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Demand Analysis

Setup Guide

Version 1.0

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About Demand Analysis

Demand Analysis is a stand alone application that gathers measurements on power and outdoor temperature for a period of time, typically hourly data for one year.

The Demand Analysis output is a set of regression coefficients that encompass the estimated demand as a function for the day type, the time of day, and an estimated or measured outdoor temperature. The output can be exported and imported into TERMIS Operation and used in connection with the update of consumer affiliations.

Demand Analysis uses the following data to calculate the regression coefficients

- Reference temperature that defines the typical temperature limit above which the room heating is typically neglected. [About Demand Analysis](#)
- Measured hourly average values for power supplied to an area.
- Measured hourly average values for outdoor temperature for a supplied area.

Subsequently, the time and outdoor temperature dependent demand is calculated in TERMIS Operation using the following formula:

For $T < T_{ref}$:

$$E(t,i) = (A1(t,i) * T + B1(t,i)) * EA$$

For $T \geq T_{ref}$:

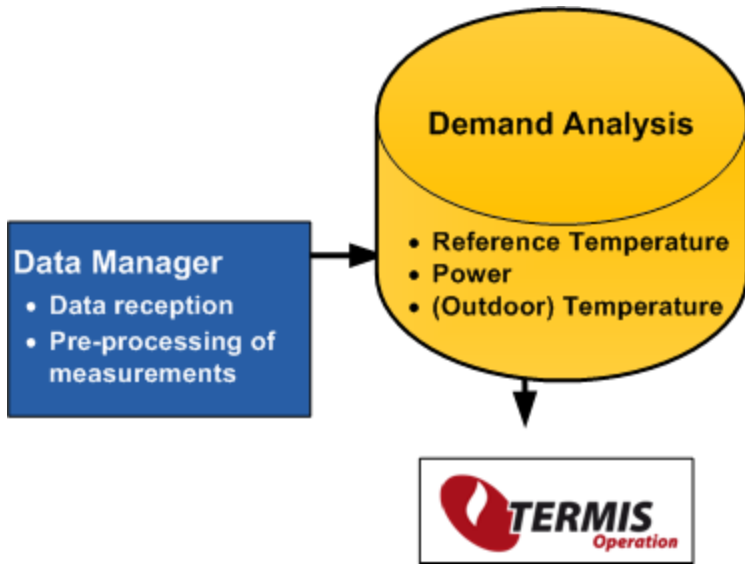
$$E(t,i) = (A2(t,i) * T + B2(t,i)) * EA$$

where

E	Normalized power
EA	Average power
T	Outdoor temperature
t	Time of day (hour)
i	Day type
A1	Linear regression coefficient
B1	Linear regression coefficient
A2	Linear regression coefficient
B2	Linear regression coefficient

The linear regression coefficients are calculated using the least square method finding two contiguous lines using the defined historical data.

The illustration shows (to the left) how data from the Data Manager database is sent to Demand Analysis and, via a table, further on to TERMIS Operation.



The demand in TERMIS Operation is expressed as a normalized power value (based on regression coefficients) multiplied by a node dependent nominal power. For cyclic simulations the estimated outdoor temperature is typically a meteorological forecast.

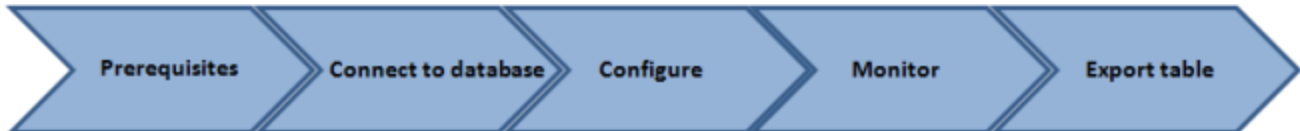
Assumptions

The configuration of Demand Analysis assumes the following:

- You have a fully configured and running version of TERMIS Operation with proper setup to access Data Manager data. The Data Manager must contain relevant measurements for power and (outdoor) temperature.

Setup flow - checklist

The table in the following suggests a setup approach for Demand Analysis with pointers to topics with details.



Step	Action	Where to find information
1	Ensure that you have a fully running version of TERMIS Operation operation and a Data Manager database with the relevant measurements for power and temperature. Optionally, you can edit the units used in Demand Analysis.	For prerequisite setup of TERMIS Operation you are referred to the documentation provided with that product. For units see the topic How To: Edit Units, page 15 .
2	Make a connection to the relevant Data Manager database that contains measurements for a substantial period of time, typically one year.	How To: Connect to Data Manager Database, page 7

Step	Action	Where to find information
3	Configure the basic settings such as for tags and day types.	How To: Configure Demand Analysis, page 8
4	Monitor the result.	How To: Observe Output - Graph and Table, page 10
5	Export table with results to TERMIS Operation.	How To: Export Table to TERMIS Operation, page 11

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[How To: Connect to Data Manager Database, page 7](#)

How To..... in Demand Analysis

The How To.... section provides a step-by-step setup of Demand Analysis.

You can find particular areas of interest using Ctrl F.

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How To: Connect to Data Manager Database

You must start the setup by pointing to the relevant database with the measurements for power and temperature for a substantial period of time, usually one year.

To connect to Data Manager database

- From the menu bar select **Edit** edit, point to **Data Connection** and under the **Data Link Properties** dialog select the relevant database and test the connection.

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[How To: Configure Demand Analysis, page 8](#)

How To: Configure Demand Analysis

This topic explains how to perform basic setup in Demand Analysis.

Before

Ensure that you have

- A proper connection to the Data Manager database.
- Data tags in Data Manager must be based on hourly average values.
- In Data Manager, values for power and temperature must be stored using the units W and K, respectively.

To perform basic configuration

1. From the menu bar select **Edit** and then **Configuration**.
2. Under the **Configuration** dialog you must configure settings under the two tab pages. Each tab page setting is described in-depth in the ensuing.

General

On the **General** tab page configure the setup of tags following the guidelines in the ensuing table.

Item	Description
Reference temperature	Enter a value for the reference temperature to indicate the nominal estimate for energy needed in regards to heating. Suggested value (in Kelvin): 289 (default value). For details see the topic How To: Observe Output - Graph and Table, page 10 .
Power Tag	Select the measurement for the power from the list of Data Manager tags.
Temperature Tag	Select the measurement for the outdoor temperature from the list of Data Manager tags.
Start Time	Define the start time for the analysis. This is the default minimum time from the Data Manager database.
End Time	Define the end time for the analysis. This is the default maximum time from the Data Manager database. Typically, the period from start till end is one year.

Day Types

On the **Day Type** tab page you can define different day types following the guidelines in the ensuing table . You can at any time revert to the default setup by pressing the **Default** button.

The definition process is based on a week profile that allows you to indicate week days with individual demand profiles. The demand profile naturally varies from country to country. As an example the first four days of the week in Scandinavia (Monday, Tuesday, Wednesday Thursday) typically share the same profile whereas Friday may be somewhat

different in the demand profile. Saturdays and Sundays may have somewhat different profiles and in this example they are given different day types.

The day type is defined as a simple number between 1 and 7. The definition of day types must be sequential and start with number.

Sample day type values:

Item	Description
Sunday	1
Monday	2
Tuesday	2
Wednesday	2
Thursday	2
Friday	3
Saturday	4

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[How To: Observe Output - Graph and Table, page 10](#)

How To: Observe Output - Graph and Table

When you have completed the setup (as explained in other topics) of the reference temperature and the power and temperature tags, you can observe the result over time in the pane to the right in Demand Analysis.

Graphical presentation

The **Graph** tab shows all the measurement points for power and temperature (red dots) on a joint time series basis, and aligned against nominal values. The green graph represents the calculated line for the values within the current hour. The reference temperature is where the curve bends.

For each day type that you select, you can observe the changes on an hourly basis for the entire 24-hour day using the arrows to navigate between the time intervals.

Table presentation

The **Demand Data** tab shows the curve values for an entire week. The table provides the exact curve position for any given measured time period.

Example

You want to see the details for your defined Day Type 2 at 19:00 hours. This day type spans Monday through Friday. In the ensuing figure you can see how the curve values are exactly the same for the given time. The last curve values (see the row marked with an asterisk) are added only to illustrate how the value for the same time but a different day (Saturday) differ from the other values.

Mon	19:00:00	289	-0.09049011468...	26.58876927668...	-0.00696595932...	2.450288378297.
Tue	1.19:00:00	289	-0.09049011468...	26.58876927668...	-0.00696595932...	2.450288378297.
Wed	2.19:00:00	289	-0.09049011468...	26.58876927668...	-0.00696595932...	2.450288378297.
Thu	3.19:00:00	289	-0.09049011468...	26.58876927668...	-0.00696595932...	2.450288378297.
Fri	4.19:00:00	289	-0.09049011468...	26.58876927668...	-0.00696595932...	2.450288378297.
Sat *	5.19:00:00	289	-0.09111340046...	26.79031744405...	-0.01055828340...	3.509888613451.

Time stamp notation

The time stamp is related to the regional settings for your computer.

The following is the suggested notation used in time stamp: **D. HH:MM:SS** where D is the weekday.

Example:

2. 14:46:00 (Wednesday at 14:46:00) ; where

0 = Monday

1 = Tuesday

2 = Wednesday

3 = Thursday

4 = Friday

5 = Saturday

6 = Sunday

How To: Export Table to TERMIS Operation

When you have performed the setup according to your requirements and established that the Demand Analysis contains all relevant data you can export the result and use it in TERMIS Operation to update the consumer affiliations.

To export table

- From the menu bar select **File**, point to **Export Results**, and select the folder where you want to place the table file.

You are recommended to maintain the default name for the table, **TBL_PrognosisData**.

This is the name used by TERMIS Operation for the setup of consumer affiliation using the Demand Analysis table. If you change the name you must make additional changes in TERMIS Operation as explained in the supplied documentation. Else the update of consumer affiliations will fail.

Next

Open TERMIS Operation and perform the setup for the update of consumer affiliation. For assistance see the documentation provided with the product.

Appendix Section

The Appendix section contains contents that is intended as reference material only or otherwise fall beyond the natural framework for the functionality in Demand Analysis.

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About Menu Bar

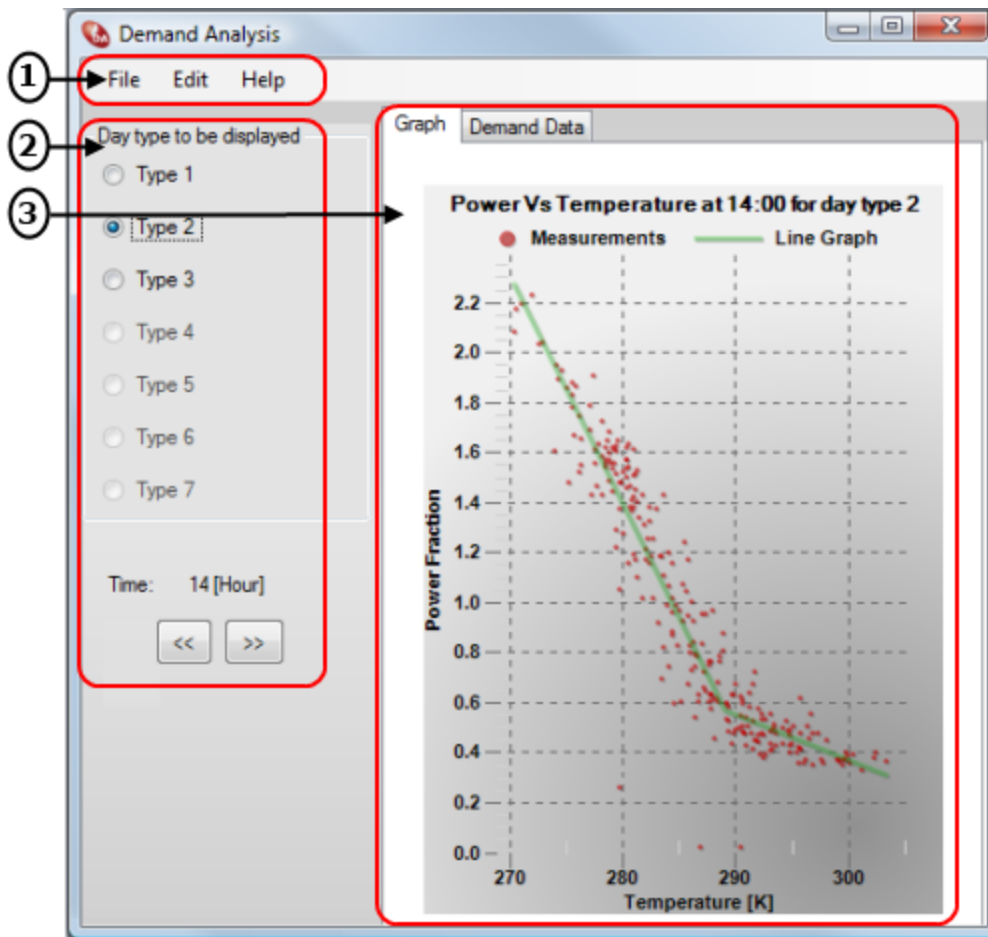
The ensuing table provides an overview to the various functions in the Demand Analysis.

Menu	Submenu	Description
File	New (CTRL+N)	Create a new configuration.
	Open (CTRL+O)	Open an existing configuration.
	Save (CTRL+S)	Save the current configuration.
	Save As	Save the current configuration under a new name.
	Export Results	Export the output to a file with the format .tbl . This file can subsequently be imported into TERMIS Operation for update of consumption.
	Exit	Save and exit the system.
Edit	Configuration	Perform a setup defining a number of mandatory tags and day types.
	Data Connection	Connect to the relevant database with all pertinent historic data - typically hourly data from the past year.
	Units	Allow the presentation of data in common units.
Help	Help Topics	Access the product documentation. You can also use the F1 function key on your keyboard to access Help.
	About Demand Analysis	Information about the application version.

Navigate the Demand Analysis User Interface

The following shows the Demand Analysis user interface. In the ensuing you will find pointers to further information about the various interface elements.

Sample user interface



Notation

Element	Description
Menu bar	For details About Menu Bar, page 13 .
Left pane	On the left pane you can select which day type you want to monitor. At the bottom, you can use the arrows to toggle between each time interval during the 24-hour day (military time).
Right pane	The right pane contains two tab pages that display the results <ul style="list-style-type: none"> - as a graphical representation and - as a table representation (shows more details).

How To: Edit Units

You can edit the default units supplied with the application.

To edit units

1. From the menu bar select **Edit** and then **Units**.
2. Under the **Units** dialog make the appropriate changes following the guidelines in the ensuing table

Column	Description
Property type	Read-only. This is the name of the unit.
Unit	The measurement for the unit. Select a new unit from the drop-down menu.
Factor	Read-only. The calculation factor for the unit.
Offset	The decimal position for the unit.
Format	The display format for the unit.

Add units

The Demand Analysis comes with a list of physical types (phys types) with a number of defined units. You can add more units if required.

To add more units

1. Open the Units dialog and locate the appropriate type to which you want to add a new unit.
2. Right-click and select **Add Unit**.
3. Under the **New Unit For <Type>** dialog enter a name for the new unit.
4. Accept the default values for the unit, or modify the values as appropriate using the information in the following table.

Unit values	Definition
Name	Unique name of the new unit.
Factor	The calculation factor for the unit. Example: The unit ft (feet) has the factor 3.29084.
Offset	The decimal position for the unit value.
Format	The display format for the unit.

Load unit set

You can save any unit set and load it on different machines if necessary. This allows you to define region specific unit sets. You may for example want to define a unit set that applies to measurements that are specific to other regions,

such as the US or UK regions, than your home region.

To save a unit set

1. Open the **Unit** dialog and right-click anywhere in the dialog and select **Save Unit Set**.
2. Enter a name for the new unit set and press **Save**.

To load a saved unit set

1. From the menu bar select **Configuration** and then **Units**.
2. Still in the **Unit** dialog, right-click and select **Load Unit Set**.
3. Locate the appropriate unit set and press **Open**.