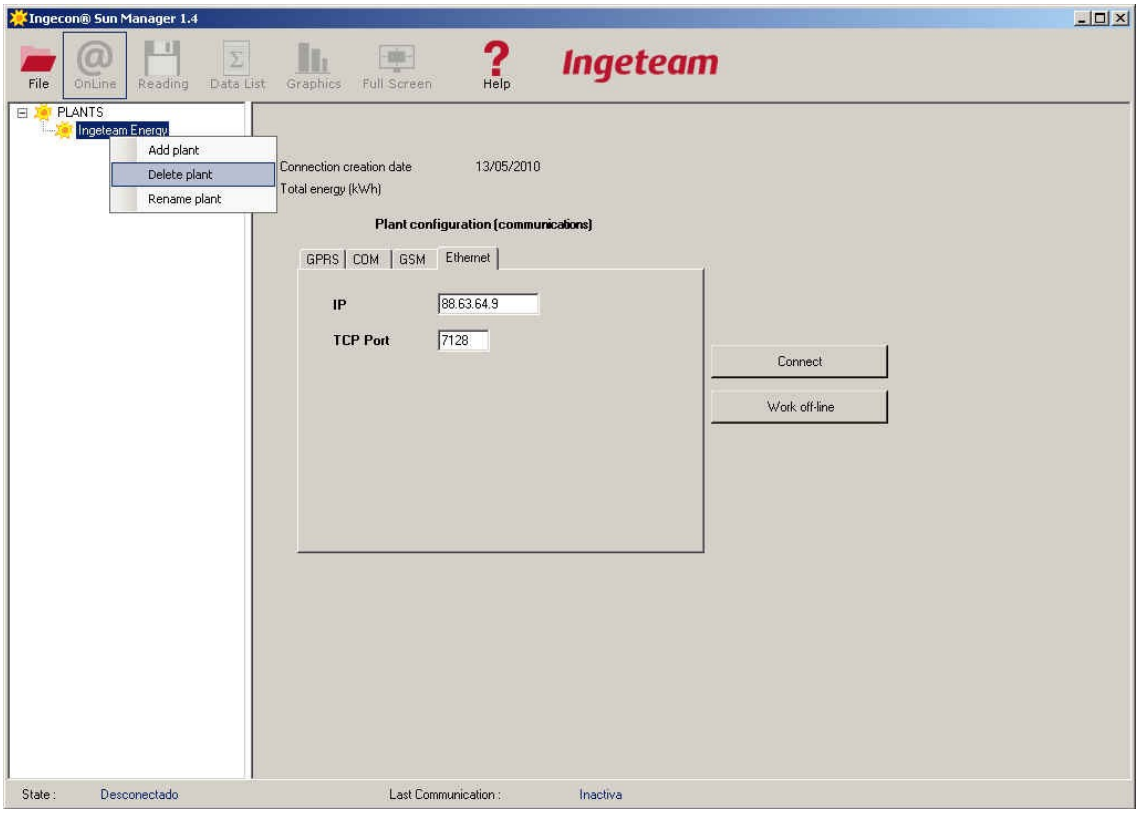
The software and its folder structure make it possible to work with a number of PV installations through a single PC.

The first step is to create the PV Plant to work with. Right click on PLANTS to access a pop-up menu which will allow a new plant to be added, and which must be assigned a name.





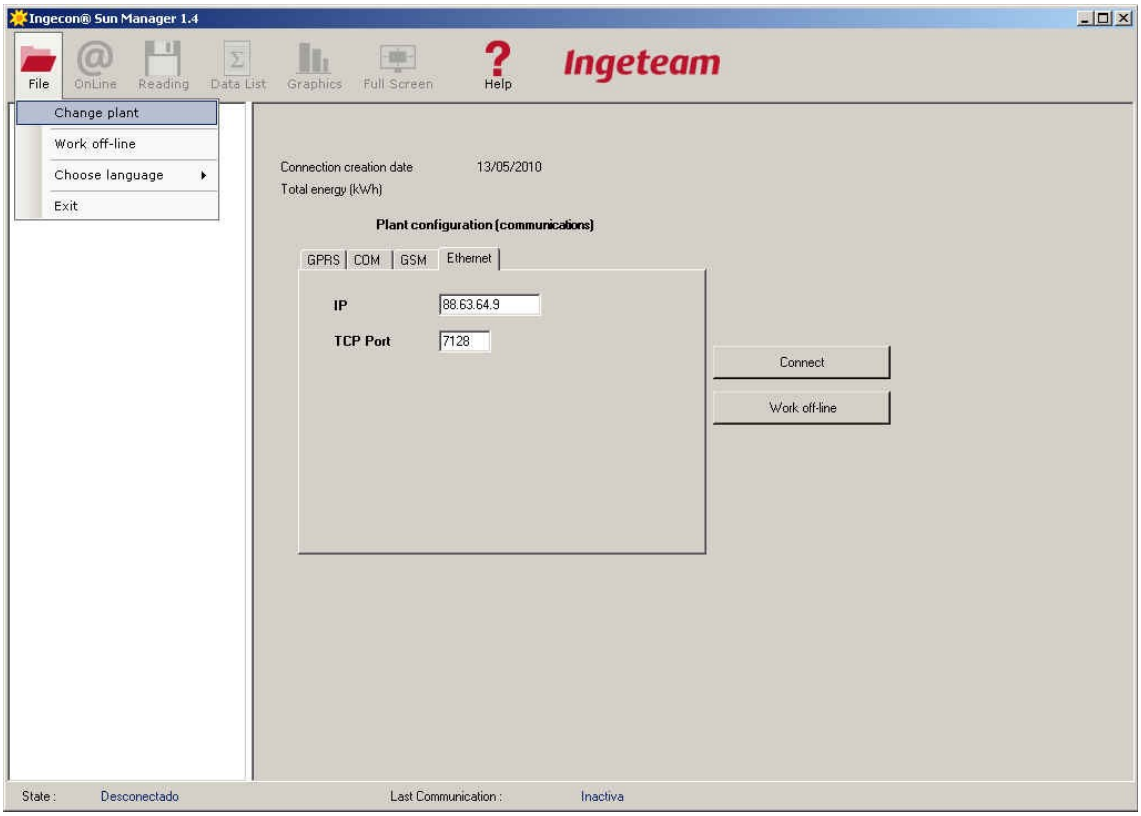
An existing plant can be deleted by right-clicking on that plant and then selecting the delete plant option. Alternatively, select the plant and then press the "Del" key. In either case a user message will appear on screen to indicate that the data will be deleted.



As can be seen in the figure above, it is also possible to rename the plants created. This is done by selected the rename plant option **Delete plant.**

Change plant.

Once you are connected to a plant to go to another plant simply select the file menu **File** and click on the change plant option **Change plant.**



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3.3 Configuring the communication link.

When the Plant name is selected, the Plant configuration parameters will be displayed on the right-hand side of the screen. These parameters should be changed to suit the communication link available at the Plant.

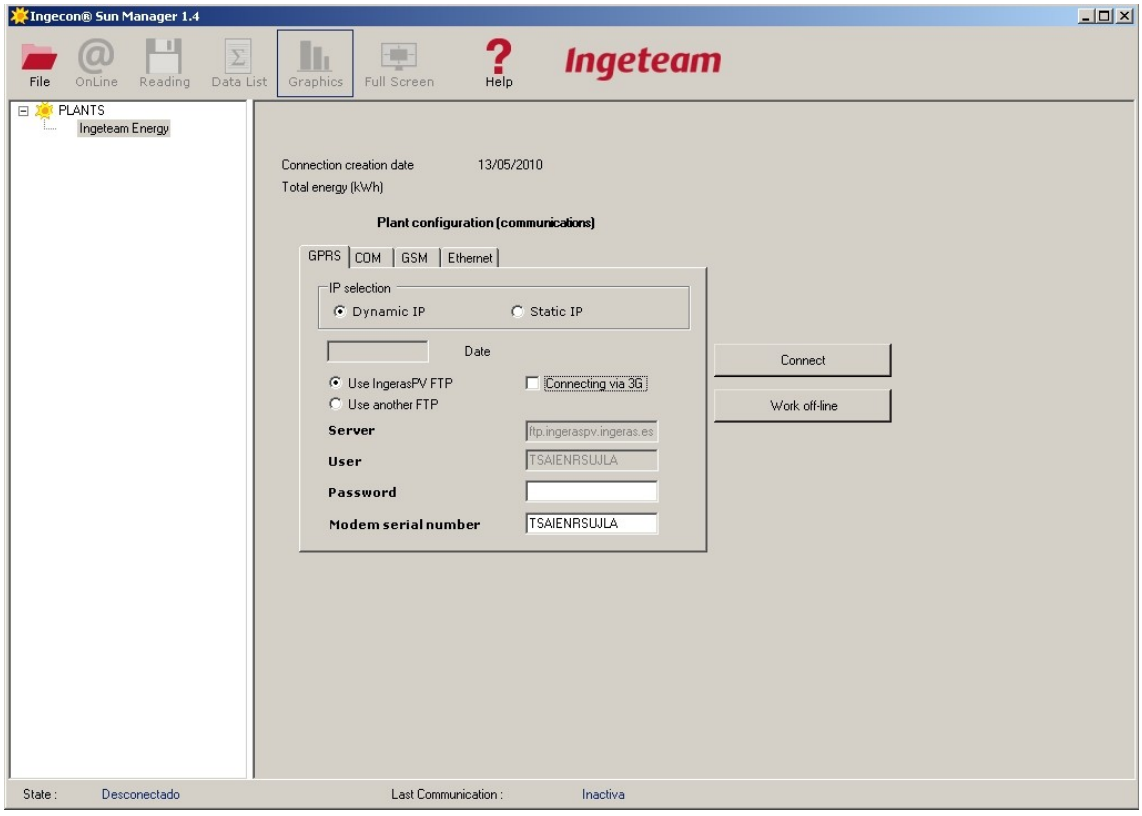
The Communications Configuration window has four tabs. The first tab is for the GPRS configuration, the second is for the serial port, the third is for the GSM communication link and, finally, the fourth is to configure the Ethernet parameters.

3.3.1 GPRS Communications

GPRS communications is made with the modem, which requires a SIM card and a contract with a telecommunications operator. This modem is accessible from any computer with Internet and the Ingecon Sun Manager. Considering the amount of inverter data to be downloaded, just over a few tens of Mb, the Movistar "M2M Voice" is the most suitable service if the modem is also to be uninterruptedly connected to the Internet. "Voice" is required to send SMS alarm messages, as the SMS service is not included in "M2M Data". Normally the modem internet IP address is dynamic, however operators do also offer fixed IP addresses.

In any case, keep a check on your SMS consumption and consult your telecommunication operator's customer service regarding the best rates available.

In the same way as for the GSM modem, you need to disable the PIN code request on the SIM card.



3.3.1.1 GPRS with a dynamic IP

Each time the modem connects to the Internet, the telecommunications operator assigns it a new IP address, which does not necessarily coincide with the one assigned

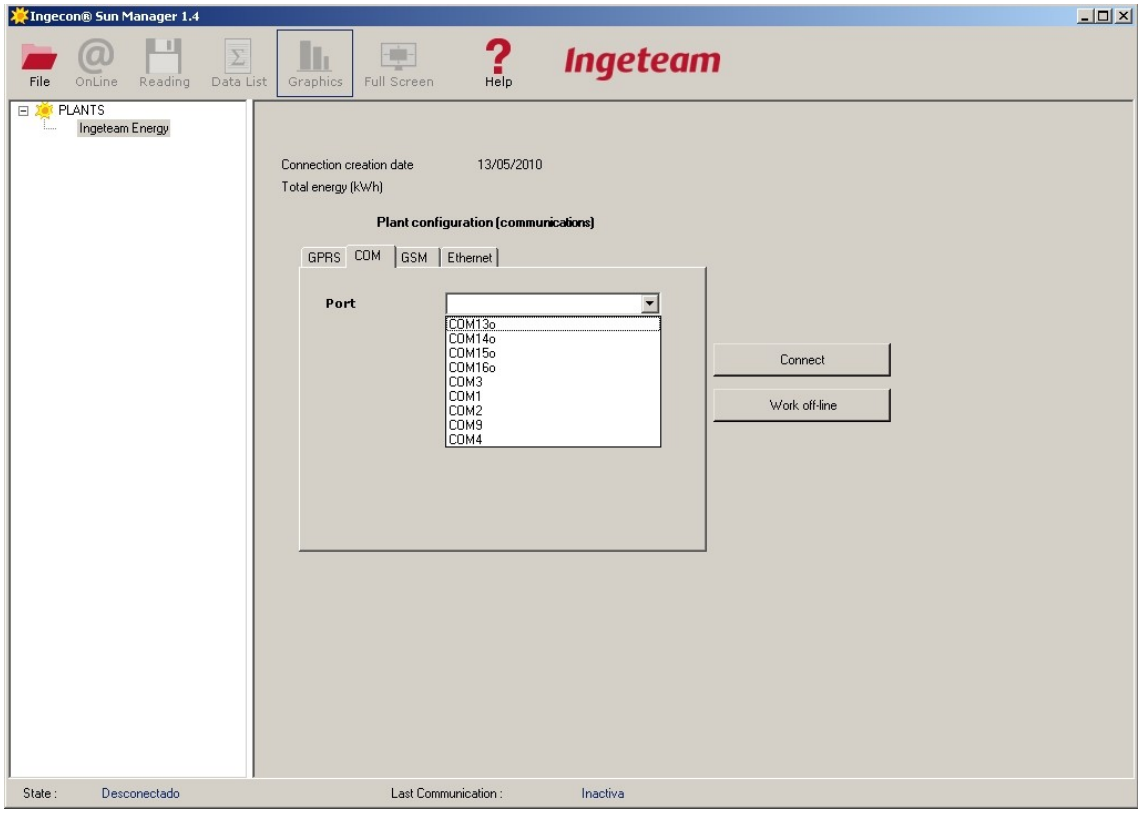
during an earlier connection. For this, Ingeteam offers the ftp server ftp.ingeraspv.ingeras.es. When using a dynamic IP, you need to complete the following fields: Server (the server ftp address for authentication in order to obtain the dynamic IP); User; and Password. You also need to indicate the serial number of the modem to be used for communicating with the inverters. If the server used is the one offered by Ingeteam, then the user number and the modem serial number are the same, as shown in the following figure.

3.3.1.2 GPRS with a static IP

Ask your telecommunication operator's customer service about the possibility of obtaining a fixed IP for your modem. In this case, you simply need to enter the IP in the appropriate field.

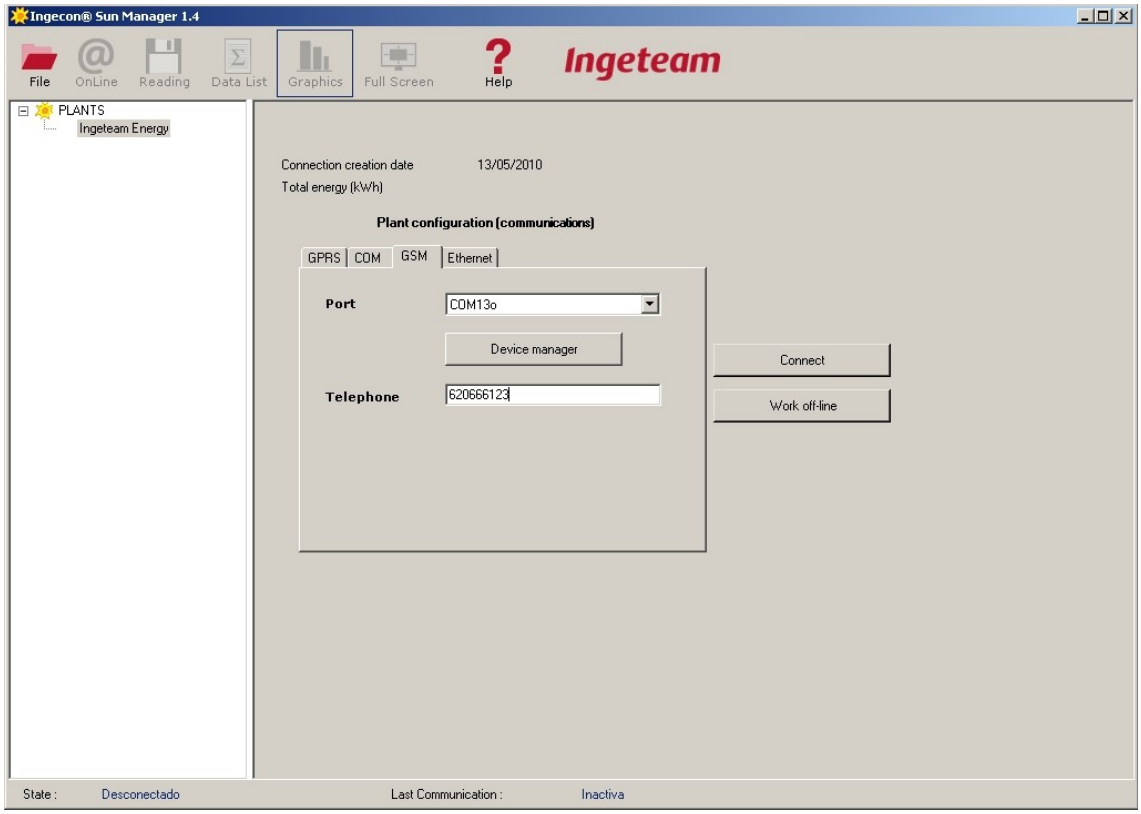
3.3.2 Serial Port Communication.

For serial port communications, you need to select one of the COM ports available on the PC for the connection.



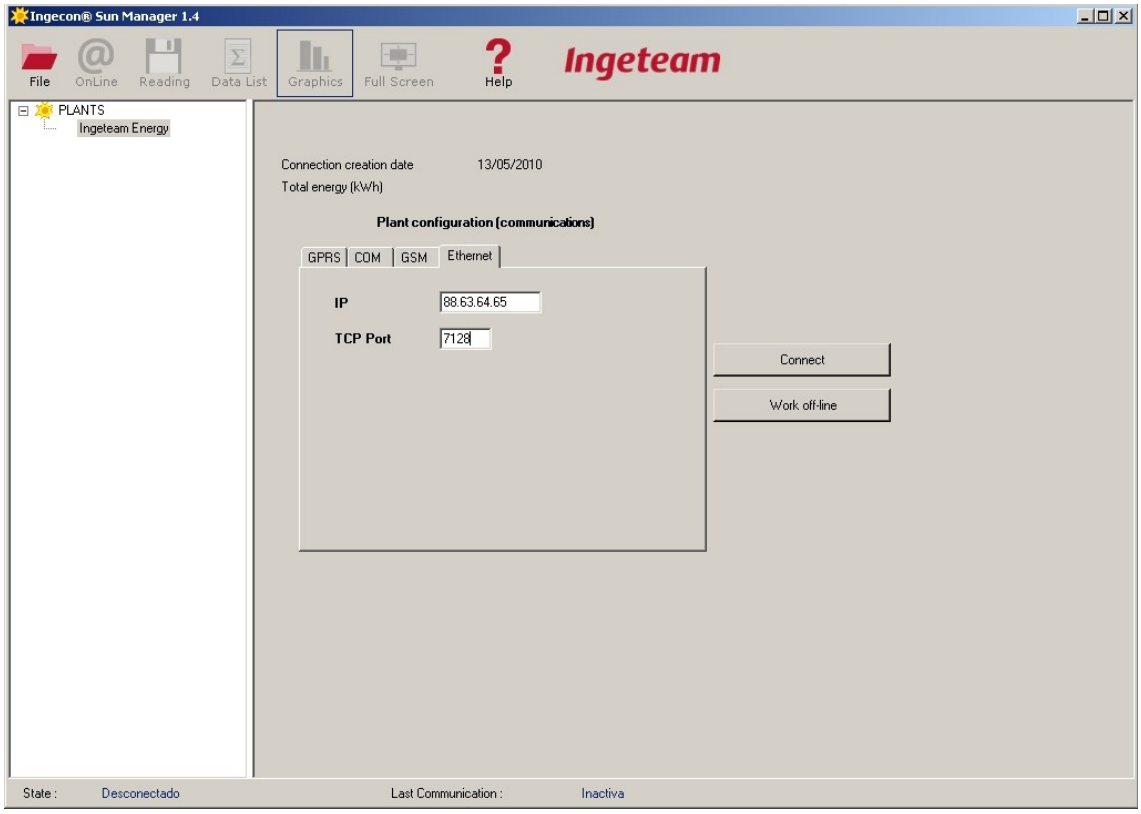
3.3.3 GSM phone communication

The GSM tab is to select a data call communication system from the modem through the GSM network. To configure this option you need to enter the modem phone number.



Ethernet Communication

Use this option if your inverter is equipped with the Ethernet communication card, or if an RS485 / Ethernet converter has been connected to the RS485 bus formed by its inverters. The following parameters need to be configured: IP address; and the port used to configure this equipment to accept TCP clients.



3.4 Offline mode

Use this option when you want to work with plant data without being connected.

3.5 Disconnection

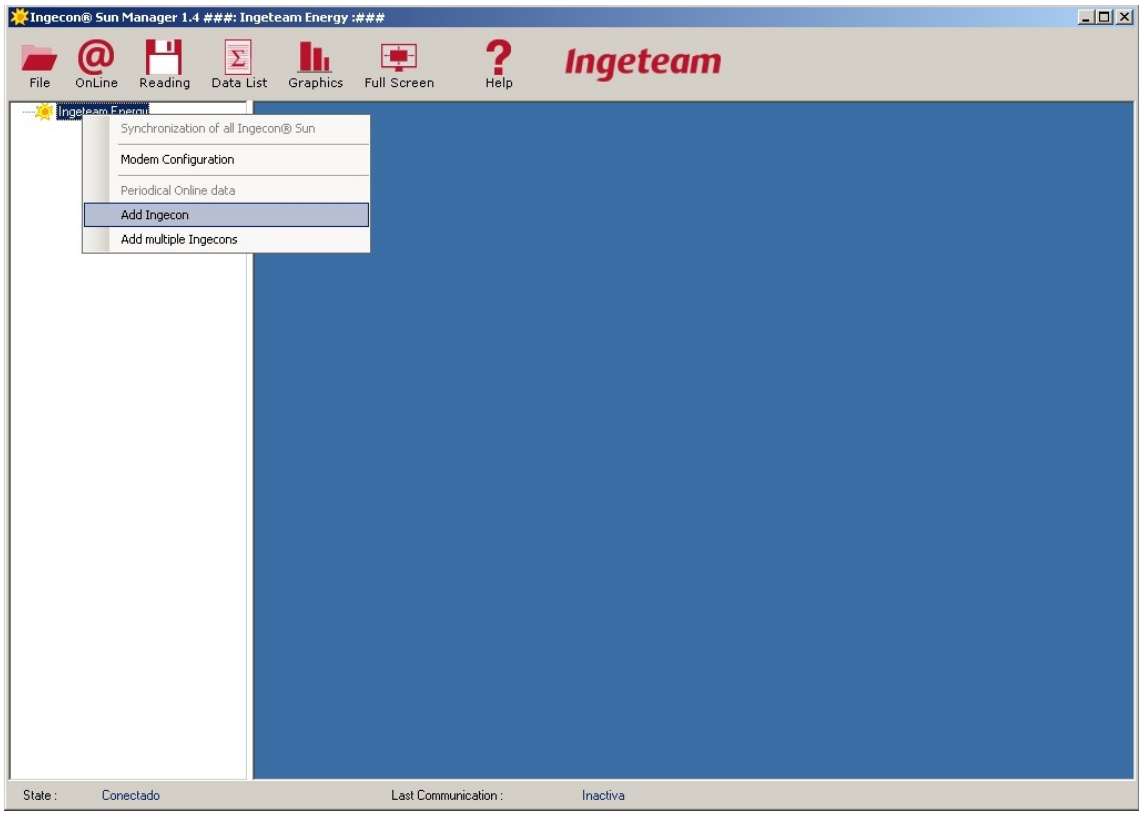
Allows you to disconnect from the plant.

4 Working with the plant

Once the communication has been configure, you can work either with or without a connection.

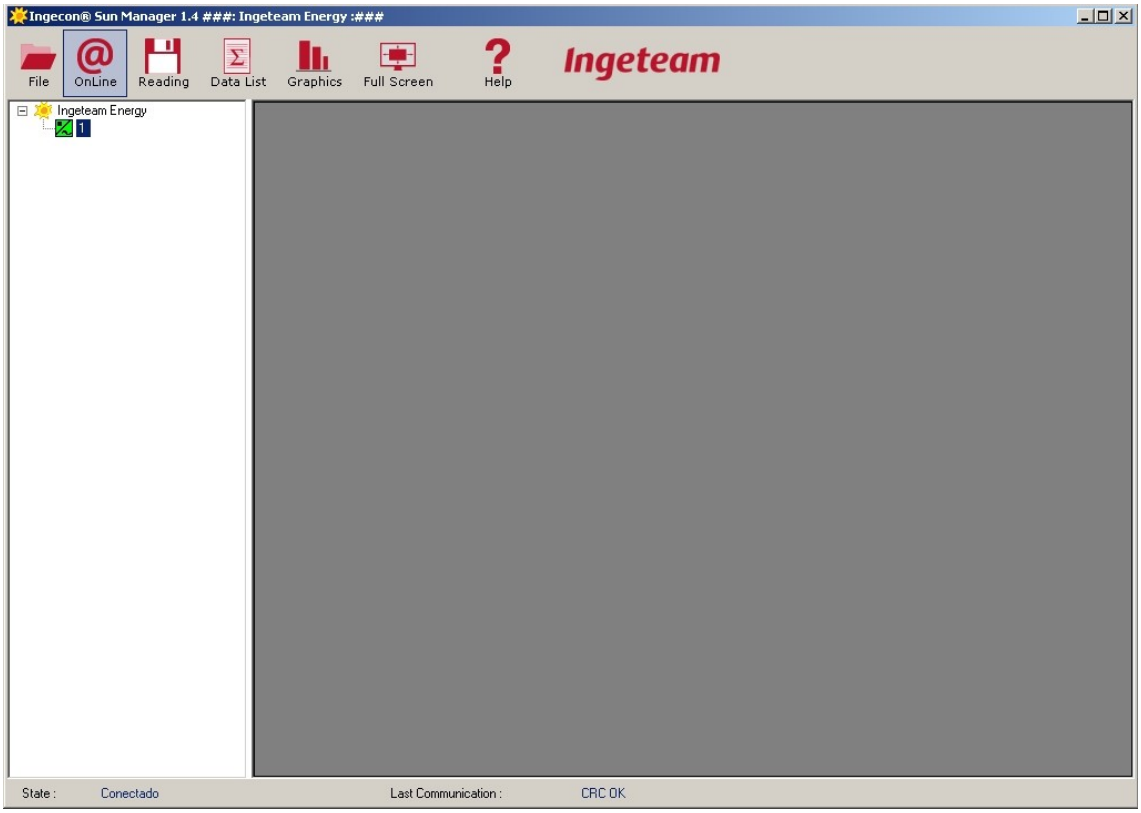
For working without a connection, double click on the Plant you want to work with or else select a plant and click on the work without connection button "**Work off-line**". For working whilst connected, select a plant and click on the connect button "**Connect**".

If you are working whilst connected, the following screen will be displayed.



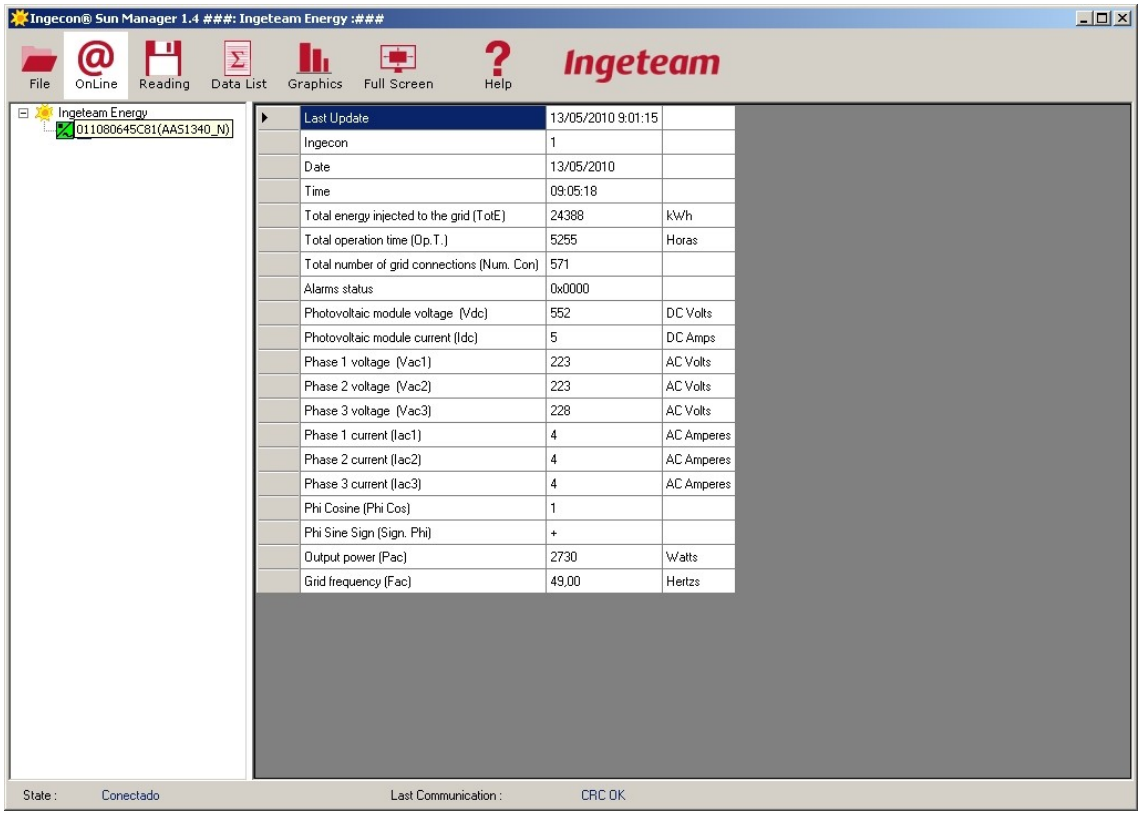
Right-click on the plant name on the left-hand panel and the pop-up menu displayed will allow you to add an Ingecon, which is the generic name used to define an inverter type machine which can either be three phase, single phase, hybrid or a string monitor.

Following the same procedure as for the Plants, a value needs to be entered and which must be between 1 and 247. If the node responds, the icon turns green, otherwise it will turn red. In this latter case, this may be because the node does not exist in your network or it may indicate a communication problem with that node.



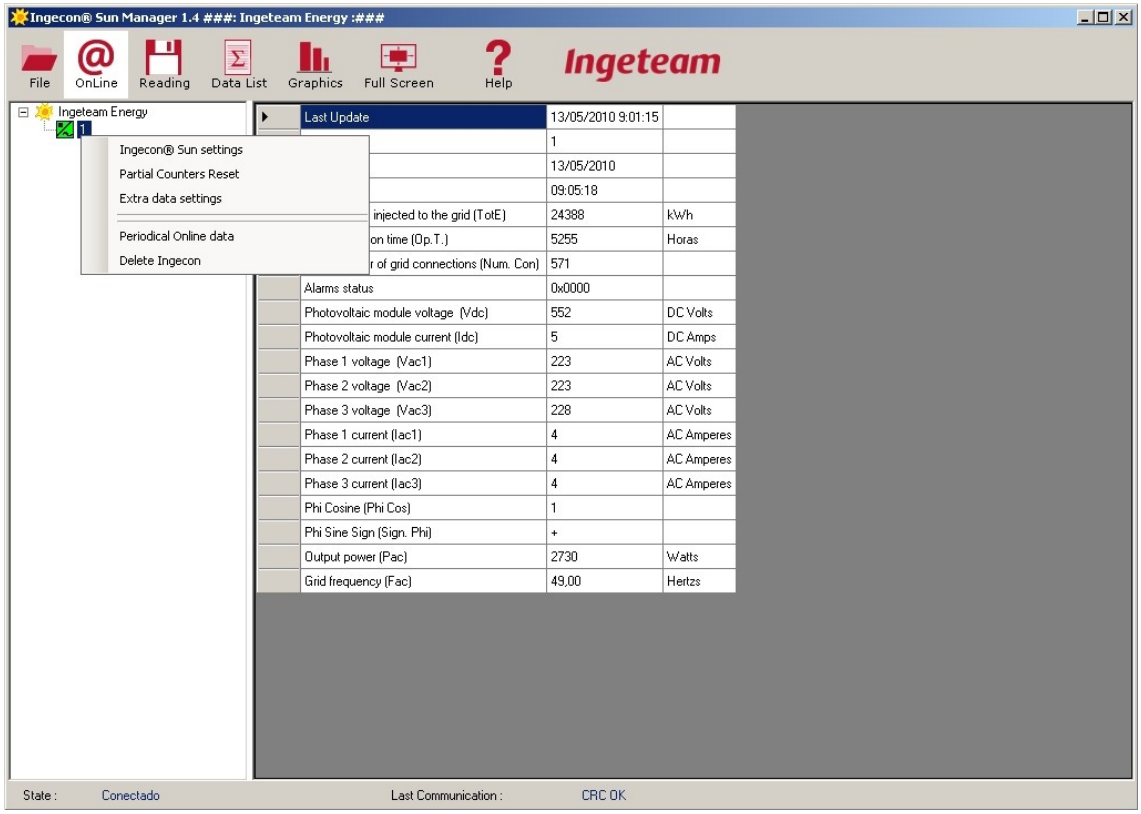
4.1.1 Serial number and Firmware.

The serial number and firmware code for the Ingecons can be obtained by simply positioning the mouse pointer over an Ingecon.

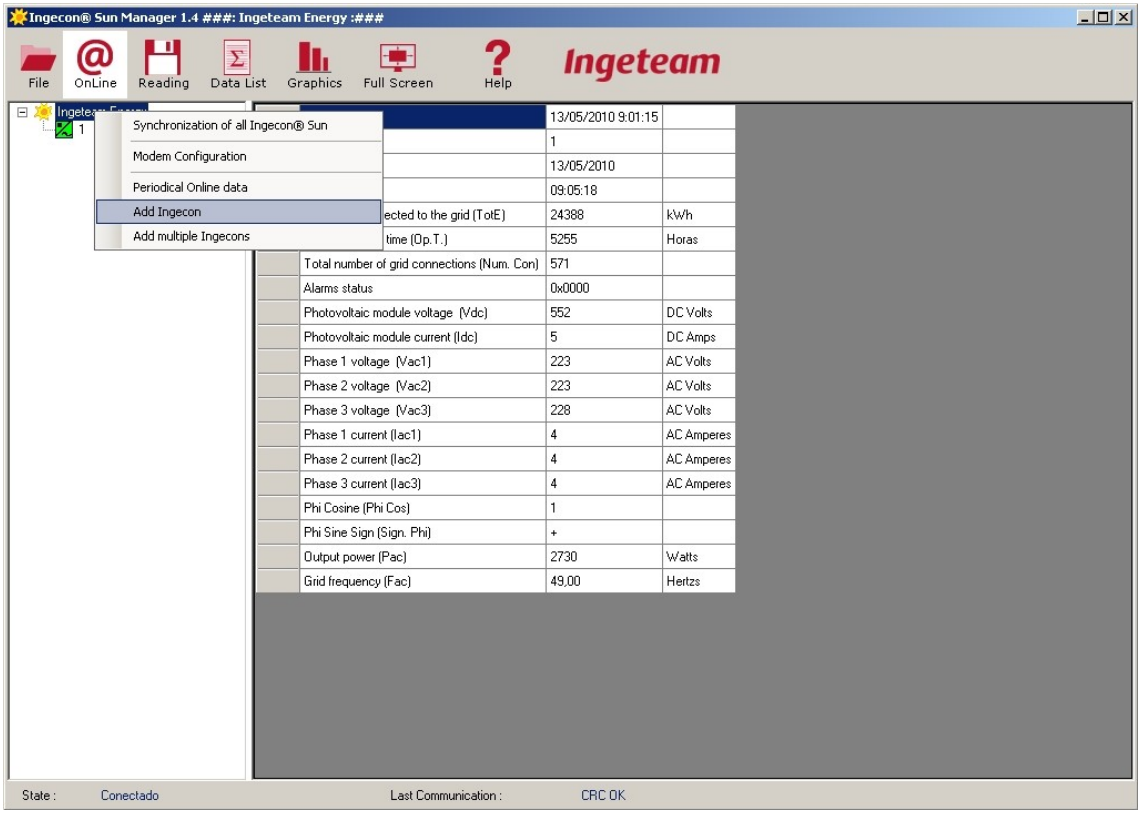

Ingecon® Sun Manager 1.4 ###: Ingeteam Energy :###
File
OnLine
Reading
Data List
Graphics
Full Screen
Help
Ingeteam
Ingeteam Energy
011080645C81(AAS1340_N)
Last Update 13/05/2010 9:01:15
Ingecon 1
Date 13/05/2010
Time 09:05:18
Total energy injected to the grid (TotE) 24388 kWh
Total operation time (Op.T.) 5255 Horas
Total number of grid connections (Num. Con) 571
Alarms status 0x0000
Photovoltaic module voltage (Vdc) 552 DC Volts
Photovoltaic module current (Idc) 5 DC Amps
Phase 1 voltage (Vac1) 223 AC Volts
Phase 2 voltage (Vac2) 223 AC Volts
Phase 3 voltage (Vac3) 228 AC Volts
Phase 1 current (Iac1) 4 AC Amperes
Phase 2 current (Iac2) 4 AC Amperes
Phase 3 current (Iac3) 4 AC Amperes
Phi Cosine (Phi Cos) 1
Phi Sine Sign (Sign. Phi) +
Output power (Pac) 2730 Watts
Grid frequency (Fac) 49,00 Hertzs
State : Conectado
Last Communication : CRC OK

5 Plant pop-up menu

Right-click on the plant tree zone and the following pop-up menu will be displayed. This menu gives a series of options.



5.1 Add inverters



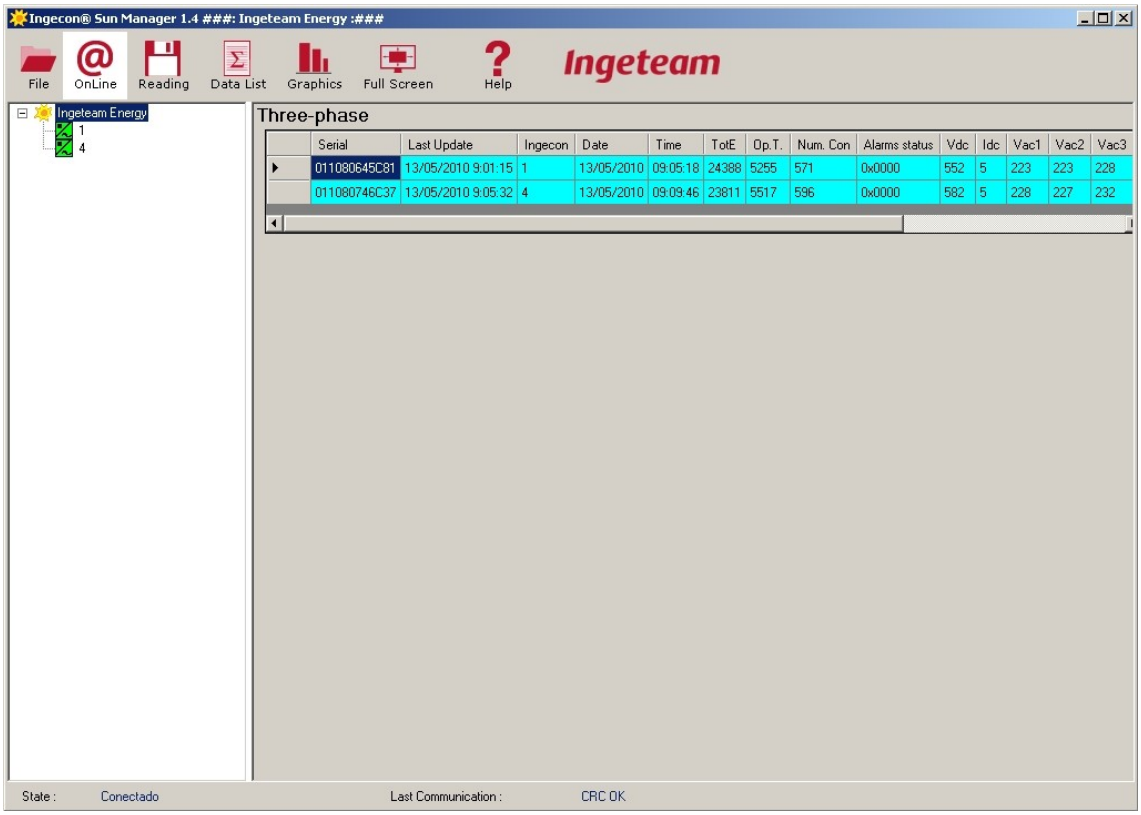
Left-click on any of the Ingecons and the following pop-up menu will be displayed.

5.1.1 A single Ingecon® Sun

Double click on any of the Ingecons to obtain the Online parameters shown in the figure above. The Enter key can also be used to the same effect.

5.1.2 All the Ingecon® Sun

Double click on the Plant (in the case of the figure above "Plant 1") to botain a list of online parameters for each of the Ingecons connected to the Plant.



Each line gives the data for one Ingecon. The background colour indicates the percentage of the maximum power being delivered by the Ingecon in question.

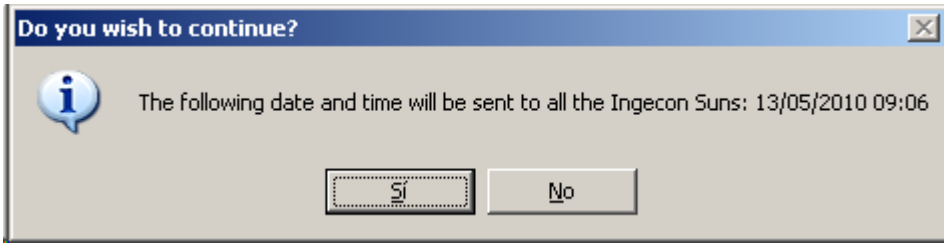
COLOUR	PERCENTAGE (%)
Red	<20
Orange	20 - 40
Yellow	40 - 60
Green	60 - 80
Cian	>80

5.1.3 Continuous online data

This function provides a continuous read-out of the inverter online data.

5.1.4 Synchronisation of the Ingecon Sun inverters

The user is asked whether he would like to go ahead and send the time and date to all the Ingecons:



A message then confirms that this synchronisation has been sent

5.1.5 Configuring the Modems

This menu serves to configure the reports and alarms that the modem can send by SMS (short text messages by mobile phone). Consult the Communication Accessories Manual AAX2002IKH01 for more details on GPRS communication.

Reports: These can be generated on a daily, weekly or monthly basis and contain the energy production figures for the period in question.

Alarms: To provide real-time warnings of any system incidents.

5.1.5.1 Configuring the alarms, configuring the GPRS and configuring the telephones (1-4)

Inverters Here the number of inverters at the plant should be indicated.

Surveilance interval This field is to indicate the time interval in minutes at which the inverter housing the modem makes a status query to the other inverters.

Test message. An option to enable a test message to be sent from the modem, once the modem configuration has been completed. This serves to check that the modem is operating correctly.

For the modem to trigger an alarm, the cause must be sufficiently serious.

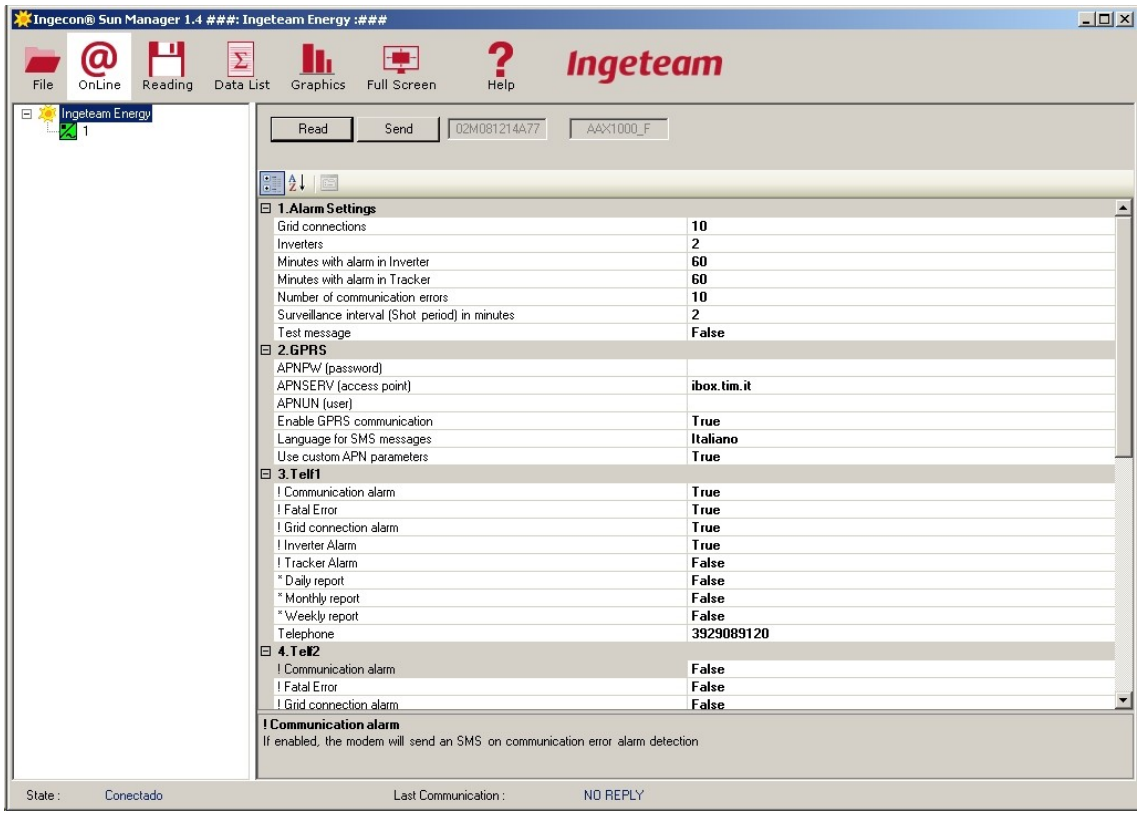
Minutes with alarm in inverter. Minimum duration in minutes required for an inverter alarm to be considered serious enough for a message to be sent from the modem.

Minutes with alarm at tracker Minimum duration in minutes required for a tracker alarm to be considered serious enough for a message to be sent from the modem.

Number of communication errors Minimum number of communication errors required to trigger an alarm message from the modem.

Grid connections. Number of network connections a day considered to be a network connection problem. An alarm message will be triggered.

The modem is able to send SMS alarms to up to four mobile phones.



For each of these phones, you need to select the time interval for the reports and the type of alarms to be communicated.

5.1.6 Configuring the GSM Modems

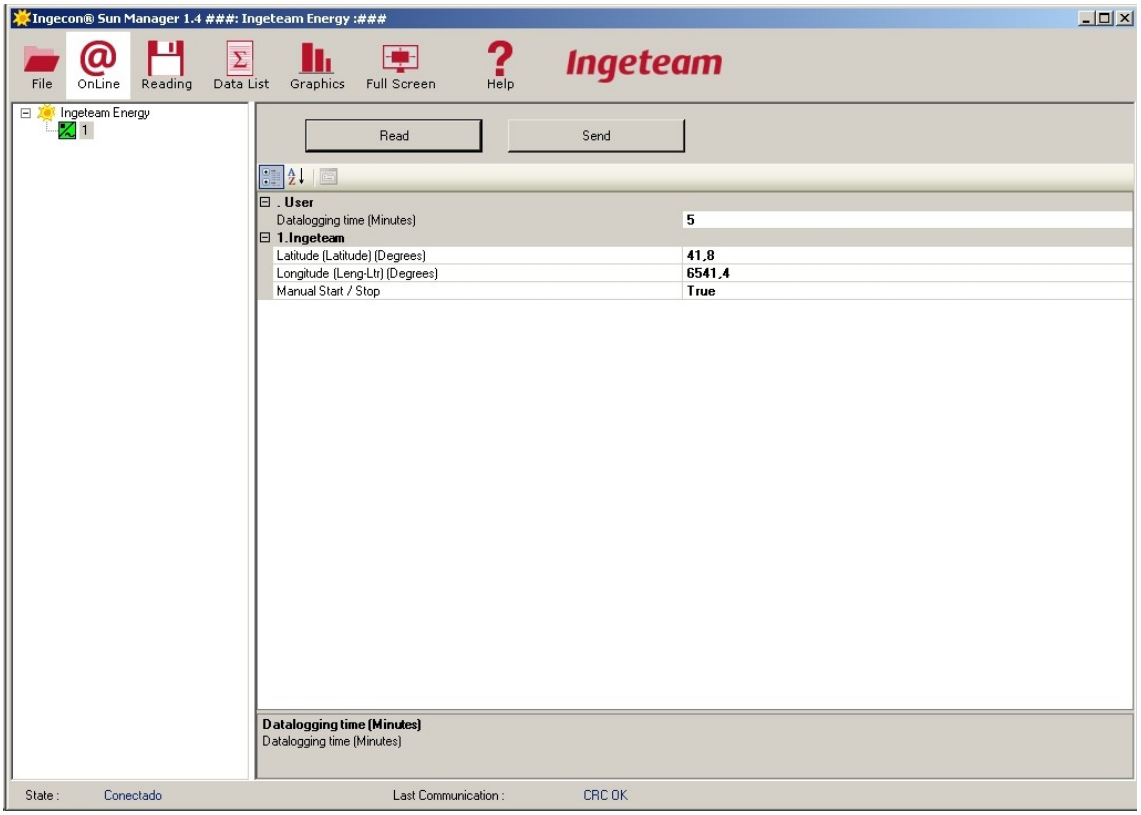
This is the same procedure as for the GPRS modem configuration, except for the fact that there is no GPRS tab.

6 Ingecon Pop-up Menu

6.1 Ingecon Sun Configuration

This displays the Configuration Panel. Click on the read button **Read** for a read-out of the configuration of the Ingecon selected.

Once read, any user-entered changes will be indicated in body type. Click on the send button **Send** to send the changes to the Ingecon.



6.2 Resetting the partial counters

The partial counters can be zeroed at any time so required. To do so, the PC must be connected to the system.

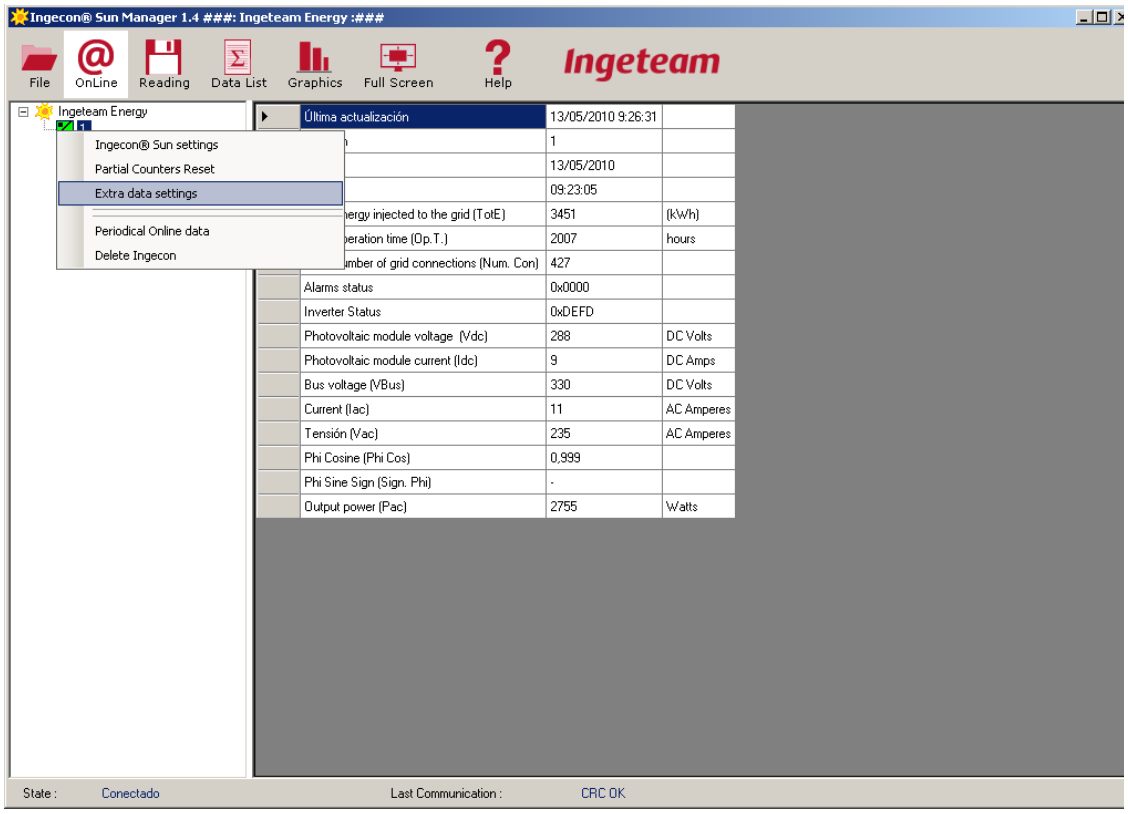
Click on the accept button in the pop-up menu displayed after selecting the option to reset the partial counters of the Ingecon in question

6.3 Configuring Additional Data Items.

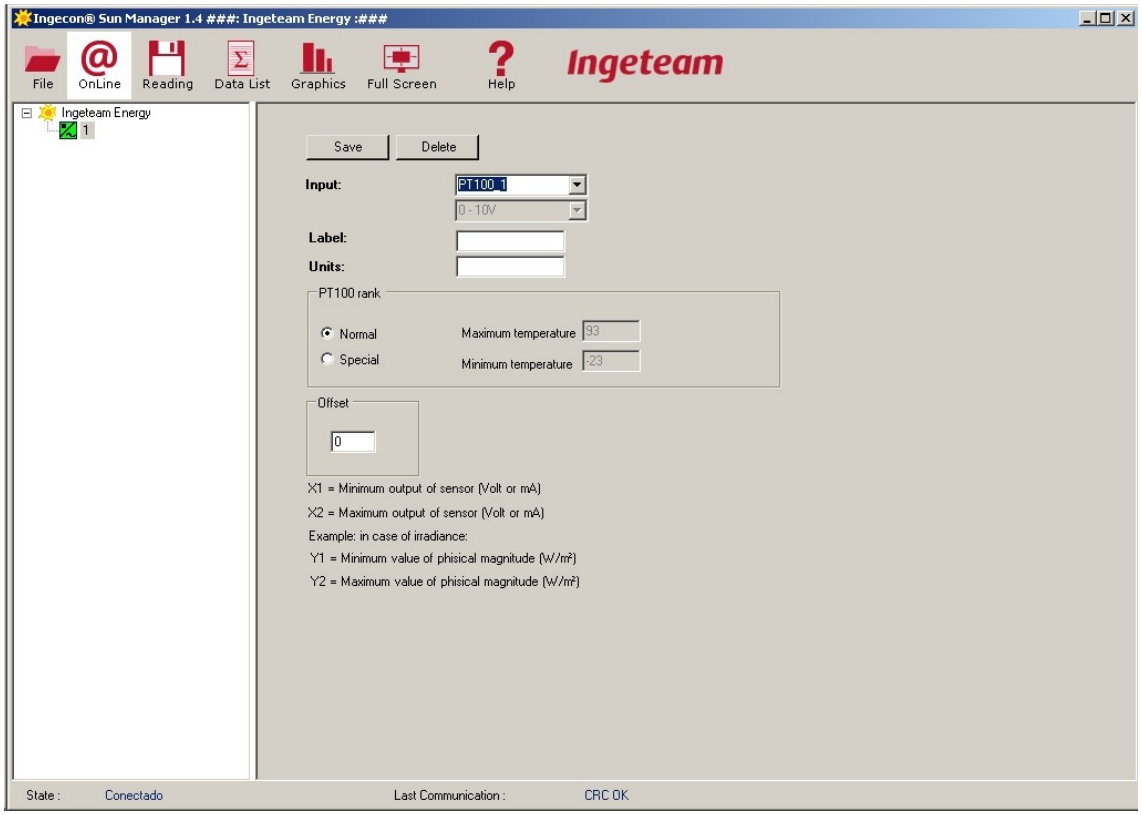
There is a list of data stored in the inverter. These data items are taken from the records obtained every 15 minutes from your Data-Logger.

In order to meet system-specific requirements, the Ingeteam monitoring programs have been designed to store up to 6 additional data items for each inverter.

Analog input card serves to provide the inverter with some additional electrical inputs to accommodate these new data items. For further details, refer to the communications installation manual The display of the new data items is fully user configurable through the tools menu **Tools.**



Configuration example:



The meaning of each field is given below:

Input: The number of the additional data item selected (EA_1, EA_2, EA_3, EA_4, PT100_1, PT 100_2). Each input offers a number of electric signal reception possibilities:

- EA_1 admits:

  Voltage signal in the range from 0 to10 Vdc, or

  Current signal in the range from 0 to 20 mA.

- EA_2 admits:

  Voltage signal in the range from 0 to10 Vdc, or

  Current signal in the range from 0 to 20 mA.

- EA_3 admits:

  Voltage signal in the range from 0 to 2 Vdc, or

  Current signal in the range from 0 to 20 mA.

- EA_4 admits:

  Voltage signal in the range from 0 to 0.4 Vdc, or

  Current signal in the range from 0 to 20 mA.

- PT100_1, PT 100_2:

  Are inputs for the direct connection of PT100 type resistors.

Conditioning: The electric signal entering the inverter can either be a voltage or a current signal.

Label: The name used for the data item displayed.

Units: The units in which the data item is represented.

Equation: Two operating points serve to define the relationship between the electrical signal (X) and the data item represented (Y).

In the configuration example above, input « EA_1» is received by the first additional analog input. It comes from a radiation meter which offers a voltage output which takes the following values:

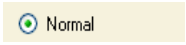
0 Vdc for an irradiance of 0 W/m^2.

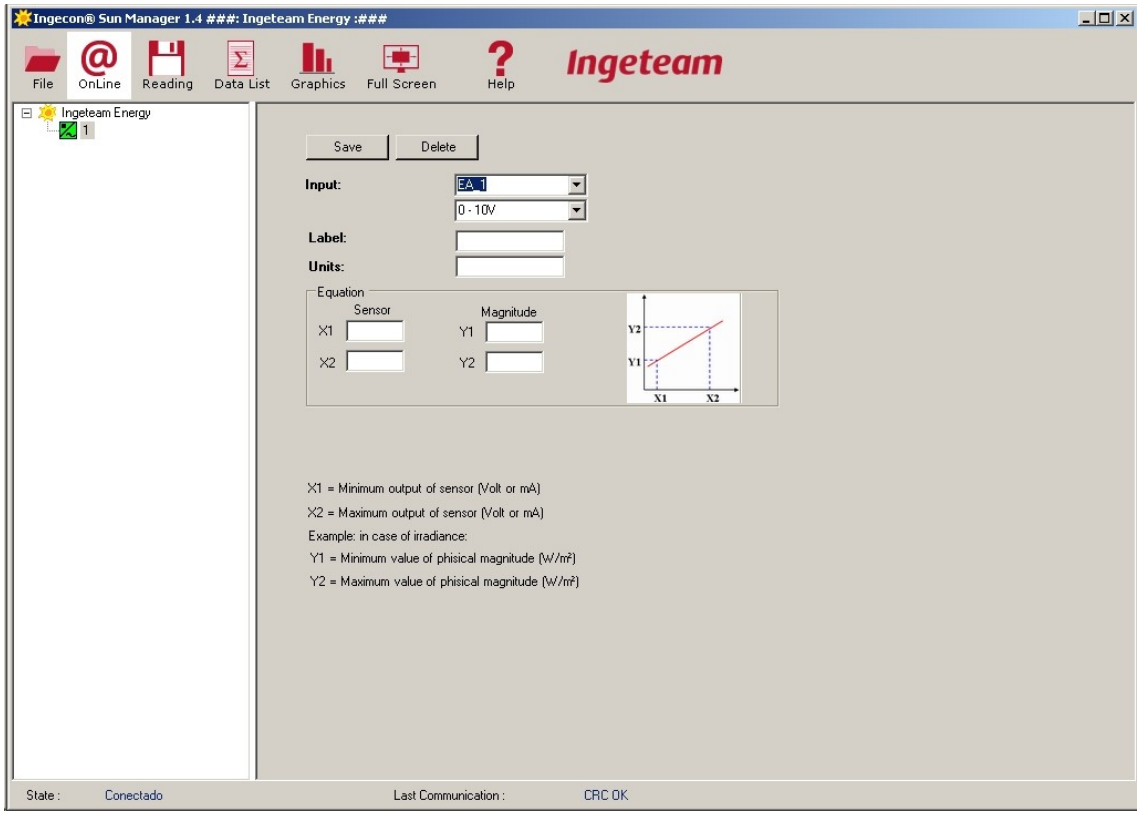
10 Vdc for an irradiance of 1200 W/m^2.

Values (X1-Y1) and (X2-Y2) define these two operating points.

PT-100 Input.

The normal operating range for a PT100 is -23 to 93 degrees Celsius (ºC). The fields should be filled in as follows:

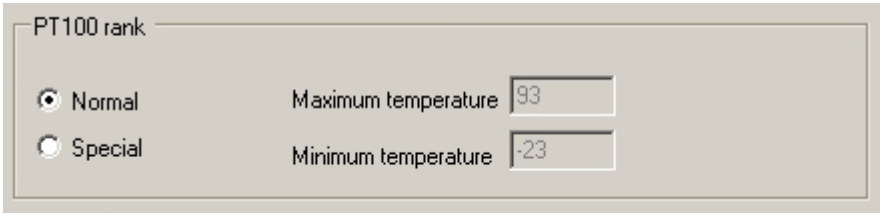




The « Offset » field makes it possible to correct any measurement deviations caused either by the excessive length of the sensor cables or for any other reason. The value monitored shall be obtained from the following expression:

Value monitored = value measured + « Offset »

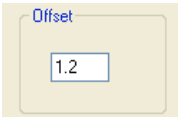
In exceptional circumstances, the system can be configured to operated at different temperatures.



This option requires hardware modifications which must be carried out to a specific monitoring configuration by personnel expressly authorised to do so.

Offset.

To correct any possible sensor errors, a correction value can be added to the measurement temperature.
Therefore, if Offset = 1.2, then the monitoring program will display a temperature of 1.2 degrees Celsius (ºC) higher than the temperature detected by the sensor.



Once the configuration has been completed, click on save: **Save**.

In this way the "Irradiance" variable has been included in the list of data items stored by the Data_Logger. This makes it possible to perform an Online reading, store the data files and display them through list-outs or graphs.

To delete one of the data inputs, simply select it and click on the delete button: **Delete.**

7 Data collection

To access the Read-out menu, once you have accessed the plant, select the read-out icon **Lectura**.

The following items will be displayed on the panel to the right of the Ingecon plant tree:

- Calendar.
- Progress bar.
- Logs.

Calendar

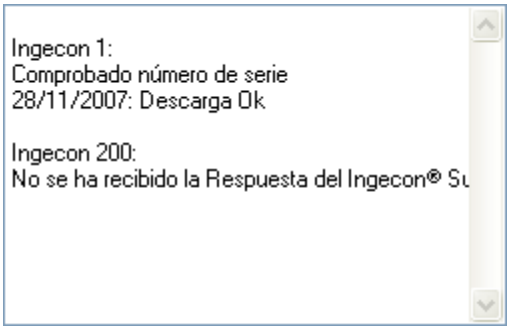
Use the calendar to select the days on which you would like to download data

Progress bar

The progress bar indicates the data downloading status for each inverter and for each date given. When communication is via GPRS or GSM, if there is no data downloading activity over a long time interval, then a disconnection occurs. In this case, you need to select the archive, change plant option **File -> Change plant**, update the IP and re-connect.

Logs

The logs are text boxes displaying details of the downloads.



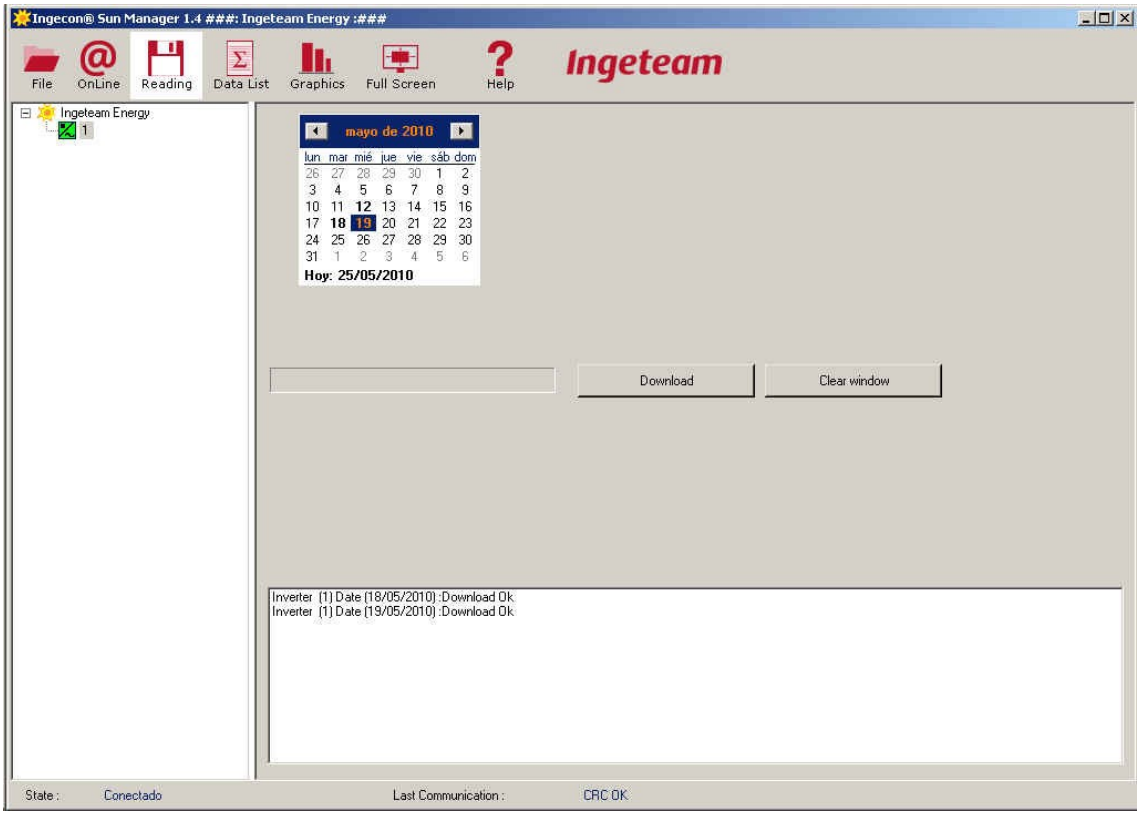
Types of downloads.

The downloads can be for either just one Ingecon® Sun or for all the Ingecon® Sun inverters.

All the Ingecon®Sun inverters

To download for all the Ingecon® Sun inverters, select the Plant name on the Ingecon tree and click on the accept button.

At the end of the downloading process, a screen should be displayed, similar to the one shown below.

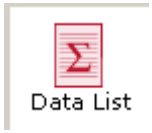


Just one Ingecon®Sun

The procedure is similar to the one described for All the Ingecons, except for the fact that, in this case, you should select an Ingecon from the Ingecon tree and click on the accept button.

8 Data List-outs

To access the List-out Menu, select the list-out icon **Listados** once you have accessed the plant.



The following items will be displayed on the panel to the right of the Ingecon plant tree:

- Calendar.
- Options.
- Parameters

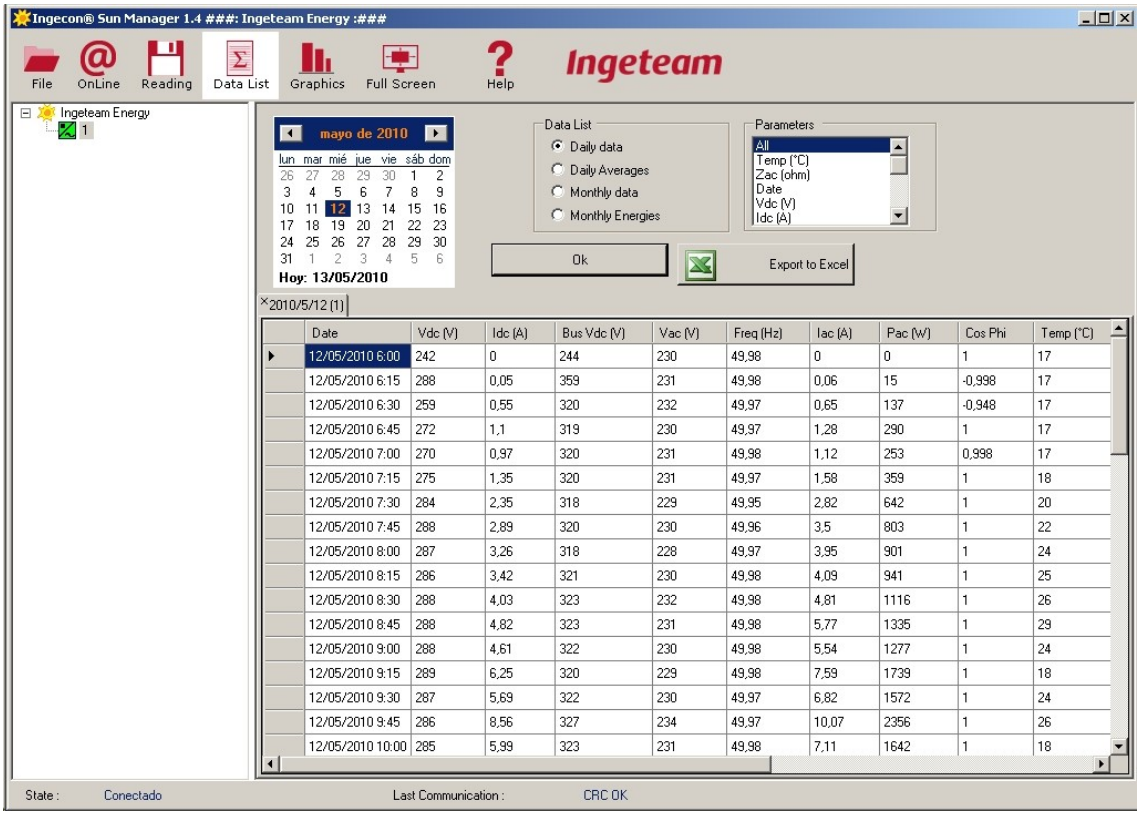
Calendar

The calendar can be used to select the days on which a data list-out is to be provided. The days for which data are available for the selected Ingecon are shown in bold type. When several Ingecons are selected at the same time, then the data for the last Ingecon to be selected will be displayed. If all the Ingecons are selected, by clicking on the plant name on the Ingecon tree, then the days will not be displayed in bold type.

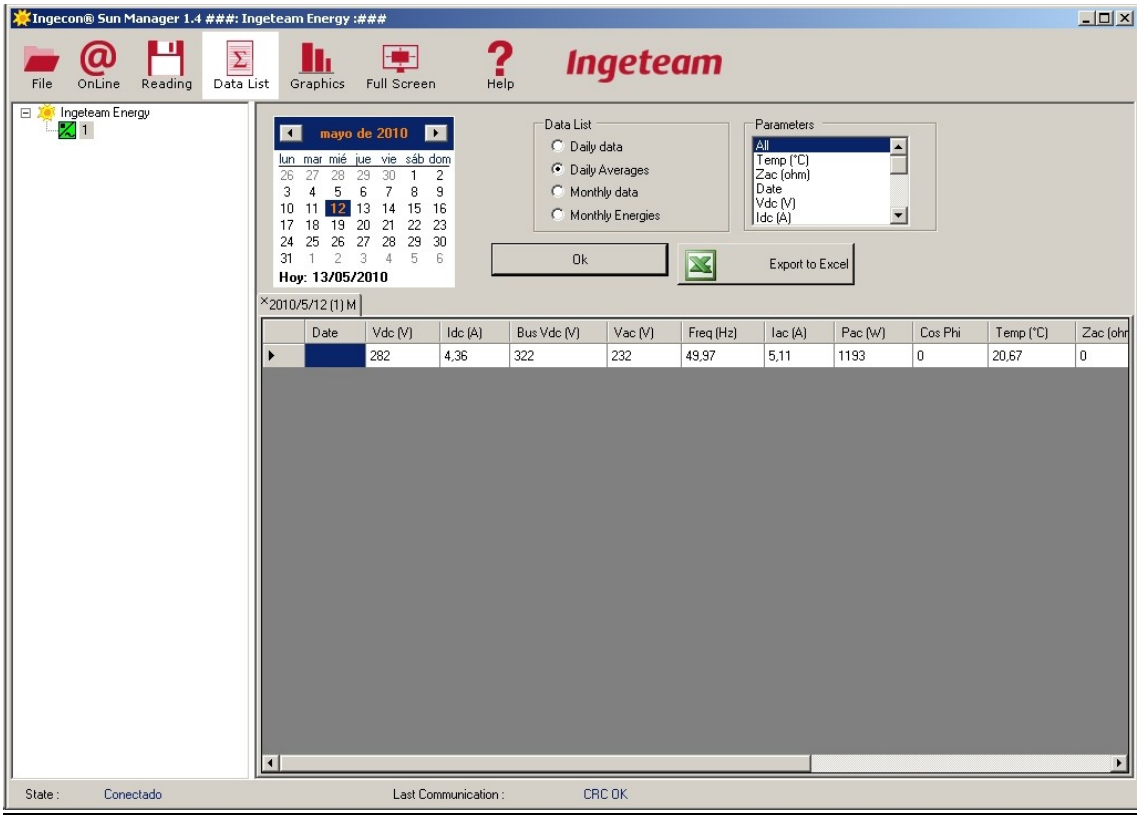
Options

The user can list-out any of the following options for either the specific Ingecon selected or all the Ingecons.

- Data list: To display a data table for each day and for each Ingecon selected.

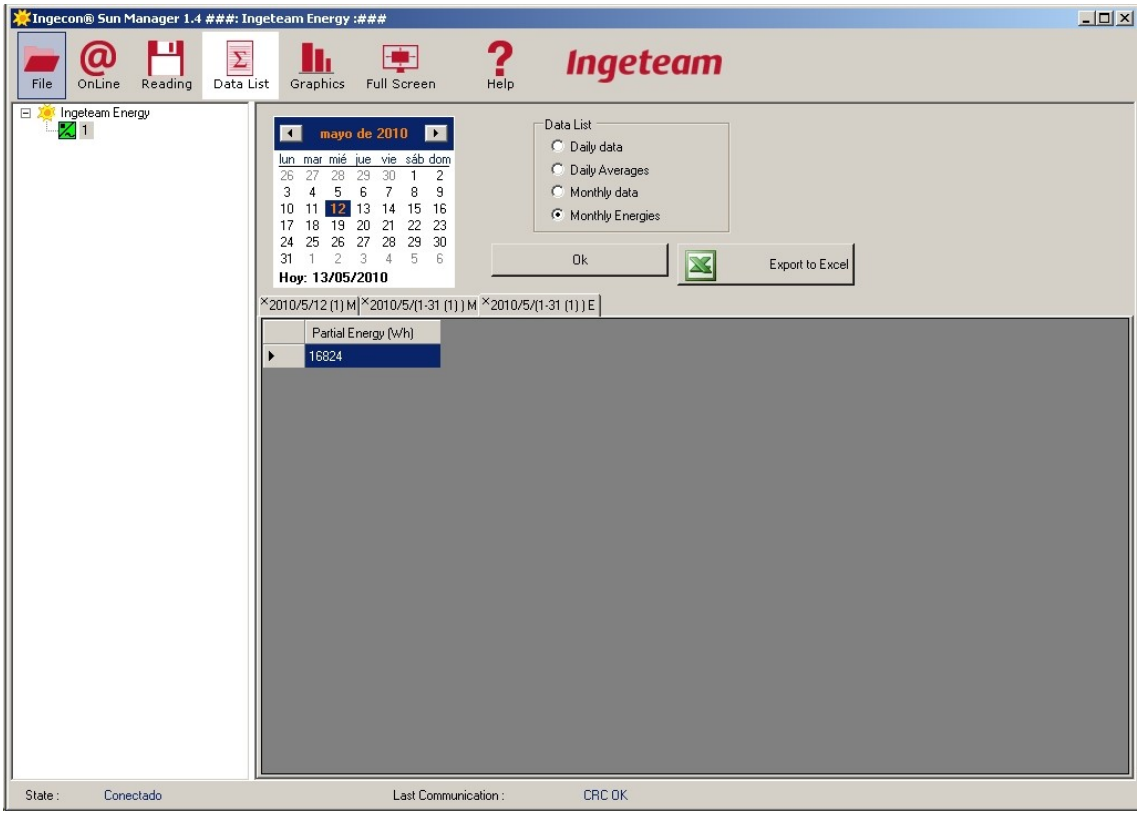


- Daily averages: To display a data table with the means for each day and for each Ingecon selected.



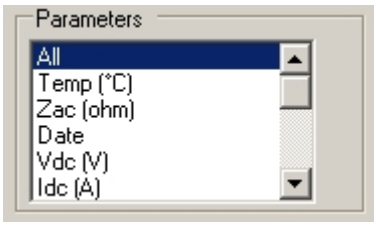
- Monthly data: To display the data for all the days of the months for which information is available.

- Monthly data
  - This is directed at selecting just one Ingecon in order to display the total energy figures for the days for which information is available in the current month and for the Ingecon in question.

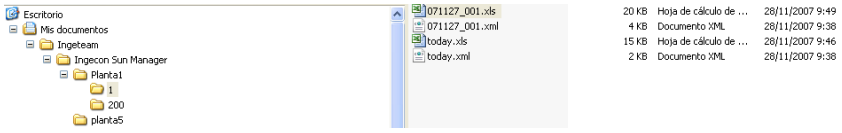


Parameters

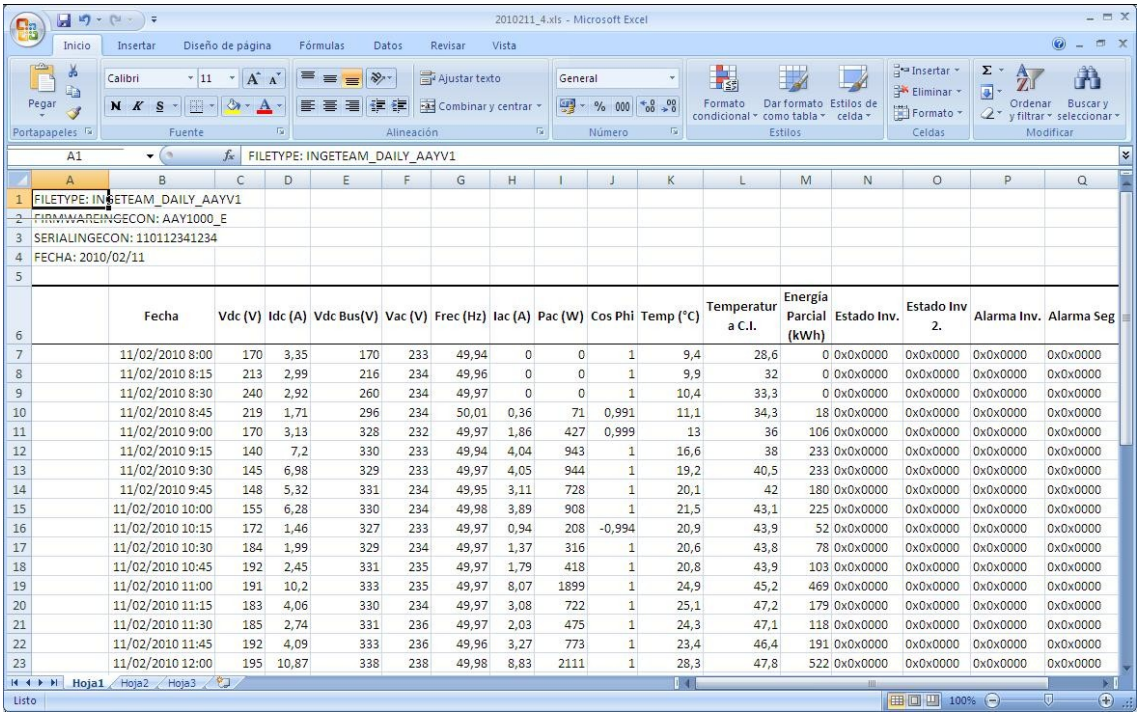
In addition, the user can select which parameters are to be listed-out from the following table and for the following options: Daily Figures, Daily Mean Figures and Monthly figures. (If no parameter is selected for the list-out, then no data will be listed out).



There is also the possibility of exporting the data to Excel. The data will be stored in the directory structure shown in the following figure (for inverter 1 of plant 1, you wil get an Excel File named Today.xls with the figures for today. For previous days, the file name has the following structure: (07 (year), 11 (month) 27 (day) and 001 (Ingecon number).



The file contents will be as follows:



	Fecha	Vdc (V)	Idc (A)	Vdc Bus(V)	Vac (V)	Frec (Hz)	Iac (A)	Pac (W)	Cos Phi	Temp (°C)	Temperatura C.I.	Energía Parcial (kWh)	Estado Inv.	Estado Inv 2.	Alarma Inv.	Alarma Seg
7	11/02/2010 8:00	170	3,35	170	233	49,94	0	0	1	9,4	28,6	0	0x0x0000	0x0x0000	0x0x0000	0x0x0000
8	11/02/2010 8:15	213	2,99	216	234	49,96	0	0	1	9,9	32	0	0x0x0000	0x0x0000	0x0x0000	0x0x0000
9	11/02/2010 8:30	240	2,92	260	234	49,97	0	0	1	10,4	33,3	0	0x0x0000	0x0x0000	0x0x0000	0x0x0000
10	11/02/2010 8:45	219	1,71	296	234	50,01	0,36	71	0,991	11,1	34,3	18	0x0x0000	0x0x0000	0x0x0000	0x0x0000
11	11/02/2010 9:00	170	3,13	328	232	49,97	1,86	427	0,999	13	36	106	0x0x0000	0x0x0000	0x0x0000	0x0x0000
12	11/02/2010 9:15	140	7,2	330	233	49,94	4,04	943	1	16,6	38	233	0x0x0000	0x0x0000	0x0x0000	0x0x0000
13	11/02/2010 9:30	145	6,98	329	233	49,97	4,05	944	1	19,2	40,5	233	0x0x0000	0x0x0000	0x0x0000	0x0x0000
14	11/02/2010 9:45	148	5,32	331	234	49,95	3,11	728	1	20,1	42	180	0x0x0000	0x0x0000	0x0x0000	0x0x0000
15	11/02/2010 10:00	155	6,28	330	234	49,98	3,89	908	1	21,5	43,1	225	0x0x0000	0x0x0000	0x0x0000	0x0x0000
16	11/02/2010 10:15	172	1,46	327	233	49,97	0,94	208	-0,994	20,9	43,9	52	0x0x0000	0x0x0000	0x0x0000	0x0x0000
17	11/02/2010 10:30	184	1,99	329	234	49,97	1,37	316	1	20,6	43,8	78	0x0x0000	0x0x0000	0x0x0000	0x0x0000
18	11/02/2010 10:45	192	2,45	331	235	49,97	1,79	418	1	20,8	43,9	103	0x0x0000	0x0x0000	0x0x0000	0x0x0000
19	11/02/2010 11:00	191	10,2	333	235	49,97	8,07	1899	1	24,9	45,2	469	0x0x0000	0x0x0000	0x0x0000	0x0x0000
20	11/02/2010 11:15	183	4,06	330	234	49,97	3,08	722	1	25,1	47,2	179	0x0x0000	0x0x0000	0x0x0000	0x0x0000
21	11/02/2010 11:30	185	2,74	331	236	49,97	2,03	475	1	24,3	47,1	118	0x0x0000	0x0x0000	0x0x0000	0x0x0000
22	11/02/2010 11:45	192	4,09	333	236	49,96	3,27	773	1	23,4	46,4	191	0x0x0000	0x0x0000	0x0x0000	0x0x0000
23	11/02/2010 12:00	195	10,87	338	238	49,98	8,83	2111	1	28,3	47,8	522	0x0x0000	0x0x0000	0x0x0000	0x0x0000

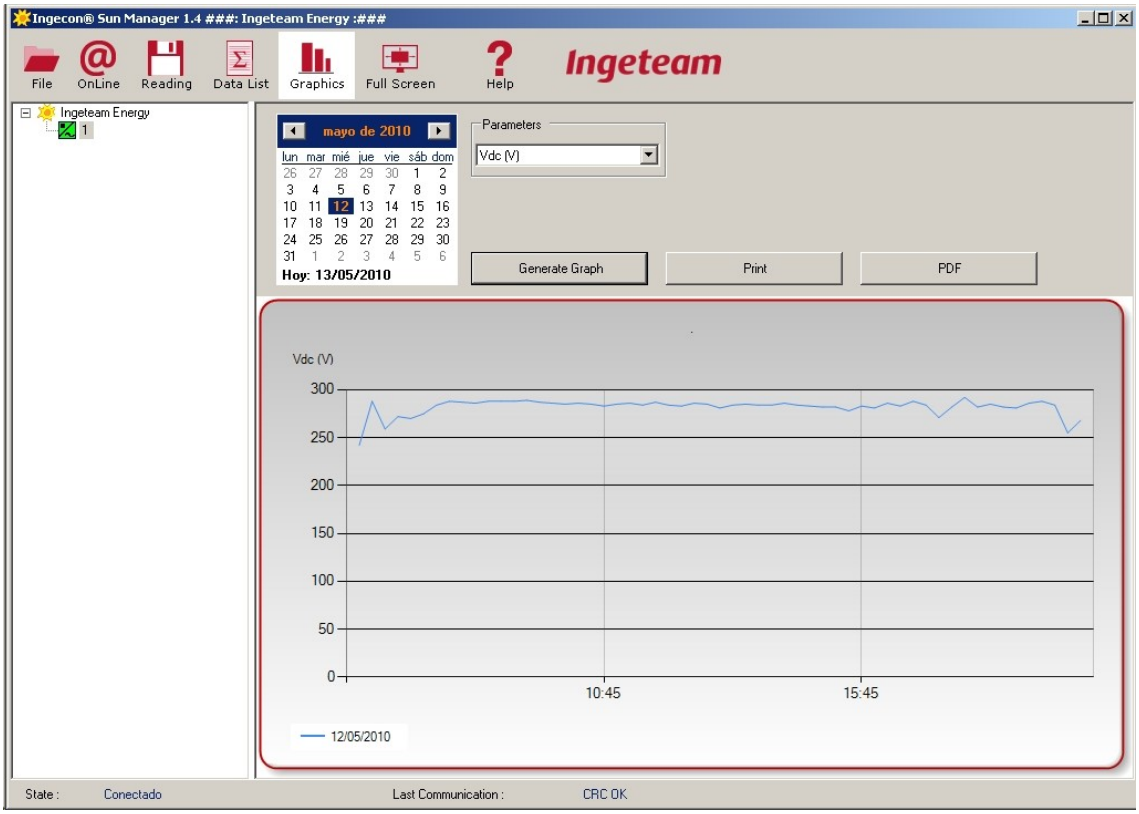
9 Graphs

To access the graphs menu, select the Graphs icon **Gráficos** once you have accessed the plant.

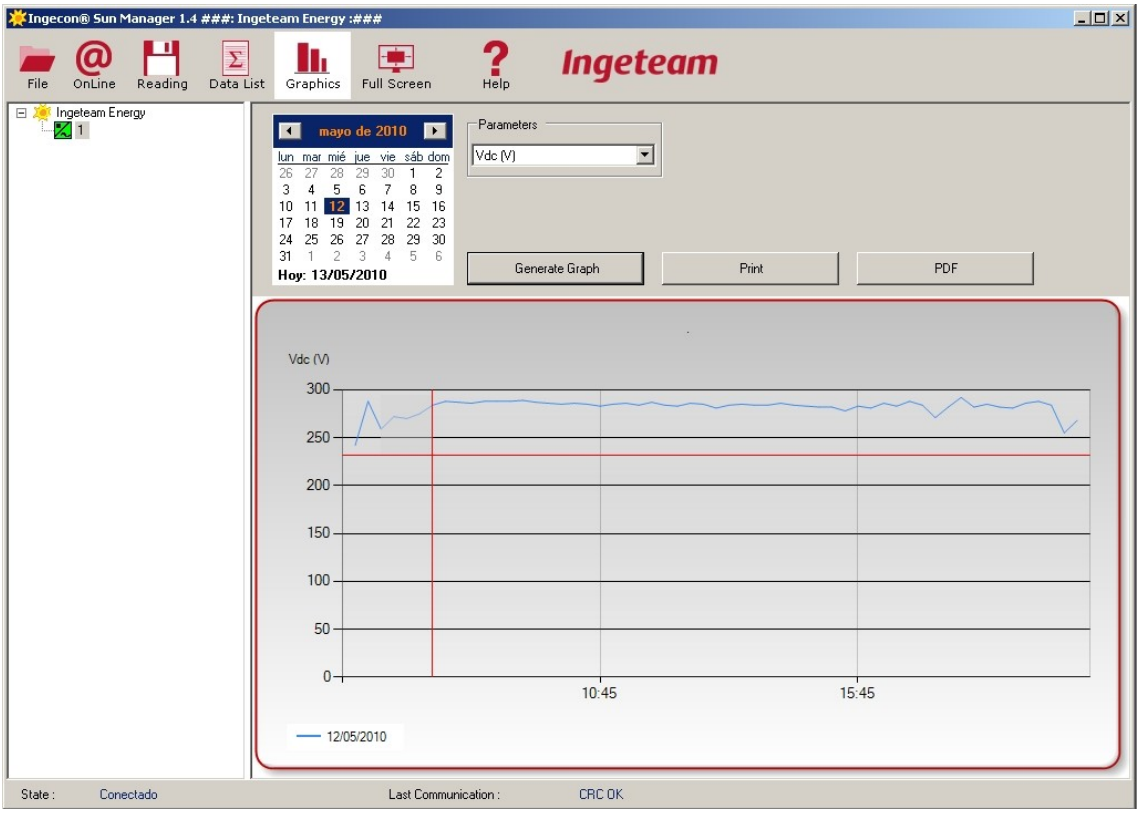
There are two types of graph menus: data graphs and energy graphs.

Data Graphs

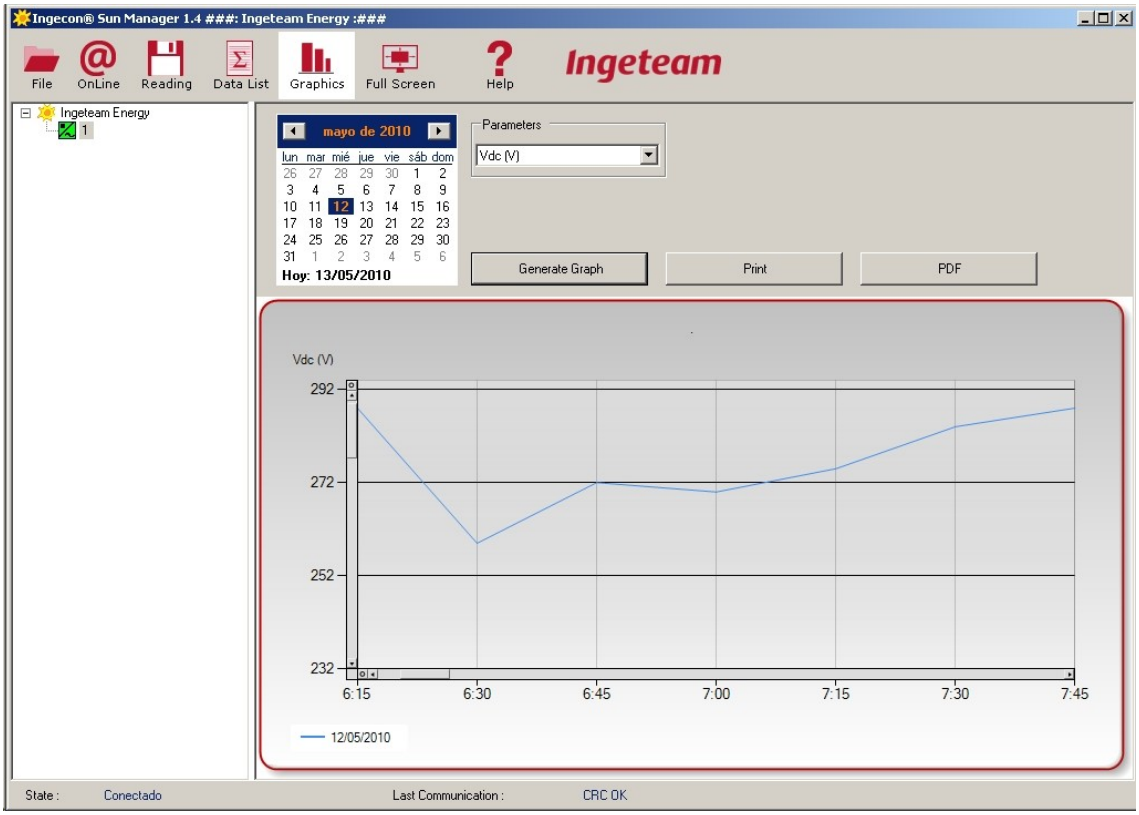
Select the parameter to be displayed on the specific day selected on the calendar.



To zoom in on the graph, click and drag the time range for which more detail is required..



Once in this time range, to zoom out, click on the circles which are over the vertical axis scroll bar, and to the left of the vertical axis.

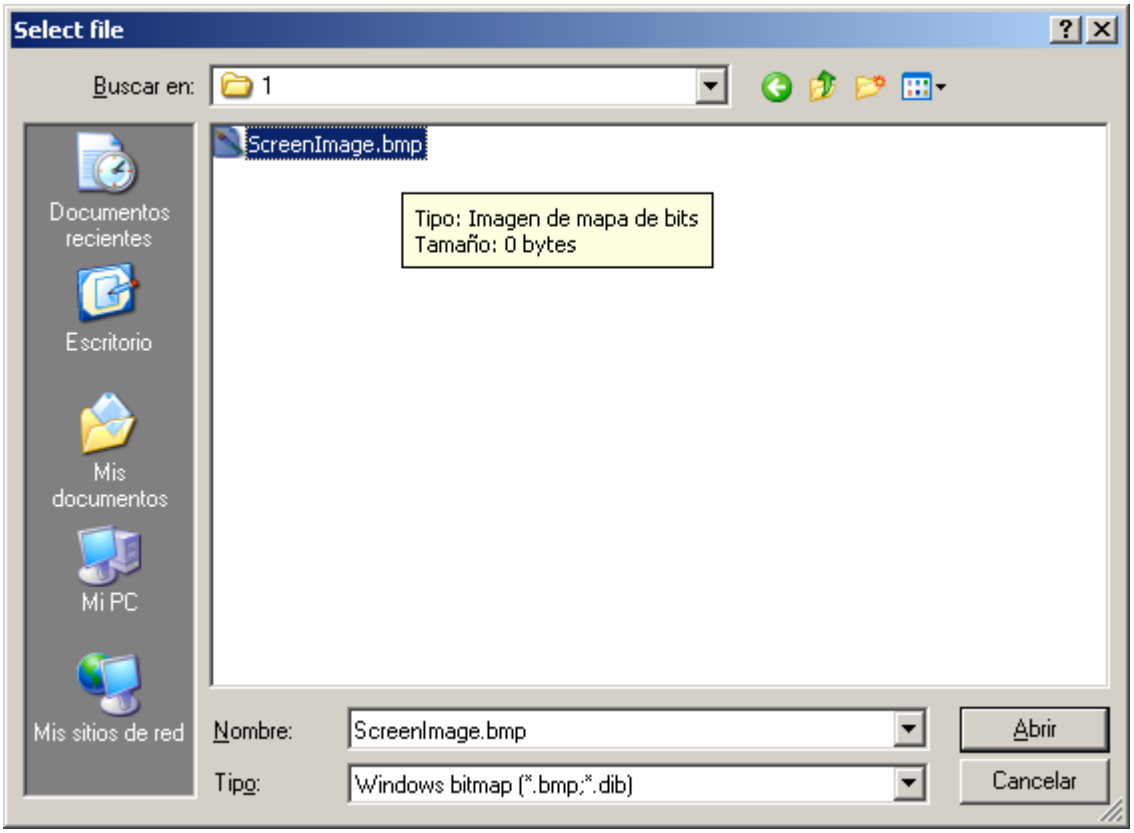


10 Full Screen presentation

To access the Full Screen menu, select the Full Screen icon, once you have accessed the Plant.

There will be a series of on-screen labels positioned over the background image displayed by default. The label dimensions can be changed if required.

Select the load image button **Load image** to load a different background image from the following text box.



Click on the display button **Show** for the full on-screen PC display of all the online data for the Ingecon currently selected:

11 FILE STRUCTURE.

When the program is executed for the first time, a directory is created with the user folder entitled My Documents **"Mis Documentos"**. This directory is called "**Mis Documentos/Ingeteam/Ingecon Manager**". This folder initially contains two. Xml files:

- plantas.xml: containing information on the program language, routes and the names under which the plant data is stored.

When a plant is added to the plant tree, a folder is created in directory: **Mis Documentos/Ingeteam/Ingecon Manager**. This folder shall be named after the plant added. If the plant name is **Planta 1**, the the folder name shall be: **Mis Documentos/Ingeteam/Ingecon Manager/Planta1**.
File **planta.xml** is automatically created with the **Planta 1** folder, containing information on:

- Plant creation date.
- Total stored energy.
- The Ingecons at the plant.
- The configuration of communications with the plant.

When an Ingecon is added to the tree of a specific plant (take Plant 1 as an example), a folder is created in directory: **Mis Documentos/Ingeteam/Ingecon Manager/Planta1**. This folder shall be named after the Ingecon selected. In fact, the possibility of the user entering values other than from 1 to 255 has been disabled. For example, if the inverter were number 2, then the folder would be "**Mis Documentos/Ingeteam/Ingecon Manager/Planta1/2**".

The following file shall also be created with the Plant 1 Folder:

- **fullscreen.xml**: with information on the display menu background image save route, and also on the position of the data labels to be expanded on the full screen with the Plant Online Data option..

Other typical files are:

- ***Ingecon Manager.exe***: This is the system execution file, and its route is: **Archivos de programa/Ingecon Manager**.

- ***ISManager.ico***: This is the application icon, with the same route as **Ingecon Manager.exe**.
- ***070531_001.xml*** : Daily data file pertaining to the Ingecon 1 on 31st May 2007.
- ***Today.xml*** **:** If data for the present day have already been downloaded, then this file will not be completed until the day has ended. For this reason it is stored with this name instead of with the format used by the rest of downloaded data files. This serves to indicate that the downloaded data are not yet definitive.

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