

GidasPenman

(FAO Penman Monteith evapotranspiration index)

User's Manual

Updated on 31/03/2011

Sommario

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1. Introduction

The LSI-Evapotranspiration program calculates the reference evapotranspiration index according to the FAO Penman-Monteith equation, as specified in the document “*Crop evapotranspiration - Guidelines for computing crop water requirements FAO Irrigation and drainage paper 56, FAO - Food and Agriculture Organization of the United Nations Rome, 1998.*”

Evapotranspiration means the water vapor transferred to the air by the ground or vegetation. The processes which cause evapotranspiration are evaporation and transpiration.

Evaporation is the process in which water is transformed from liquid to vapor and is transferred from the ground to the atmosphere. The parameters which influence the evaporation are: temperature, humidity, radiation and air speed. If the ground is not short of water the vapor index depends only on the weather conditions. In case of poor water supply, a controlling mechanism is triggered, thus delaying the evaporative process.

Transpiration means the transfer of water vapor by the vegetable tissues. Plants release water mainly from the stomata located on their leaves. Through transpiration, most of the water retained by the plants is transferred and only a small part is kept for themselves. Transpiration depends on the same weather conditions that influence the evaporation, on the type of culture, techniques employed and ground morphology.

The *ET₀* reference evapotranspiration is the evapotranspiration rate of a standard reference surface which is not dry. The reference surface is well represented by a 12-cm high, not dry, widespread culture of green grass which completely overshadows the underlying ground.

With *ET₀* users can study the evaporative demands of the atmosphere regardless of the specific culture and its characteristics. *ET₀* values obtained in several locations and periods can therefore be compared since they refer to the same reference area.

The LSI-Evapotranspiration calculates the *ET₀* evapotranspiration index both on a daily and monthly basis.

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The *ET0* reference evapotranspiration is the evapotranspiration rate of a standard reference surface which is not dry. The reference surface is well represented by a 12-cm high, not dry, widespread culture of green grass which completely overshadows the underlying ground.

With *ET0* users can study the evaporative demands of the atmosphere regardless of the specific culture and its characteristics. *ET0* values obtained in several locations and periods can therefore be compared since they refer to the same reference area.

The LSI-Evapotranspiration calculates the *ET0* evapotranspiration index both on a daily and monthly basis.

1.1. Applicability limits

The limits of the environmental quantities for the applicability of the program are the same as the those of the instrument and are:

| <i>Quantity</i> | <i>Applicability limit</i> |
|-----------------------|----------------------------|
| Temperature (°C) | -30 ÷ 70 |
| Relative humidity (%) | 0 ÷ 100 |
| Air speed(m/s) | 0 ÷ 50 |
| Radiation (Watt/m2) | -150 ÷ 1500 |

2. System requirements

Personal computer

- Processor at 600 MHz operating frequency or higher. 1 GHz recommended;
- Display: SVGA res. 1024x768 or higher;
- Operating system (*):
 - 32 bit: Microsoft Windows 32 bit XP SP3/Vista/Seven/2003 Server
 - 64 bit: Microsoft Windows Seven;
- Microsoft .NET Framework V.3.5 (**);
- LSI LASTEM 3DOM program (updated to the last available version) previously installed to communicate with the instrument;
- LSI LASTEM *Gidas* Database for data recording (***).

(*) Operating systems must be updated with the latest update released by Microsoft and available through Windows Update; for operating systems not listed is not guaranteed correct and complete operation of programs.

(**)The Microsoft .NET Framework 3.5 setup is included in the LSI Lastem product DVD issued after March 2011 and, if necessary, is automatically installed during the installation process starts from the DVD. If you do not have the updated version of the DVD you can download the installer for the Microsoft .NET Framework 3.5 directly from the Microsoft Download Center at <http://www.microsoft.com/downloads/en/default.aspx> inserting in the search field. the term ".NET".

(*) *Gidas* database is installed with *GidasViewer* program and required *SQL Server 2005 Express* or higher. *GidasTEA* can also be connected to *Gidas* database installed on SQL Server remote instance. For the system requirements of *SQL Server 2005 Express*, see the documentation of the *GidasViewer* program or the official Microsoft site [http://technet.microsoft.com/en-us/library/ms143506\(SQL.90\).aspx](http://technet.microsoft.com/en-us/library/ms143506(SQL.90).aspx)

3. Preliminary configurations

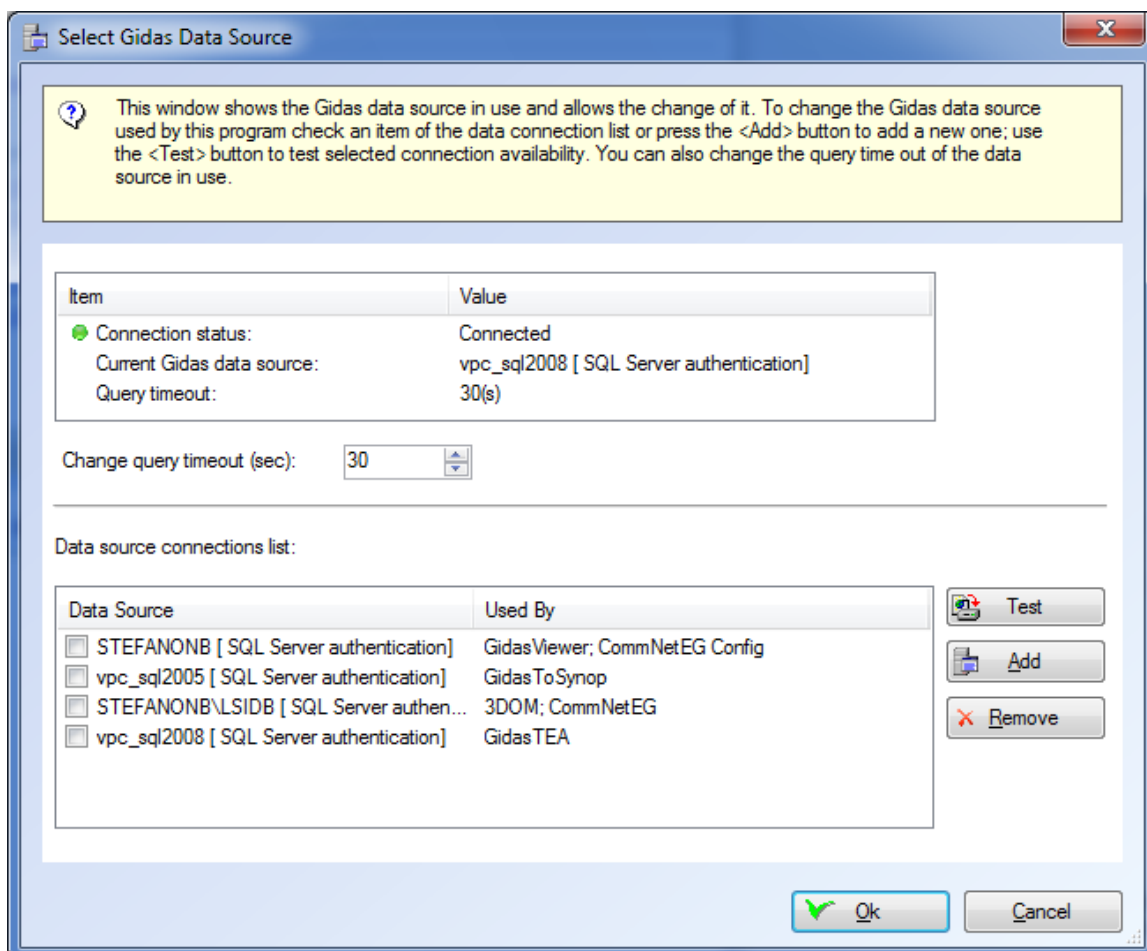
3.1. Gidas database configuration

GidasPenman program uses the environmental data recorded on Gidas database, the SQL Server 2005 database used to record the data measured by LSI LASTEM instruments.

In order to store data on Gidas database you have first to install the *GidasViewer* creating the database itself and to request a login license for each datalogger. This action requires the presence of SQL Server 2005: if the user does not have this application, during the database installation a free of charge version of SQL Server 2005 *Express* will be installed. For further information please see the manual of *GidasViewer* program.

3.1.1. Connecting to Gidas database

Once launched for the first time *GidasPenman* program automatically logs in *Gidas* database created with the installing procedure of *GidasViewer* program. The program can also log in a *Gidas* database set on a different device accessible by network; in this case please use the menu *File* → *Change Data Source* which opens the window for the selection of data source:



This window shows the *Gidas data source* in use and allows the change of it. To modify the data source used by the program select one element from the list of available data sources or press the

<Add> button to add a new one; use the <Test> button to test the selected connection availability. It will be mainly available the connection to local computer. For further info please consult the manual of *GidasViewer* program.

The current version of *GidasPenman* program is compatible with *Gidas* database 2.4.0.0. version or higher; to visualize the connected database version select the menu ? → *About Gidas database*.

If the user has two different installations on *Gidas* database (e.g. a local and a network one), he can modify the data sources used by the program using *File* → *Change Data Source*. This operation will close the running calculation project.

3.2. Configuration of program to open report file

The program is used to create reports with the results of calculations in *Office Open XML* (ECMA-376) standard format. It is supported by:

- *Word 2007* (native)
- *Word 2000* or higher by installing the *compatibility pack* (<http://office.microsoft.com/en-us/products/HA101686761033.aspx>)
- *OpenOffice 3.2* (<http://www.openoffice.org/>)
- *SoftMaker Office* or the free version document viewer *TextMaker* (dimension: 5 MB) (<http://www.officeviewers.com/>)

The choice of standard format let the user free to use his favorite program to view, modify and print out report files.

Choose the menu *Options* → *Report Settings* to open the window for report file configuration.

In the *General* file you can view the predefined program installed on your computer associated with *Office Open XML* (.docx) file. In case of absence of any associated program, press the < *Select* > button to open the window to select programs (this window is accessible only if no predefined program exists in association with .docx file).

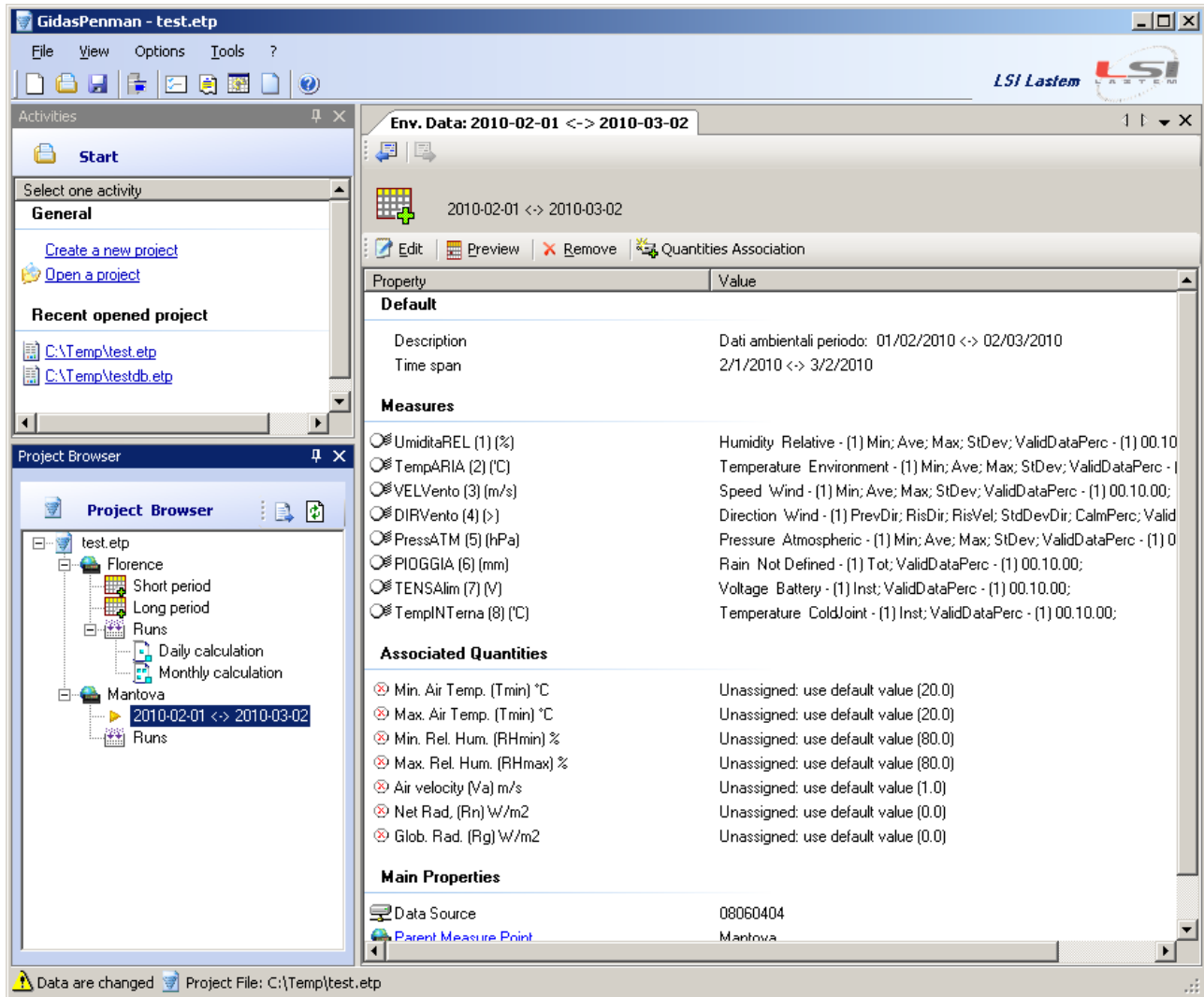


This window offers few options; chose one solution or install a program able to manage .docx files. Press <Select> to associate a program previously installed on the computer to .docx file.



4. Program use

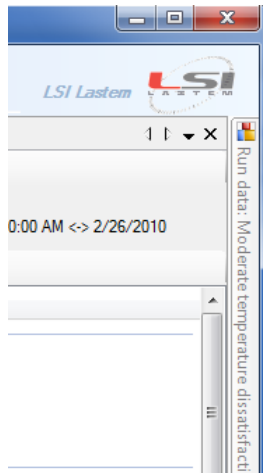
4.1. User interface

After starting the program and loading a calculation project, the window appears as follows:

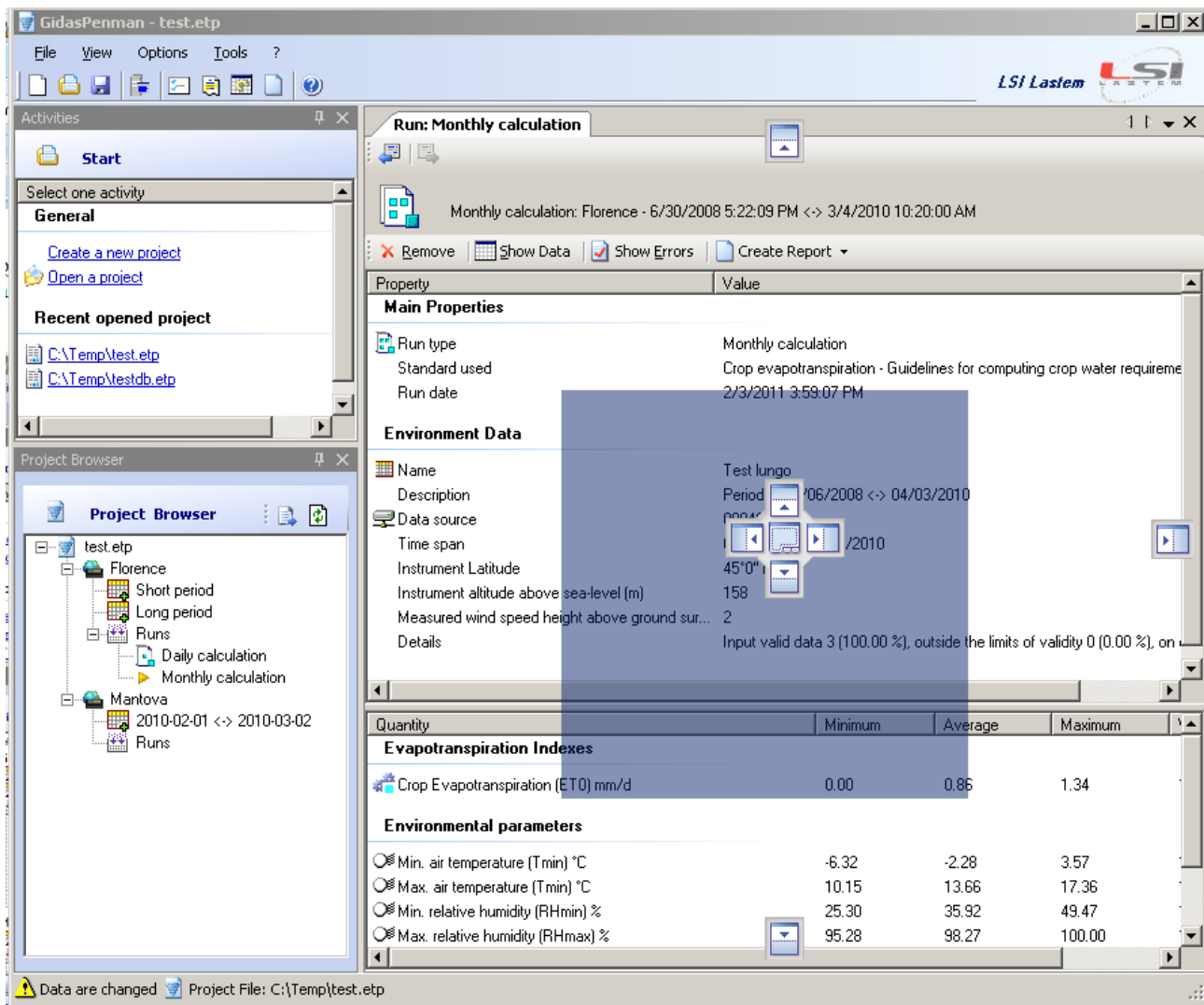


You might see different screen views because these windows are modifiable:

- if the  icon is present on the file bar, the window is always visible. The  icon indicates that the file automatically hides once it is not selected showing only the logo secured next to the main window; to refresh the window just click it.



- you can move and save windows in different positions on the screen by carrying the title bar; during this operation you can view the new available positions for anchoring.



In every moment you can restore the default layout selecting **View** → *Reset Default Layout*.

4.1.1. Menu

The program presents these menus:

File

- *New*: opens a new project.
- *Open*: opens an already existing project.
- *Save*: saves the actual project.
- *Save As*: saves the actual project under a different name.
- *Change Data Source*: views the window to change *Gidas* database source used by the program.
- *Refresh Data Source*: updates all data loaded by *Gidas* database; use this action to save for the first time the instrument database once the program is already installed.
- *Recent Projects*: views the lists of projects recently opened.
- *Exit*: switches off the program.

View

- *Quantities Measures Association*: views the window showing the available instruments and those where the association of measures and standards used for the calculation is already configured.
- *Properties*: views the main window of properties showing the details of the selected object in the project.
- *Activities*: views the activity window.
- *Reset Default layout*: resets the standard layout after modifying the windows position.

Options

- *Settings*: shows general settings for calculations.
- *Report Settings*: shows the window with report management settings.
- *Export to Text File Settings*: shows the window with settings to format date and numeral values to export data to text.
- *Data Table Format Settings*: shows the window to set formats for data tables.

Tools

- *License Manager*: starts the License Manager program.

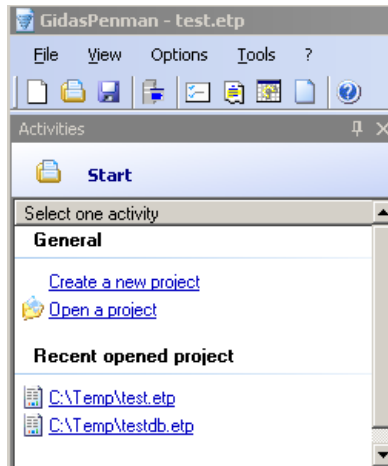
?

- *Contents*: shows the User Manual program.
- *Check for Updates*: starts the research for new updates available for the program.
- *About*: show all info related to the program.
- *About Gidas Database*: shows info about the connected *Gidas* database.

Some of these Menu commands are available on the toolbar below the main menu window. Point the mouse on a button and wait shortly before viewing the related short description.

4.2. Activities window

The activities window is the program start up: shown in *View* → *Activities* menu (always appears when the program is started for the first time) and it shows a list of projects recently opened and the options *Create a new project* and *Open a project*.



Use the mouse to select your favorite element.

4.3. Projects

To make a calculation you need to open an already existing project or to create a new one. Select *File* → *New* menu or *Create a new project* in the activities window to open a new project. To open an existing project select *File* → *Open* or *Open a project* in the Activities window.







A project may contain multiple locations, for each location you can have multiple sets of environmental data and make different types of calculation (daily and monthly).

When you open a new project the program starts the wizard to insert a new location (§ **Errore. L'origine riferimento non è stata trovata.**).

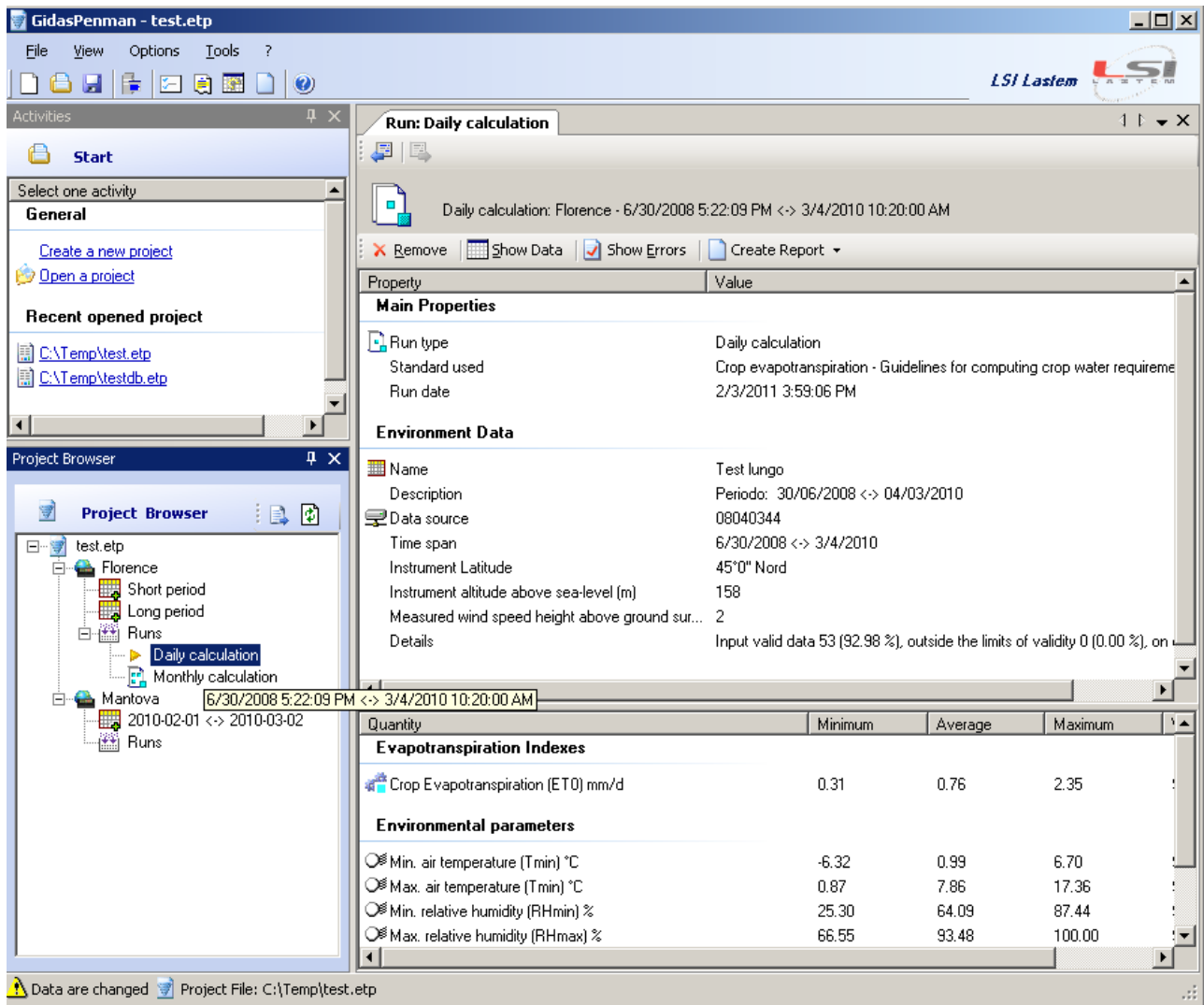
4.3.1. Project browser

The project browser window represents the main view on the project. The browser shows in a knot structure the sites, the measure points and the list of defined subjects.

Each of the present elements appears under a different icon:

-  represents the collection of locations.
-  represents a location.
-  represents a set of environmental data to use in the calculation.
-  represents the collection of calculation results in a location.
-  represents a daily calculation.
-  represents a monthly calculation.

After an element is selected in the project browser, its characteristics will be displayed the properties window.



In this view the selection of a calculation in the project window determines the view of the relative characteristics on the right hand side *Properties* window.

You can use the contextual menu for each element or press the <Properties window> buttons to add, remove or modify the selected element.

4.4. Add a location to a project

To add a location to a project select the project in the project browser, click with the mouse right button and from the contextual menu select *Add Location* to start the guided procedure.

The guided procedure requires some information about the instrument:

To note:

- *Measured wind speed height above ground surface (m)*: indicates the altitude where the wind speed is measured; the calculation of the evapotranspiration index requires that wind speed data be set at a standard altitude of 2 m; for this purpose the program uses the formulae contained in the FAO reference documentation;
- *Instrument altitude above sea-level (m)*: absolute height of the measurement instrument;
- *Latitude of measured data (decimal degree)*: latitude of the location of the measurement instrument.

4.5. Environmental data

To make a calculation you must selected from the database GIDAS the environmental data measured by instruments.

WARNING:

The data must already be saved in the database GIDAS using the program 3DOM or the program CommNetEG. To use the environmental data is necessary to install the license to use the program.

To add a selection of environmental data to a calculation, select the location in the project window and select *Add Environmental Data* from the contextual menu or *<Environmental Data>* button in the Properties window of the location. This selection opens the wizard procedure to add the environmental data selection:

Environmental Data Selection: source selection

Measure Point: Florence

Select instrument or user survey that contains the elaboration period:

| Item | Value |
|-------------------------------|-----------------------|
| Instrument Serial Number: | 10050005 |
| Survey Configuration date: | 6/24/2010 10:34:21 AM |
| Survey Last Elaborated Value: | 7/1/2010 11:05:00 AM |

Set Period time span:

| Item | Value |
|------------------------|-------------------------|
| Selection data period: | 6/25/2010 <-> 6/30/2010 |

< Previous Next > Finish Cancel

Pressing the *<Select>* button you can select the configuration of the instrument used to measure the data for calculation. If the instrument is reconfigured, the selection window will show the different configurations available:

or environmental data. If the instrument containing the data is not in the list you have not yet downloaded the data in the database Gidas or you have not installed the license (open Windows Explorer, locate the license file and start with a double click to install the license without leaving the program).

Instruments

- 08040344
 - 6/30/2008 4:30 PM
 - 6/30/2008 5:22 PM
- 08100474
 - 12/1/2009 3:32 PM

Ok Cancel

After selected the instrument, the program set the time span on a default value (§**Errore. L'origine riferimento non è stata trovata.**). The <Set> button edits the preview of selected data that enables a more precise selection of the period to be used for the calculations. The preview shows data elaborated in a daily base: please note that if the period selected is long the extraction of the data may take several minutes.

Environmental data preview

This form shows environmental data preview. Change selection period. Use contextual menu on the table to copy or export data. Press <Ok> to set the options you chose

Select period: 1/ 1/2010 12:00:00 to 2/12/2010 12:00:00 < > Refresh

Data range: 12/1/2009 3:32:18 PM 2/12/2010 12:00:00 PM

☒ Show only measures used in the evapotranspiration calculation

| Date Time | UmiditaREL Min (%) | UmiditaREL Max (%) | TempARIA Min (°C) | TempARIA Max (°C) | RadGLOBale Ave (W/m2) | R |
|-----------------------|--------------------|--------------------|-------------------|-------------------|-----------------------|-----|
| 1/15/2010 12:00:00 AM | 48.807 | 100.000 | 4.283 | 12.871 | 8.867 | -13 |
| 1/16/2010 12:00:00 AM | 42.444 | 100.000 | 1.214 | 13.416 | 56.139 | -38 |
| 1/17/2010 12:00:00 AM | 100.000 | 100.000 | 2.875 | 9.826 | 5.191 | -14 |
| 1/18/2010 12:00:00 AM | 100.000 | 100.000 | 4.164 | 10.803 | 8.657 | -14 |
| 1/19/2010 12:00:00 AM | 35.597 | 100.000 | 1.327 | 12.463 | 55.501 | -48 |

Ok Cancel

After selecting the data you need to associate the correspondence between measured values and calculations quantities to each configuration of your instrument. (§ 0).

NOTE

The association of measures and calculated quantities can be performed only once for each instrument configuration.

4.5.1. Association of measures to quantities

Every time you use for the first time an instrument you need to associate the correspondence between measured values and calculations quantities.

The guided procedure to add environmental data checks the need of the association:

Edit environmental data: Short period - Periodo: 25/06/2010 <-> 30/06/2010

Environmental Data Selection: resume

Check values. If something must be changed click the <Back> button; click the <Finish> button to complete the guided procedure. Click the Quantities Association button to set or change the measures quantities association.

Click the button to set or change the association between quantities and measures:

Association

| Property | Value |
|--|--|
| Main Properties | |
| Data Source | 08100474 |
| Survey Configuration Date: | 12/1/2009 3:32:18 PM |
| Measures | |
| <input type="radio"/> UmiditaREL (1) (%) | Humidity Relative - (1) Min; Ave; Max; StDev; ValidDataPerc - (1) 00 |
| <input type="radio"/> TempARIA (2) (°C) | Temperature Environment - (1) Min; Ave; Max; StDev; ValidDataPerc - (1) 00 |
| <input type="radio"/> PressATM (3) (hPa) | Pressure Atmospheric - (1) Min; Ave; Max; StDev; ValidDataPerc - (1) 00 |
| <input type="radio"/> ... | ... |

< Previous Next > Finish Cancel

The <Association> button opens the association window showing for all the used calculations values the associated measured channels and the default values to be used in case a measure data is missing:

Association measures quantities

This form shows bulletin preview. To edit bulletin check the "Enable bulletin editing"; to save bulletin on file press the "Save" button.

Instrument configuration: 08100474 --> 12/1/2009 3:32:18 PM

Press <Default> button to perform an automatic association

Default



| | | | | |
|--------------------------|--------------------------------------|-----|----------------|----|
| Min. Air Temp. (Tmin) °C | 08100474 - TempARIA (1) Min (°C) | ... | Default value: | 20 |
| Max. Air Temp. (Tmax) °C | 08100474 - TempARIA (1) Max (°C) | ... | Default value: | 20 |
| Min. Rel. Hum. (RHmin) % | 08100474 - UmiditaREL (0) Min (%) | ... | Default value: | 80 |
| Max. Rel. Hum. (RHmax) % | 08100474 - UmiditaREL (0) Max (%) | ... | Default value: | 80 |
| Air velocity (Va) m/s | 08100474 - VELVento (5) Ave (m/s) | ... | Default value: | 1 |
| Net Rad. (Rn) W/m2 | 08100474 - RadNETta (5) Ave (W/m2) | ... | Default value: | 0 |
| Glob. Rad. (Rg) W/m2 | 08100474 - RadGLOBale (4) Ave (W/m2) | ... | Default value: | 0 |

The evapotranspiration calculation requires the net radiation. If this measure is not available you can also use the global radiation, in which case the net radiation is calculated by the program.

Ok Annulla

The <Default> button starts the wizard procedure to select the most suitable association based on the characteristics of the instrument configuration; for each given value you will have the associable measures listed according their compatibility grade express on percentage. The association is

proposed when a measure and a quantity share an equal grade of 100%. For lower values the user has to decide the appropriate association; if it is not possible to associate a measure to a quantity, a predefined value will be used.

The  button allows selecting the association manually; the  button removes it.

NOTE

The association of measures and calculated quantities can be performed only once for each instrument configuration.

The menu *View* → *Quantities Measures Association* displays all (licensed) configured instruments present in the computer and shows for each instrument configuration if the association of measure and quantities used in the calculation is present or missing.

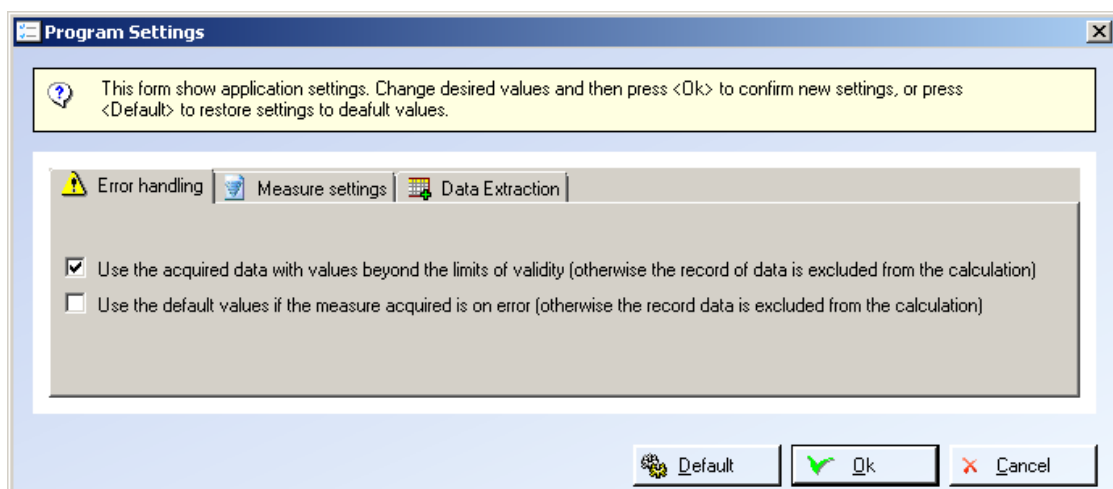
4.6. Calculations

4.6.1. Configuration options

To modify the configuration options for calculations select menu *Options* → *Settings*

4.6.1.1. Error handling configuration

The *Error Handling* form in *Program Settings* window shows the available options for error handling:



It is important to understand the use of the first two voices:

- *Use the acquired data with values beyond the limits of validity:* if you do not select this voice and just one parameter exceeds the limits of validity set by the standard, the record of environmental data will be excluded from the calculations; by selecting this voice the calculation will be strengthen even if the entry data go beyond the validity limits set by the standard.
- *Use the default values if the measure acquired is an error:* when an environmental measure is incorrect or missing, selecting this voice the calculation will proceed using the configured predefined value from the association of calculated quantities (§4.5.1); if you do not select this option the data with the incorrect value will be automatically excluded from the calculation; use this option with caution.

4.6.1.2. Measure settings

The *Moderate settings* window in the *Program Settings* shows the list of limits set for the different acquired and calculated quantities; it also indicate the abbreviations of the measures used by the program.

4.6.1.3. Data extraction

The *Data Extraction* window in the *Program Settings* shows the number of months for the initial selection of environmental data.

You should not increase too much this value otherwise the preview of the data maybe slowed by the large amount of data to be extracted from the database.

4.6.2. Calculations characteristics

You can make a calculation for each location containing at least one or more selections of environmental data.

NOTE

Each calculation is saved in the Location in the Calculation Results section and it can be open also if its generating elements are deleted or modified; this means that the calculation results store the entry data so that if you modify the time span of the selected data this operation does not affect the calculation just made but only the future ones.

4.6.3. Make a run

To make a run select the Location and use the *Run* contextual menu or press the similar button in the *Properties* window. The wizard procedure for the calculation allows choosing the calculation to be made among the daily and monthly calculation for every environmental set of data.

Run calculation on Florence - Genova

Florence: runs selection

LSI Lastem

Choose the calculation runs and then press <Next> to start the calculation. Select a list item to view details of each calculation run

☐ Check to remove all existing runs belonging to this location.

| Environmental data | Run type |
|--|---------------------|
| <input checked="" type="checkbox"/> Short period | Daily calculation |
| <input checked="" type="checkbox"/> Short period | Monthly calculation |
| <input checked="" type="checkbox"/> Long period | Daily calculation |
| <input checked="" type="checkbox"/> Long period | Monthly calculation |

Click on a item of the list to get additional informations.

< Previous

Next >

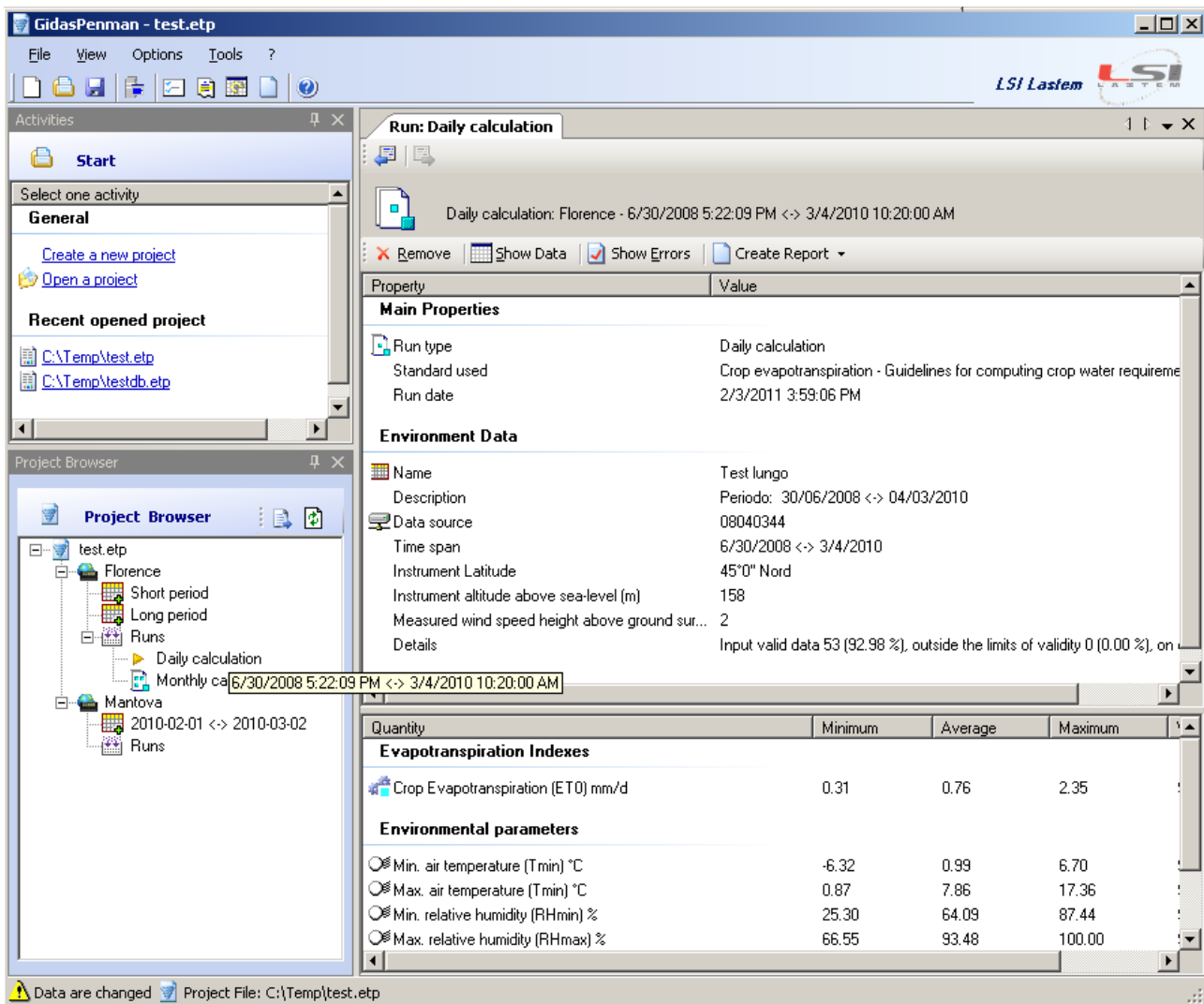
Finish

Cancel

Selecting the *Check to remove all existing runs belonging to this location* checkbox you delete all the calculations already made on this location (not the environmental data present in the database). Otherwise the calculations will be added to the already made permitting the confrontation.

4.7. Viewing the calculation results

Select a calculation in the project browser to open the calculation properties window:

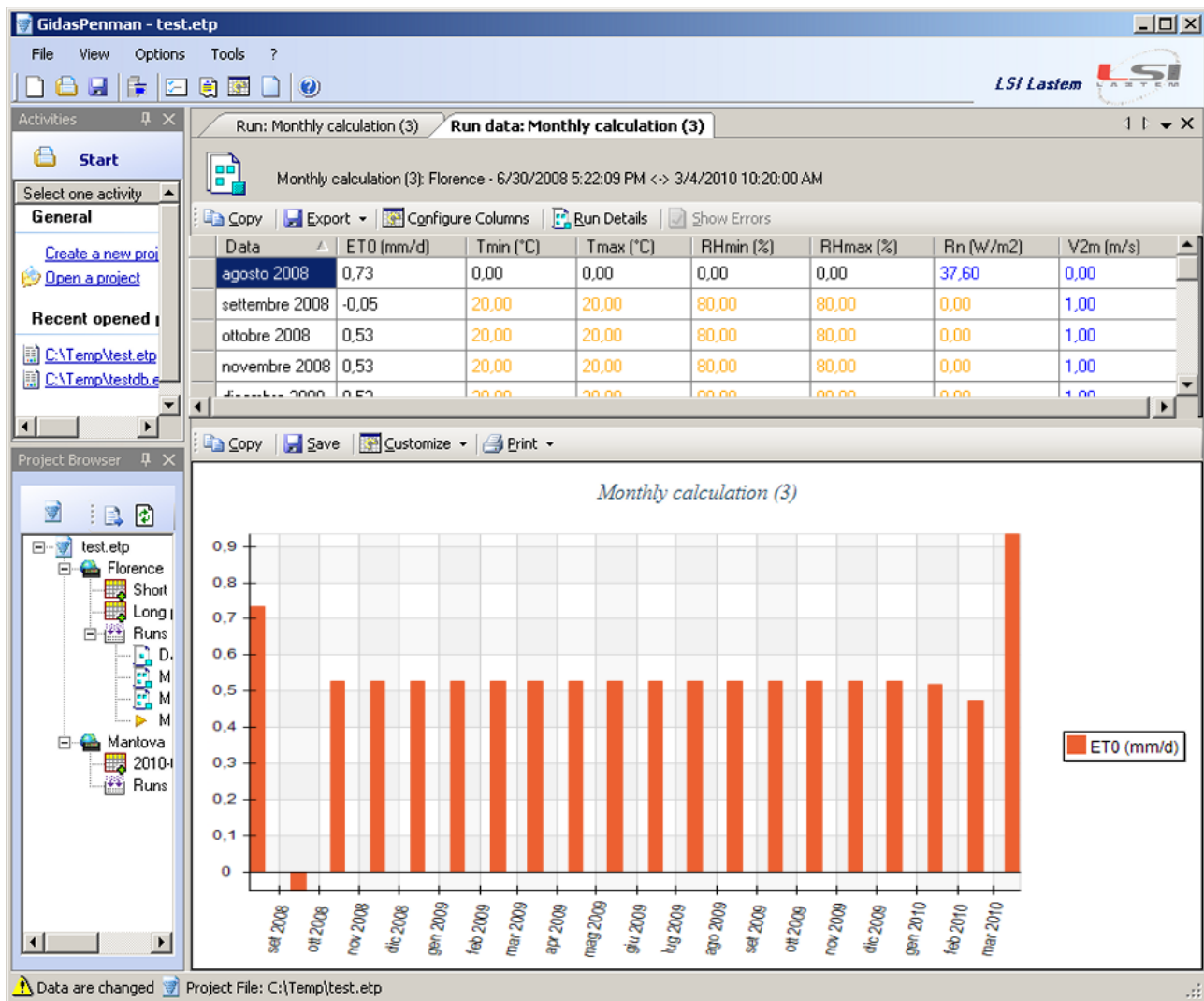


In the upper section of the window you find the data used for the calculation, in the lower section the statistic results (Minimum, Average, Maximum and the percentage of Valid data used in the calculation) of the calculated indices and the environmental variables used.

To delete a calculation select <Remove> button; to view data select <Show Data> button; to view the errors select <Show Errors> button and to create the calculation report select <Create Report> button.

The errors view shows all errors occurred during the calculation.

The Data View window shows the table and the graph of environmental data and the calculated indices. The menu *Options* → *Data Table Format Settings* sets the format of the data table.



The colors of the data table have the following meanings:

- blue: data calculated;
- orange: input data on error replaced by the constant value defined by the user;
- red: data on error.

The graph of the monthly calculation is a bar chart (as shown) the daily chart of the calculation is a line graph.

Selecting <Configure Columns> button you can select the quantities to view in the table or graph.

The available options on the table allow to:

- copy selected data on Windows (*clipboard*) memory from where can be pasted to all those applications supporting *copy and past* command;
- export the entire table on a text file or on *Microsoft Excel* (*OpenOffice* compatible); the menu *Options* → *Export To Text File Settings* holds all the setting to format the data exportation on text file.

The graph options allow to

- copy, save as image file or print the graph;
- view or hide the legend, view or hide the cursor showing the data value where the mouse is pointing: these options are accessible pressing <Options> button.

NOTE

Microsoft Excel format is compatible with Excel versions starting from Office XP.

4.8. The report

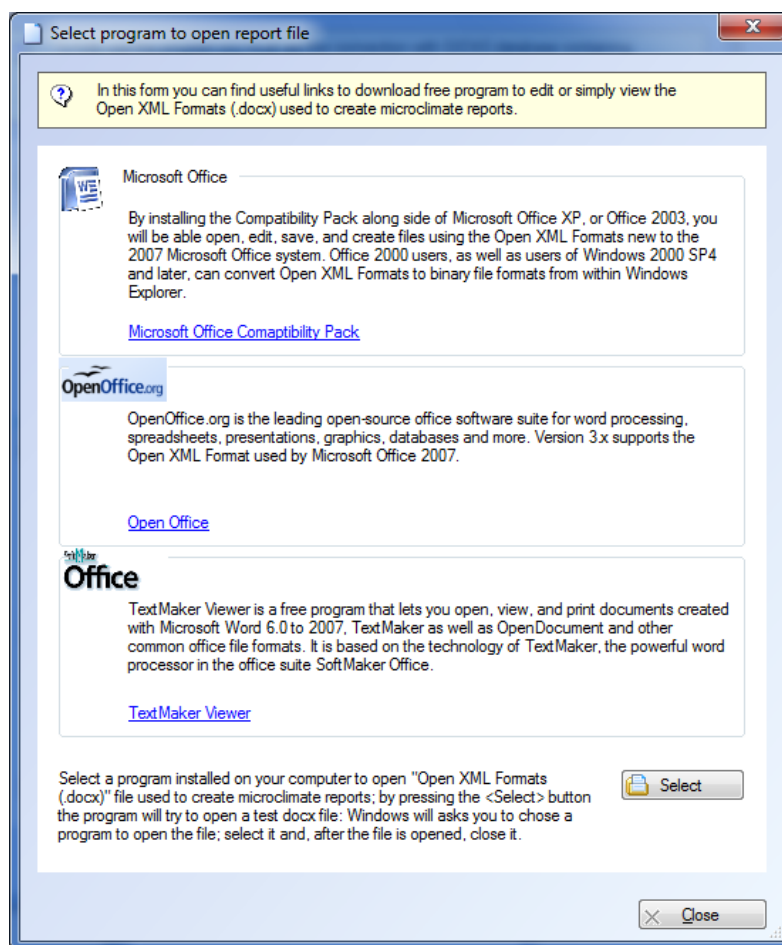
Selecting a calculation in the project browser, the calculations properties window will open; selecting the <Create Report> button you can generate a report of the single calculations.

Selecting the Location in the project browser, the Measure Point Properties will open; selecting the <Create Report> button you can generate a report containing all the calculations present in the measure point

4.8.1. Templates configuration and management

Choose *Options* → *Report Setting* to open the report configuration window.

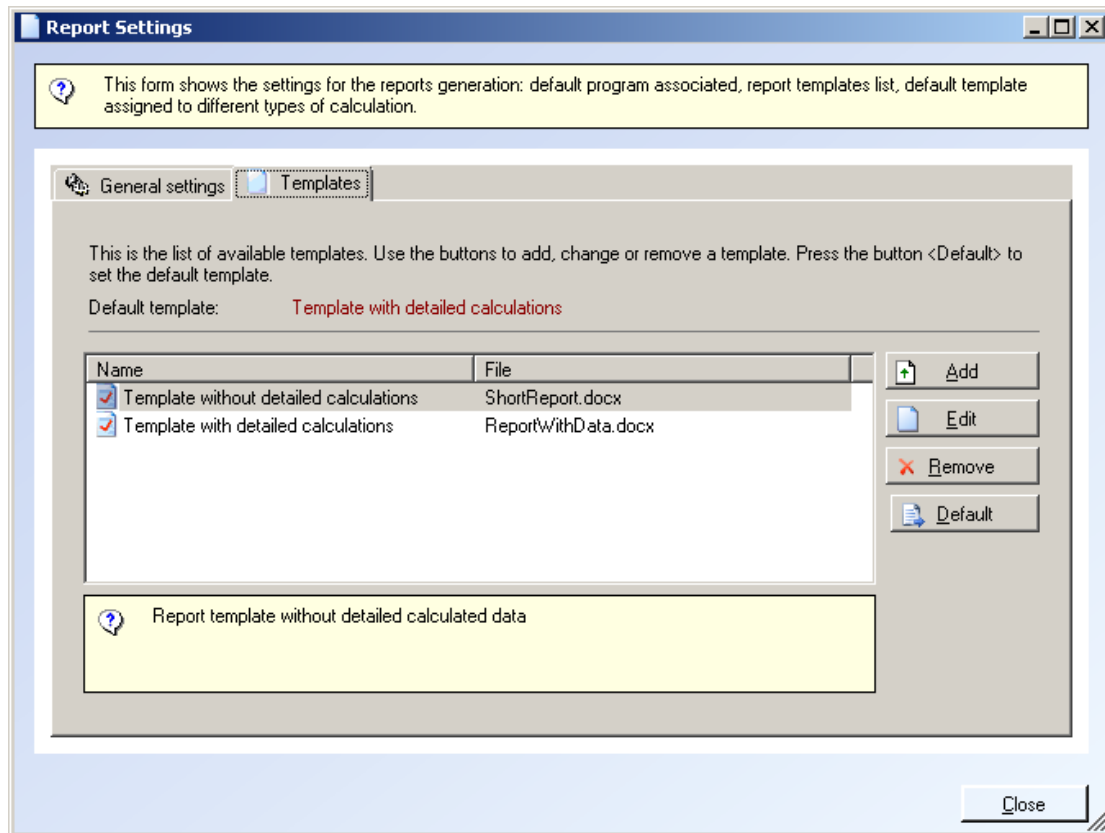
The *General* chart views the pre-defined program associated in the computer to *Office Open XML* (.docx file). If an associated program don't exist click the <Select> button to open the select program window:



This window offers few options:

- choose one of solutions or install a program able to manage *docx*.file;
- Press *Select* to associate a program already installed in the computer to *docx*.file.

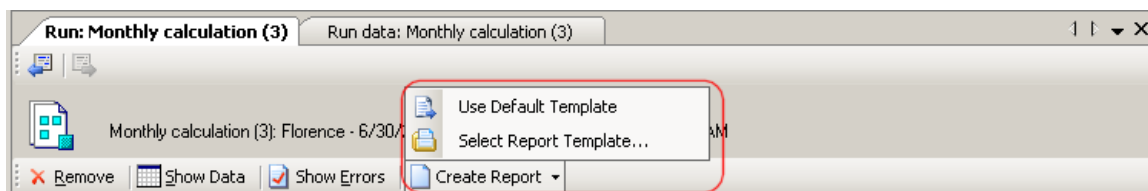
The *Templates* chart views the list of available reports:



The templates indicates with the ☒ icon are those installed with the program cannot be modified. Select an element from the list and click:

- *Remove*: to remove the element permanently;
- *Edit*: to edit the file with *docx* extension associated with the template to modify it; if you select this option on one of the templates installed with the program, a new template is duplicated from the selected one;
- *Add*: to add a new template that will be generated from the selected one.
- *Default*: select the default template.

When you select the *<Create Report>* button on a measure point or on a single calculation it is possible to choose a predefined template or a different one.:



4.8.2. Creating a template

A report model is a file *.docx* holding some *markers (keys)* that will be substituted by those values present in the calculations.

The model defined by the user are saved in the folder:

C:\ProgramData\LSI-Lastem\GidasPenman\UserTemplate (in Windows 7)

C:\Documents and Settings\All Users\Data Applications\LSI-Lastem\GidasPenman\UserTemplate (in Windows XP)

The user can modify existing models or create a new one; in this case you need to create a new file *.docx* and import the various keys that will be substituted by the information carried in the calculation the moment the report is generated.

The keys identifying the elements are enclosed in braces. Here you find a list of the keys most recognized by the program:

| Key | Meaning |
|---------------------------|--|
| General | |
| {Software} | Software used for calculation, name and version |
| {ReportDate} | Creation date of the report |
| Location | |
| {MeasurePointDescription} | Location description |
| Calculation | |
| {Run.Name} | Name associated to the calculation |
| {Run.Date} | Run date |
| {Run.Type} | Type of calculation |
| {Run.Time} | Run time span |
| {Run.FactoryMatr} | Instrument Serial Number originating the environmental data |
| {Run.TimeSpan} | Environmental time span |
| {Run.Latitude} | Instrument latitude |
| {Run.Altitude} | Instrument altitude above sea-level |
| {Run.Height} | Measured wind speed height above ground surface |
| {Run.InstDetails} | Dettagli statistici del calcolo |
| {EnvIndex.Key} | Keys generating the environmental data statistics; Quantities Names as key solution. |
| {EnvIndex.Min} | |
| {EnvIndex.Ave} | |
| {EnvIndex.Max} | |
| {CalcIndex.Key} | Keys generating the statistics table of the calculated indices Quantities Names as key solution. |
| {CalcIndex.Min} | |
| {CalcIndex.Ave} | |
| {CalcIndex.Max} | |

4.8.2.1. Inserting of subject parameter tables, of environmental measures and calculated indices

To generate a table, insert the first line with specific keys. Example:

| Quantity | Minimum Value | Average value | Maximum value |
|----------------|----------------|----------------|----------------|
| {EnvIndex.Key} | {EnvIndex.Min} | {EnvIndex.Ave} | {EnvIndex.Max} |

The report result will appear as follows:

| Parameter | Minimum Value | Average value | Maximum value |
|--------------------------------|---------------|---------------|---------------|
| Air Temp. min. (Tmin) °C | 5,00 | 5,00 | 5,00 |
| Air Temp. max. (Tmin) °C | 26,81 | 28,18 | 29,12 |
| Rel. Hum. Min. (RHmin) % | 45,71 | 67,62 | 100,00 |
| Rel. Hum.max. (RHmax) % | 45,71 | 67,62 | 100,00 |
| Net Rad. (Rn) W/m ² | 53,42 | 56,11 | 59,37 |
| Air Vel. 2m (V2m) m/s | 0,00 | 0,01 | 0,02 |

WARNING

Only the selected values in the run view will be shown (those selected in the Data calculation window), press the <Configure Columns> button (§4.7Errore. L'origine riferimento non è stata trovata.).

4.8.2.2. Inserting complete data table

To load the data tables the following keys will be needed:

| Key | Meaning |
|--------------|---------------------------|
| {Data.DD} | Date |
| {Data.Tmin} | Minimum air temperature |
| {Data.Tmax} | Maximum air temperature |
| {Data.RHmin} | Minimum relative humidity |
| {Data.RHmax} | Maximum relative humidity |
| {Data.V2} | Air velocity 2m |
| {Data.Rn} | Net radiation |
| {Data.ET0} | Evapotranspiration index |

WARNING

Contrary to the summarizing statistic tables showing the same parameters chosen in the program view, the data tables always view only the data columns configured in the model, even if few of them have been hidden in the program.

4.8.2.3. Inserting repeated elements

Besides tables lines you can add repeated complex data. E.g.: this kind of situation occurs in the report on a single measure point carrying more calculations: the section related to calculations keys has to be repeated for each calculation resent in the measure point.

For this action you need to enclose in brackets the Keys of all the calculations data:

{repeater:Run@begin} and {Run@end}repeater:

Repeating key table:

| Key | Meaning |
|----------------------------|------------------------------------|
| {Repeater:Run@begin} | To enclose the Calculation section |
| {Repeater:Run@end} | |
| {repeater:DataTable@begin} | To enclose the data table |
| {repeater:DataTable@end} | |

4.8.2.4. Inserting charts

This version of the program doesn't have an automatic function to configure and load graphs into the report. To load a graph into a report you have:

- select the calculation generating the report;
- press the <*Create Report*> button to generate the report selecting
- press the <*Show Data*> button to view the data generated from the calculation;
- press the <*Copy*> button to modify the view settings of the graph and copy it in Windows Memory;
- press the <*Paste*> button to paste the graph into the point of the *Report View* program.

4.9. User license

To make a calculation you need the license file associated to the serial number of the instrument used for environmental measure.

4.9.1. Licenses Manager program

Use menu *Tool* → *Licenses Manager* to run the program *LSI License Center* that manages the LSI programs licenses installed on the local computer.

The *LSI License Center* program is one of the components of the *LSI Support Center* program that can be directly installed from the LSI LASTEM products CD or from the Licenses files CD. You can also download the installer file from the of the LSI LASTEM FTP site. The *LSI Support Center* also contains the component that verifies the availability of the new versions of the LSI LASTEM programs installed in the computer.

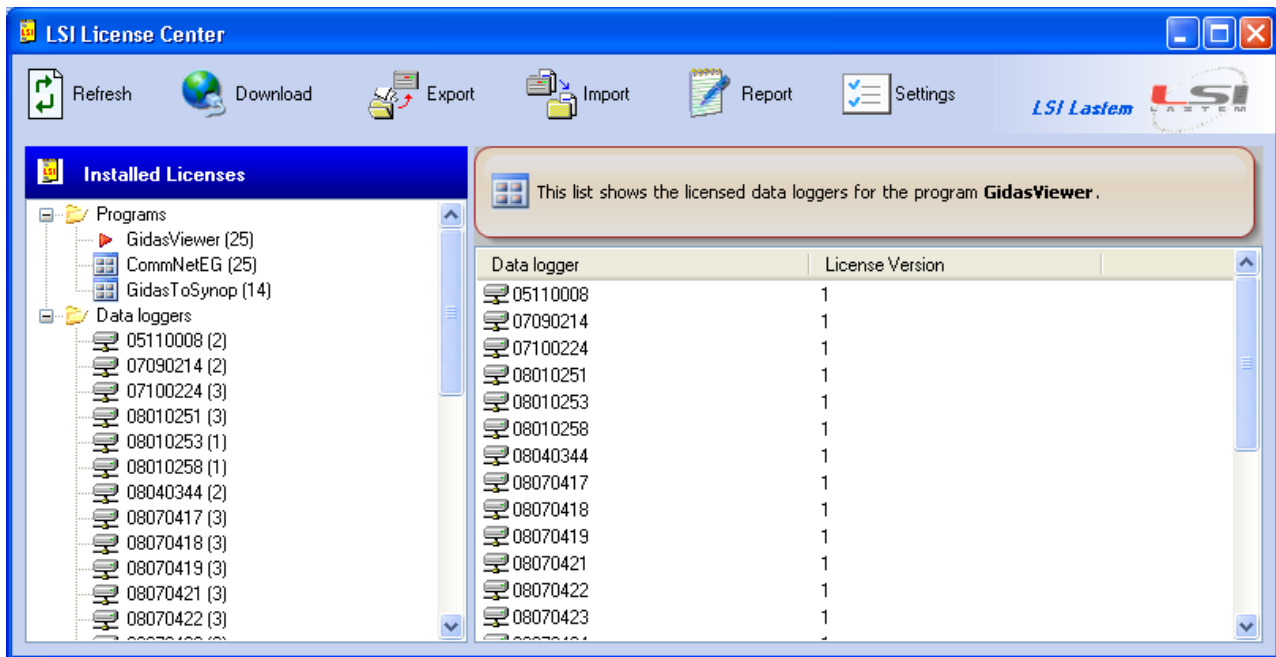
4.9.1.1. Program installation from FTP site

If the License Manager Program is not installed in the local computer you can download the installation file from the LSI LASTEM FTP site. At the end of downloading the installation will automatically starts; at the end of the installation the program will be started.

4.9.1.2. Program use

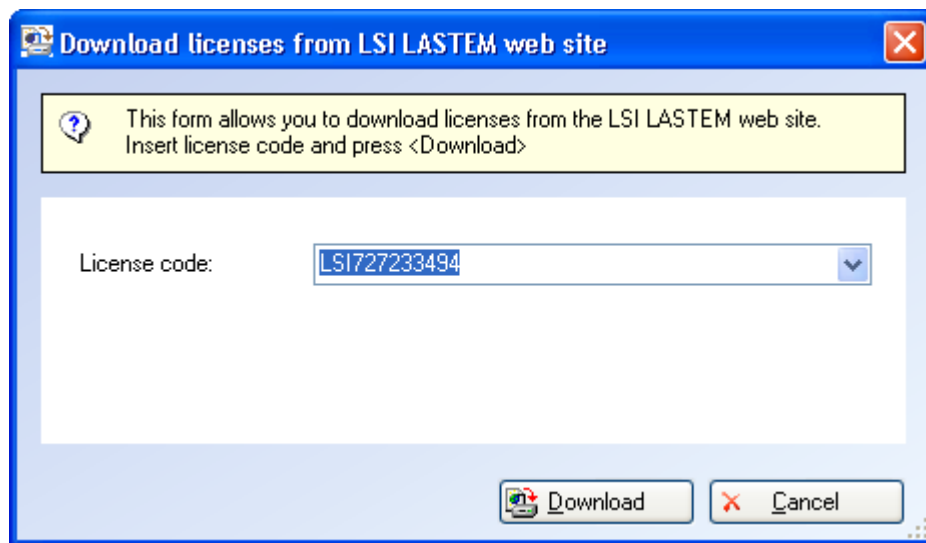
The program visualizes all the installed licenses in the computer divided for single programs or single tools. This program can:

- export the selected licenses in an archive file;
- import an archive licenses file in the local computer;
- produce a simple text file report with the list of the installed licenses in the computer;
- directly download the licenses archives from the LSI LASTEM site;



The licenses archive is constituted only by .lsilic zip file extension. This is the format of licenses distributed by LSI LASTEM.

Every licenses archive can be downloaded from the LSI LASTEM site inserting the License Code supplied by LSI LASTEM at the purchase of the programs.



Through the <Settings> button it is possible to set the parameters of the Internet communication in the case it is present a server proxy.

4.10. Configuration file inside the program

GidasPenman.exe.conf.g is the configuration program in .xml format containing few settings for the functioning of the program. You can force the program to use a different language from the predefined one by modifying the property value in *UserDefinedCulture*:

```
<applicationSettings>
  <GidasTEA.UI.Properties.Settings>
    <setting name="UserDefinedCulture" serializeAs="String">
      <value></value>
    </setting>
  </GidasTEA.UI.Properties.Settings>
</applicationSettings>
```

To force the use of English language on a computer running in Italian, you have to import the value `<value>en-us</value>`; for the use of Italian language in a computer running in another language insert the value `<value>it-it</value>`; no other location is available.

4.11. Program update

Use menu ? → *Check for updates* to run the program *LSI Update Center* that verifies the availability of the new versions of the LSI LASTEM programs installed in the computer.

The *LSI Update Center* program is one of the components of the *LSI Support Center* program that can be directly installed from the LSI LASTEM products CD or from the licenses files CD or downloading the installer file from LSI LASTEM FTP site. The *LSI Support Center* also contains the component that manages the licenses of the programs installed on the local computer.

4.11.1. Installing the program from FTP site

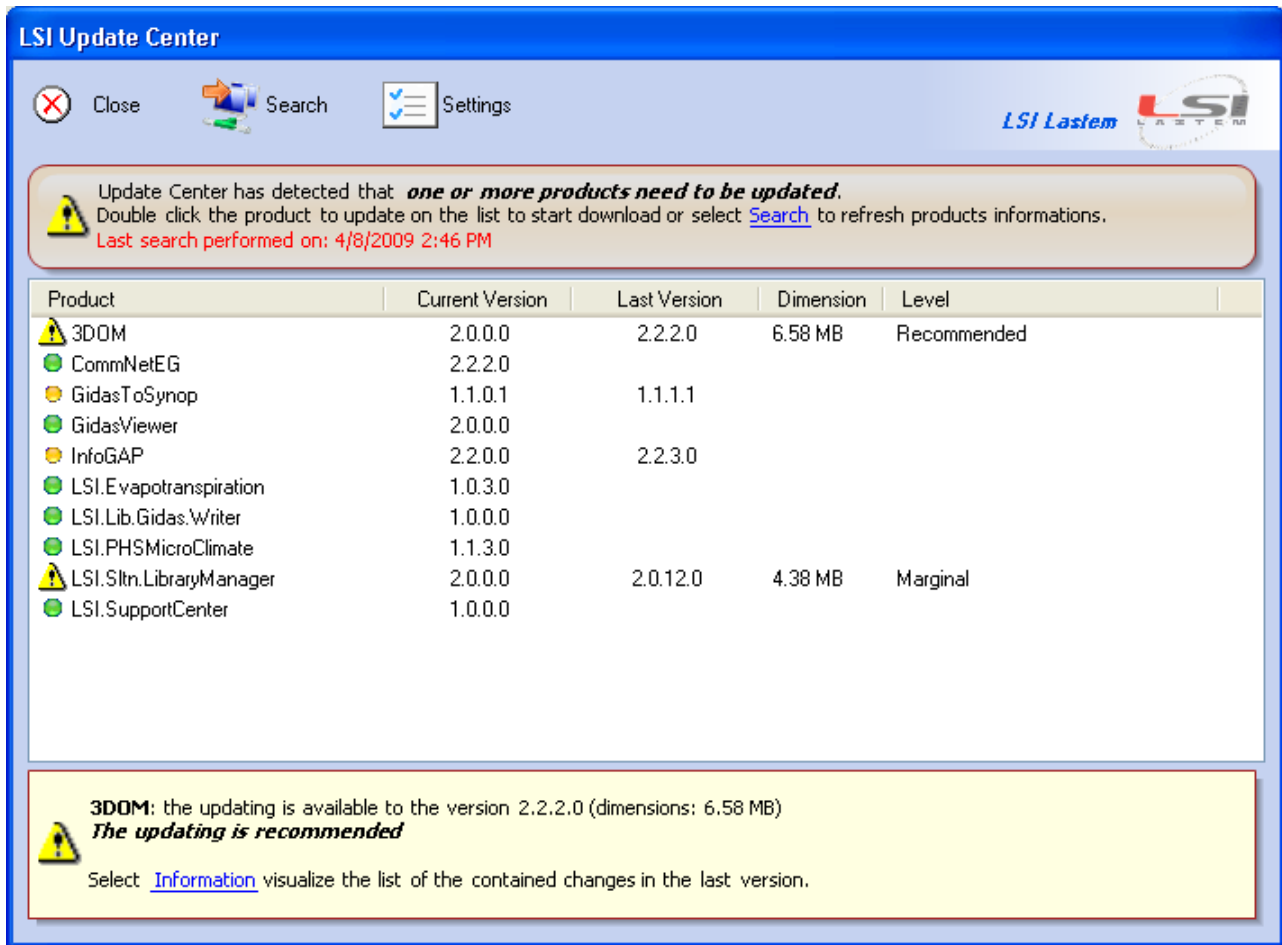
If the program *LSI Update Center* is not installed in the local computer you can download the installation file from the LSI LASTEM FTP site. At the end of the downloading the installation will automatically starts; at the end of the installation the program will be started.

4.11.2. Program use

The *LSI Update Center* program is composed from two modules:

- the program *LSI Update Center Monitor* that is started in automatic with the operating system and that verify periodically the available updates for all the LSI LASTEM programs installed in the computer;
- the program *LSI Update Center* shows the state of the available updates and, if the case, downloads from the LSI LASTEM web site the files of installation and starts the upgrade.

The program *LSI Update Center* shows the state of the LSI LASTEM programs installed in the local computer:



For every program the installed run version and the last available version is visualized.

A program can be:

- Up to date;
- Not updatable: a new version exists but the product is not updatable;
- Updatable: double click the product to update on the list to start download the installer file.

Selecting *Information* you can visualize a web page containing the list of changes of all the versions of the selected program.

Through the button <Search> is update the search of the updates and through the button <Settings> are modified the connection properties, if a proxy is used, and the temporal interval used by the monitor for the automatic search for updates.

Remind that when this program is started by the menu *Start* → *Programs* of Windows or from the contextual menu of the monitor, the program visualizes the results of the last automatic search operated by the automatic monitor visualizing the date of the search. To update the data press the button <Search>.



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



UK Office

Keison Products,

P.O. Box 2124, Chelmsford, Essex, CM1 3UP, England.

Tel: +44 (0)330 088 0560

Fax: +44 (0)1245 808399

Email: sales@keison.co.uk

Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.