



# Shadow Manager 1.4.0.0

Software for the Configuration of Shadow Impact Modules

Manual

## Revision history

Revision	Date	Change	Author
1.0	01/03/2021	Translation of first German edition	IH

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# 1 About this manual

In this manual, you will find information on how to install Shadow Manager as well as detailed instructions on how to configure your shadow impact module using this software.

## Manual structure

This manual can be used in various ways:

### Chapter 1

Here you will find notes on **how to use this manual**, and you can look up **abbreviations** used throughout the manual.

### Chapter 2

This chapter explains how to **prepare a configuration session** and outlines the **menus** and **features** as well as the **basic procedure** of a configuration session.

### Chapter 3

This chapter provides a detailed description of the configuration windows including all parameters and buttons available: **use this chapter to look up individual parameters or features**.

### Chapter 4

This chapter provides a detailed description of the communication windows including all parameters and buttons available: **use this chapter to look up individual parameters or features**.

### Chapter 5

This chapter illustrates typical configuration tasks and provides **step-by-step instructions**.

### Chapter 6

Here you will find **trouble shooting information** for the rare cases when the software and/or the shadow impact module show unexpected behaviour.

## Abbreviations and terms

This manual uses the following abbreviations and terms:

Abbreviation	Meaning
PI	place of immission
LS	light sensor
SIM	shadow impact module
WTG	wind turbine generator
SIU	shadow impact interface unit

Abbreviation	Meaning
CU	<p>central unit</p> <p>The central unit comes installed in a switch cabinet. The CU is installed in the tower base of a WTG. Depending on the tower type, the switch cabinet can either be installed to the ground using a support foot or fastened directly to the tower wall.</p> <p><b>Functions of the CU:</b></p> <ul style="list-style-type: none"> <li>• calculates shadow impact periods at buildings to be protected</li> <li>• retrieves light sensor data</li> <li>• communicates with wind turbine generators (WTG)</li> <li>• stops the relevant WTG when the shadow impact limit has been exceeded</li> <li>• automatically shuts down WTGs according to specified time periods and meteorological conditions (protection of bats)</li> <li>• records all shadow impact and WTG shutdown events</li> </ul>

### Navigational aids

If you read this manual on-screen, numerous cross references (hyperlinks) are available to quickly navigate to a related paragraph providing further information. Hyperlinks are indicated with a red arrow →.

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## 2 Introduction

Thank you for purchasing our **Shadow Manager** software.

### Purpose of the software

Software for the configuration of shadow impact modules according to project-specific requirements.

Apart from the project data of the WTGs, you also have to define walls and areas of affected places of immission (PI) and often additional parameters.



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

### 2.1 Requirements for using Shadow Manager

In order to use Shadow Manager for the configuration of your shadow impact module (SIM) on a computer, the following technical requirements must be met:

SIM	SWM V 3.5
Computer	OS Microsoft® Windows XP® or later 64 MB RAM minimum 30 MB free hard disk memory minimum
Connection	The data must be read out using a network connection (TCP/IP), see ➔ 2.3 Preparing the shadow impact module on page 8.
Shadow Manager	You can download the latest version of Shadow Manager from our homepage ( <a href="http://www.northtec.de">www.northtec.de</a> ). Each time you start Shadow Manager, the software automatically checks if a new software version is available. If there is, it downloads and installs the latest version. In the <b>Help</b> menu you can search for updates manually at any time.
Product key	In order to configure an SIM using Shadow Manager, you have to purchase a product key from us. If you want to use Shadow Manager to configure several SIMs, you need a separate product key for each SIM (or for each project in Shadow Manager). We usually send the product key via email, and you save it to your computer.

## 2.2 Preparing the communication with the SIM

Before you can use Shadow Manager to configure shadow impact modules, you have to carry out the following steps:

### **Install Shadow Manager**

Double-click on the installation file **Setup Shadow Manager** you have received via email or downloaded from our server and follow the instructions on the screen.

After a few seconds, the installation procedure will be completed and Shadow Manager is ready for use.

### **Set up Ethernet/LAN communication in Windows**

You will find the IP settings of the shadow impact module on the **label attached to the inside of the cabinet door**. If there is no label, the SIM uses the default settings (IP address 192.168.002.060, subnet mask 255.255.255.000).

If you want to connect your computer directly to the shadow impact module using a network cable, check the TCP/IP settings (Windows Vista© or later versions: TCP/IPv4) of your computer: the first three sets of digits of the IP address have to be the same as the first three sets of digits of the SIM IP address whereas the last set of digits (060 in the example above) must not be identical.

For information on changing the settings, please refer to the Windows© help (search for TCP/IP settings or respectively TCP/IPv4 settings).

**Note:** If you are not sure whether the IP information on the inside of SIM cabinet door is still up-to-date, you can also check this information directly on the SIM. To do this, open menu 2.8.2 on the SIM display.

### **Set up Shadow Manager**

Double-click the **Shadow Manager** icon on your desktop to start the software.

Select **Configuration > Language** to change the display language to English.

1. To load a product key, open the **Licenses** window from the **Help** menu and click on **Add license**.
2. Now select the valid product key from the folder to which you saved the license key received from us via email. Then click on **Open**, and the selected product key will be added to the list shown in the **Licenses** window. Close the **Licenses** window.
3. Select **Configuration > SIM connection**.
4. Enter the data for communication with the SIM. Click on **OK**.

For more information on the **SIM connection** window, see [➔ 4.1 SIM connection window](#).

The software is now ready to communicate with the SIM.

## 2.3 Preparing the shadow impact module

In order to transmit the configuration data from the software to the SIM and vice versa, you must set up a network connection between the computer and the SIM. There are two ways to do this:

- direct connection between computer and SIM via crossed Ethernet cable
- connection via router and VPN connection

**Note:** If the SIM is connected to the network of a wind park, you have to adjust the TCP/IP settings of the SIM to the range of IP addresses of the wind park network. The SIM cannot obtain IP addresses from a router automatically.



### Set up the connection using an Ethernet cable

Use a crossed Ethernet cable to connect the **Ethernet port of the SIM** to the **Ethernet port of your computer**.



Only **qualified personnel** is allowed to open the cabinet of the Shadow Impact Module (SIM).

The high voltage present inside the SIM cabinet may cause **serious injury or even death!**



You can test the LAN connection using the PING command in Windows.

## 2.4 Overview of menus and features

The menus **File**, **View**, **Configuration** and **Help** are available in the upper left of the Shadow Manager main window.

The following tables provide an overview of the individual configuration and information windows available in the menus.

Many windows can be opened directly by clicking on the respective icon in the main window.

The menus can be opened using shortcuts. Just press Alt + first letter of the menu name (e. g. Alt + F to open the **File** menu).

### File menu

When using the functions of the **File** menu, please follow the instructions on the screen.

Icon	Window	Description
	<b>New project</b>	Create a new project.
	<b>Open project</b>	Open an existing project.
	<b>Save project</b>	Save a project.
	<b>Print</b>	Print a project – you can export the project data as PDF or print it on paper. Before printing, you can select the language from German or English and then decide whether you want to print all data or only selected parts by checking or unchecking the respective boxes.
	<b>Export</b>	Export the project to Google Earth – so far, this feature is available only if the Gauss-Krüger coordinate system is used. For further information, please contact NorthTec GmbH directly.
	<b>Send configuration</b>	Send the configuration data of a project to an SIM: after you have created or edited a project, you must send the project data to the SIM. Otherwise the data will not be applied.
	<b>Read out configuration</b>	Read out a project's configuration data: if you want to edit or complement data already in use by the SIM, you first have to read out the data from the SIM.
	<b>End</b>	Exit Shadow Manager.

## View menu

The following table provides an overview of the **View** menu.

For a detailed description of the individual configuration windows, please refer to [→ 3 The configuration windows](#).

Icon	Window	Description
	<b>Project data</b>	Edit and view project-specific information on site, commissioning, customer etc., see section <a href="#">→ 3.1</a> .
	<b>Places of immission</b>	Edit and view the areas/wall possibly affected by shadow impact, see section <a href="#">→ 3.2</a> .
	<b>Wind turbine generators</b>	Edit and view the data of a WTG whose shadow impact is to be determined, see section <a href="#">→ 3.3</a> .
	<b>Combinations</b>	This is where WTGs can be combined with places of immission (PI), see section <a href="#">→ 3.4</a> .
	<b>Overview map</b>	Verify the position of WTGs and PIs, see section <a href="#">→ 3.5</a> .
	<b>Data interface configuration</b>	Define various analogue and digital input signals, see section <a href="#">→ 3.6</a> .
	<b>Switching conditions</b>	Define shutdown conditions – used for example to meet official requirements regarding bat protection, see section <a href="#">→ 3.7</a> .
	<b>Time slice shutdown</b>	Used for bat protection: divide the night into time periods and define individual shutdown conditions for each period, see section <a href="#">→ 3.8</a> .
	<b>Shutdown calendar</b>	Calendar for scheduling fixed shutdown times, see section <a href="#">→ 3.9</a> .
	<b>Module state</b>	Read out real-time data from the SIM and test stop and start commands for WTGs, see section <a href="#">→ 3.10</a> .

## Configuration menu

Icon	Window	Description
	<b>SIM connection</b>	Used to set up a connection to the SIM. For further information on this window, please refer to → 2.2 Preparing the communication with the SIM.
	<b>Communication</b>	This window is used only if the wind turbine generators to be monitored are part of a wind park and if there is a park server. For further information on this window, please refer to → 4.3 Communication window.
	<b>Light sensor</b>	This window can be used to configure, read in or read out the data for setting up a connection to a light sensor. Up to 20 light sensors can be configured. For further information on this window, please refer to → 4.4 Light sensor window.
	<b>Walls and areas</b>	In this window, you may limit the length of walls and area sides. By configuring this parameter you can avoid defining a wall or areas that are much larger than the actual wall/area. Defining walls/areas that are too large can result in unnecessary shutdowns of WTGs. For further information on this window, please refer to → 4.5 Walls and areas window.
	<b>Module state</b>	Set the cycle at which the data in the two tabs of the <b>Module State</b> window are queried. For further information on this window, please refer to → 4.6 Module State window.
	<b>Language</b>	Here you can select a language: either German or English.

## Help menu

Icon	Window	Description
	<b>NorthTec homepage</b>	Open the NorthTec homepage.
	<b>Licenses</b>	Add und remove von licenses.
	<b>Check for updates</b>	If you select this menu item, the software will carry out an online check for updates of Shadow Manager.
	<b>About Shadow Manager</b>	Displays information on the software version, information on NorthTec (phone number, address etc.) as well as information on the operating system used.

## 2.5 Overview of the configuration procedure

After you have carried out all preliminary steps on the computer, in the software and on the SIM, you can start the actual configuration procedure.

### Create or open a project

- To create a new project, click on  (in the **File** menu or in the icon bar).
- OR
- To open an existing project, click on  (**Open project** in the **File** menu or in the icon bar) and select a configuration file (format: .swk).

### Load a product key

In both cases, you may have to select a product key belonging to the project from a drop-down list.

If you want to use Shadow Manager to configure several SIMs, you need a separate product key for each SIM (or for each project in Shadow Manager). For information on how to load a product key, please refer to  2.4

Overview of menus and features.

### **Read out the data from the SIM**

If you are not sure whether the data contained in an existing project file (.swk) match the data saved in the SIM, read out the data from the SIM (choose **File > Read out configuration**) to be on the safe side.

Even if you have created a new project and you have not yet configured any data in the SIM, we recommend you read out the data from the SIM. This saves you from having to configure the data in the windows **Communication** and **Light sensor** from scratch.

### **Edit the configuration windows**

After you have created or opened a project you can edit, check or change the configuration data in the individual configuration windows as desired.

For detailed information on the configuration options in the individual windows, please refer to the respective sections in [→ Chapter 3 The configuration windows](#).



Please note that due to technical reasons, Shadow Manager uses decimal commas instead of decimal points.

### **Preparing the communication with the light sensor**

To enable the SIM to communicate with the light sensor, you have to configure the parameters under **Configuration > Light sensor**.

For further information, please refer to [→ 4.4](#)

Light sensor window.

### **Preparing the communication with the park server**

If the SIM is connected to the network of a wind park, you have to enter the TCP/IP settings of the wind park server under **Configuration > Communication**. Ask the WTG manufacturer for the required data (IP address, subnet mask, standard gateway).

For further information, please refer to [➔ 4.3 Communication window](#).

### **Send configuration to the SIM**

To apply the settings configured within Shadow Manager, you have to send the data to the SIM.

To send a configuration to the SIM, click on  or choose **File > Send configuration**. Then enter the 4-digit SIM password in the **Password prompt** window. If a password has not been set, enter the default password 0000.

Now Shadow Manager will send your configuration data to the SIM. You will receive a transmission protocol showing the data transmitted to the SIM.



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

### 3 The configuration windows

To configure the SIM using Shadow Manager you edit parameters within configuration windows. The configuration windows can be opened either from the **View** menu or by clicking the respective button in the icon bar. On the following pages, you will find a detailed description of the individual configuration windows.

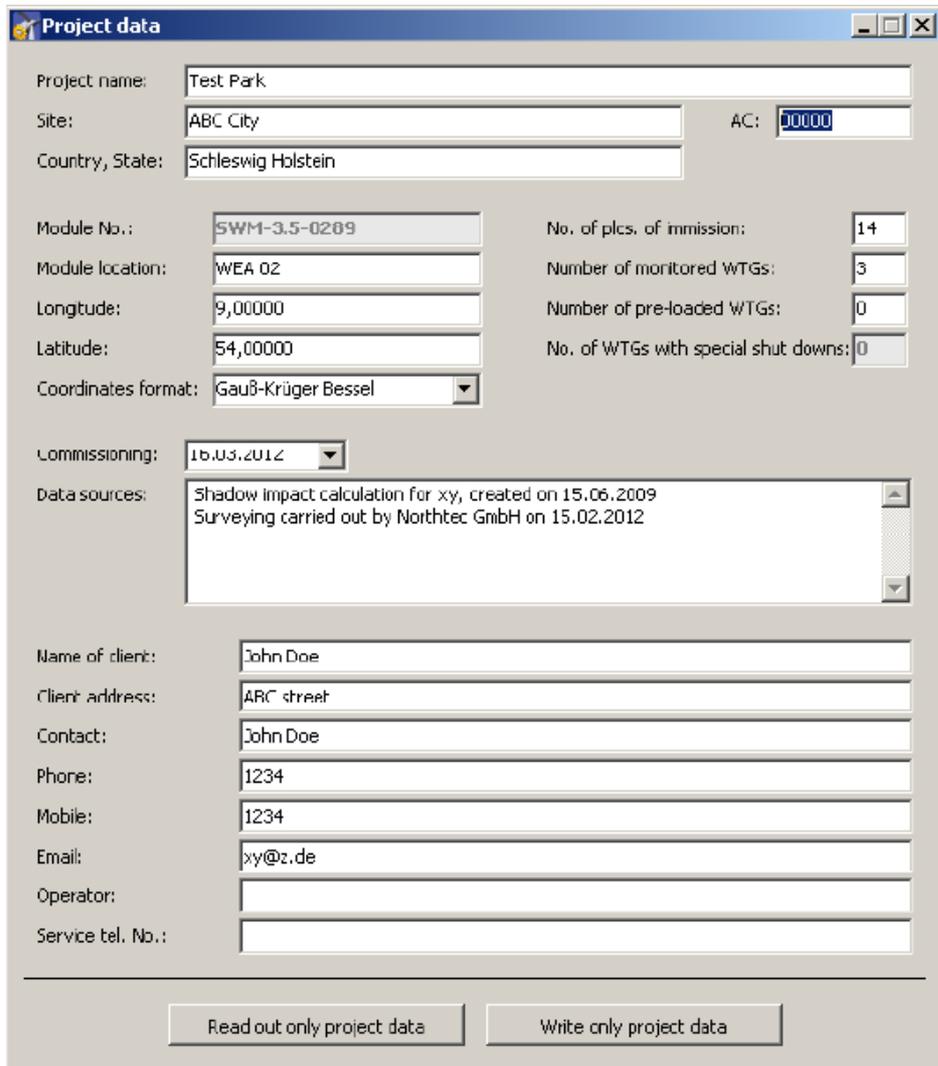


Please note that due to technical reasons, Shadow Manager uses decimal commas instead of decimal points.

#### 3.1 Project data window

To open this window, click on  or choose **View > Project data**.

This window is used to edit and display project-specific information, such as site, commissioning, customer etc.



**Project data**

Project name: Test Park

Site: ABC City AC: 00000

Country, State: Schleswig Holstein

Module No.: SWM-3.5-0209 No. of plcs. of immission: 14

Module location: WEA 02 Number of monitored WTGs: 3

Longitude: 9,00000 Number of pre-loaded WTGs: 0

Latitude: 54,00000 No. of WTGs with special shut downs: 0

Coordinates format: Gauß-Krüger Bessel

Commissioning: 1b.03.2012

Data sources: Shadow impact calculation for xy, created on 15.06.2009  
Surveying carried out by Northtec GmbH on 15.02.2012

Name of client: John Doe

Client address: ABC street

Contact: John Doe

Phone: 1234

Mobile: 1234

Email: xy@z.de

Operator:

Service tel. No.:

Read out only project data Write only project data

**general information**

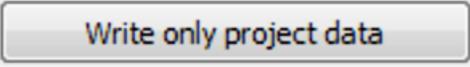
**details on site, scope, etc.**

**contact information**

Fig.: Project data window

The Project data window offers the following information and setting options.

Project data window	
<b>Project name</b>	Enter any characters.
<b>Site</b>	Enter any characters.
<b>AC</b>	Area code, enter any characters.
<b>Country, state:</b>	Enter any characters.
<b>Module number</b>	This number is read out from the SIM and cannot be changed manually.
<b>Module location</b>	<p>The function of the <b>Module location</b> item is relevant only for generator type 108. For all other generator types, this parameter is only for information.</p> <p>The shadow impact interface units (SIIU) used for generator type 108 have a digital output which is connected to the respective control of the WTG in order to transmit alarm messages. This way, the SIIUs can actively signal an alarm. In addition, the WTG control is enabled to detect a failed SIIU since under normal conditions, the operating status of the SIIU is "active".</p> <p>In addition, the central unit (CU) can also output an alarm message via the SIIU, e. g. when a light sensor has failed. This only works, if the SIIU used is installed in the same WTG as the central unit itself. To enable the central unit to identify this SIIU, you must configure the module location according to the ID number of the WTG in which the central unit is installed. ID number refers to the number indicated on the outside of the tower. The central unit will find this ID number in the settings of the WTG and can allocate the associated SIIU.</p>
<b>Longitude</b>	It is possible to enter this information in Shadow Manager. However, in order to ensure accuracy, you should read out the data from the light sensor. Inaccurate data may result in major calculation inaccuracies.
<b>Latitude</b>	as above
<b>Coordinates format</b>	Read only: The coordinate's format refers to the PI and WTG.
<b>No. of plcs. of immission</b>	Number of places of immission configured within this project.
<b>Number of monitored WTGs</b>	Number of WTGs monitored by the SIM.
<b>Number of pre-loaded WTGs</b>	Here you can enter the number of pre-loaded WTGs.
<b>Number of WTGs with special shutdowns</b>	This field indicates the number of WTGs for which it is possible to set up a "special shut down".

Project data window	
<b>Commissioning</b>	Here you can enter the date on which the SIM was commissioned.
<b>Data sources</b>	Here you can enter a range of different information for individual purposes or for the authorities.
<b>Name of client</b>	Enter any text.
<b>Client address</b>	Enter any text.
<b>Contact</b>	Enter any text.
<b>Phone</b>	Enter any number.
<b>Mobile</b>	Enter any number.
<b>Email</b>	johndoe@dummy.xx
<b>Operator</b>	Enter any text.
<b>Service tel. No.</b>	Here you can enter e.g. the phone number of the operator or the hotline number of the manufacturer.
	Click this button if instead of reading out the entire project from the SIM you want to read out only the <b>Project data</b> .
	Click this button if instead of sending the entire project to the SIM you want to send only the <b>Project data</b> .

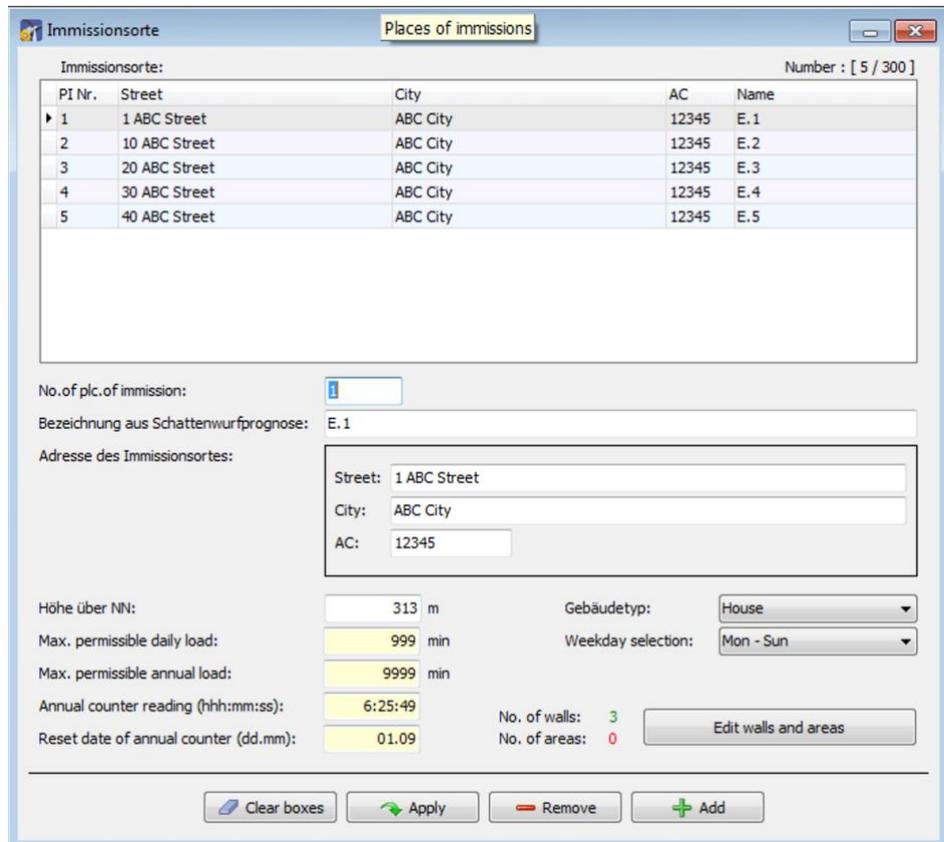


**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

### 3.2 Places of immission (IO) window

To open this window, click on  or choose **View > Places of immission**.

This window is used to edit and display project-specific information, such as site, commissioning, customer etc.



The screenshot shows a software window titled 'Immissionsorte' with a sub-header 'Places of immissions'. It contains a table with 5 rows of PI data. Below the table are several input fields and buttons. Annotations on the right side of the image point to different parts of the window:

- list of PIs (display area)**: Points to the table listing PIs.
- data of the PI selected above (input area)**: Points to the input fields for a selected PI.
- buttons**: Points to the 'Clear boxes', 'Apply', 'Remove', and 'Add' buttons at the bottom.

PI Nr.	Street	City	AC	Name
1	1 ABC Street	ABC City	12345	E.1
2	10 ABC Street	ABC City	12345	E.2
3	20 ABC Street	ABC City	12345	E.3
4	30 ABC Street	ABC City	12345	E.4
5	40 ABC Street	ABC City	12345	E.5

Input fields for selected PI (PI 1):

- No. of plc. of immission:
- Bezeichnung aus Schattenwurfprognose:
- Adresse des Immissionsortes:
  - Street:
  - City:
  - AC:
- Höhe über NN:  m
- Gebäudetyp:
- Max. permissible daily load:  min
- Weekday selection:
- Max. permissible annual load:  min
- Annual counter reading (hh:mm:ss):
- Reset date of annual counter (dd.mm):
- No. of walls:
- No. of areas:
- 

Buttons:

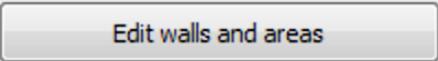
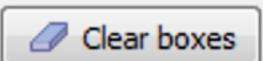
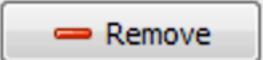
Fig.: Places of immission (IO) window

The upper part of the screen lists the PIs already created. The information "14/300" in the upper-right corner of the screen means that 14 of 300 possible PIs have been created so far.

The lower part of the screen is used to create or edit PIs. In addition, there are 6 buttons available.

The Places of immission window offers the following information and setting options.

Places of immission window	
<b>No. of plc. of immission</b>	Serial number of the PI. Up to 300 PIs can be configured.
<b>Name from shadow impact forecast</b>	Name of the PI as used in a shadow impact forecast which may have been created.
<b>Address of pl. of immission</b>	Exact address of the PI (street name, city, area code)
<b>Height abv. SL</b>	Height above sea level in meters

Places of immission window	
<b>Max. permissible daily load</b>	Maximum daily load in minutes as specified by the authorities.
<b>Max. permissible annual load</b>	Maximum annual load in minutes as specified by the authorities.
<b>Annual counter reading (hh:mm:ss)</b>	<p>This is the total period over which the selected PI has been loaded with shadow impact over the present year under consideration.</p> <p><b>IMPORTANT:</b> We strongly recommend you read out the annual counter <b>before</b> you make changes. Otherwise the preload used after sending the project file to the SIM may be incorrect.</p>
<b>Reset date of annual counter (dd:mm)</b>	<p>As the "shadow impact year" is not necessarily the same as the calendar year, you can set a different date here.</p> <p><b>Note:</b> When exchanging the hardware (SIM), proceed as follows: first read out this value from the SIM to Shadow Manager; after the new SIM has been installed, read out the value from Shadow Manager to the SIM.</p>
<b>Building type</b>	Drop-down list offering the following selection: House, Commercial, Stable, Church or Open area.
<b>Weekday selection</b>	<p>Drop-down list offering the following selection: <b>Mon-Sun, Mon-Sat, Mon-Fri, Sat+Sun</b></p> <p>Example: For a commercially used building for example, you may choose <b>Mon-Fri</b>, for a house used as a weekend cottage, you may choose <b>Sat+Sun</b>.</p>
<b>No. of walls</b>	This field indicates only the number of walls. For creating or editing a wall you use the <b>Edit walls and areas</b> window.
<b>No. of areas</b>	as above
	Please refer to "Edit walls and areas" below.
	Deletes the data you entered in the free text field of the selected PI.
	<p>Applies the entered data.</p> <p><b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>
	Deletes the PI selected in the list. <b>Attention:</b> If you click this button, the PI will be deleted immediately. There is no confirmation prompt.
	Used to add a new PI number. Up to 300 PIs can be configured.

## Edit walls and areas window

To open this window, select a PI from the list of PIs in the **Places of immission** window and then click on **Edit walls and areas**.

In the **Edit walls and areas** window, you can edit or create walls and areas for an existing PI.

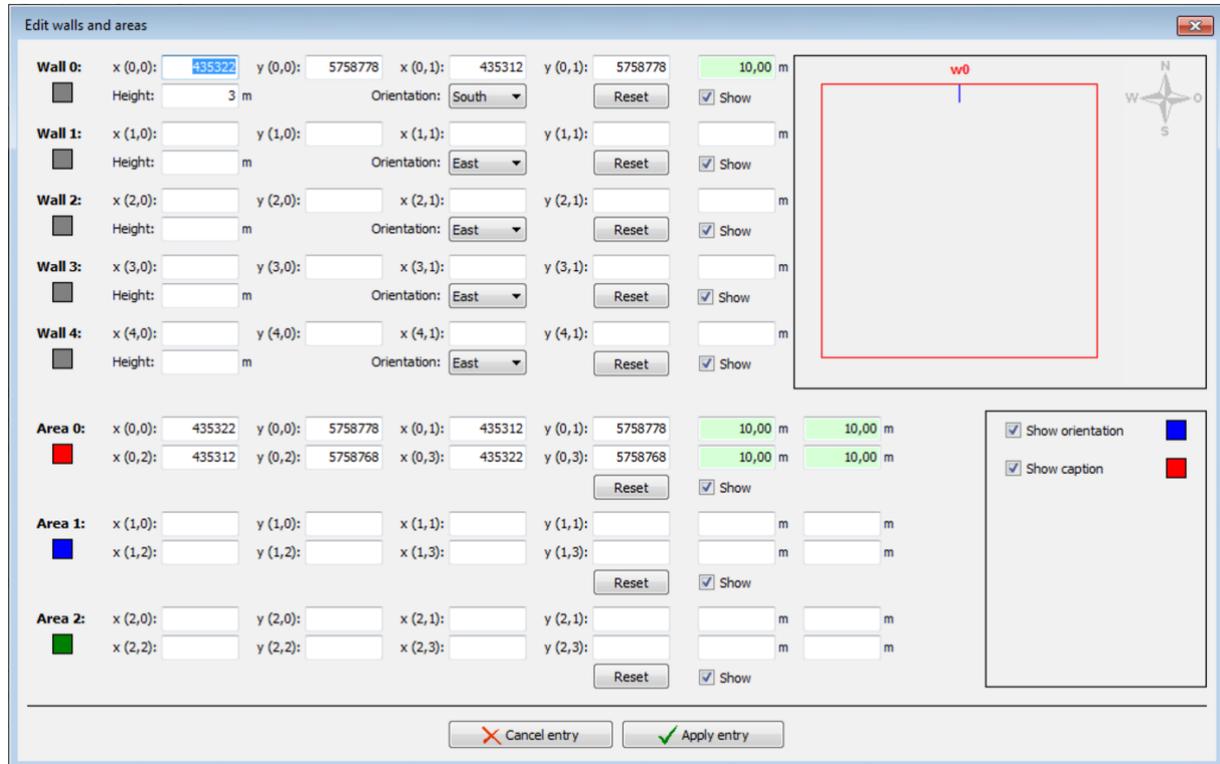


Fig.: **Edit walls and areas** window (section)

### Example of a defined wall

- Wall 0 in the example above is defined by Gauss-Krüger coordinates [(x 0.0)/(y 0.0) and (x 0.1)/(y 0.1)] and by **Height** in meters (**3 m in this case**).
- The value shaded in green is the result of the defined coordinates and indicates that the length of the wall is 10 m.
- Since the **Show** box for this wall and the Show orientation box (right edge of screen) are checked, wall 0 (**w0**) is indicated in the upper right corner by a blue line.
- Since the orientation of the wall was set to **South**, the blue line is below the wall (southern orientation).

### Example of a defined area

- Area 0 in the example above is defined by Gauss-Krüger coordinates [(x 0.0)/(y 0.0), (x 0.1)/(y 0.1), (x 0.2)/(y 0.2) and (x 0.3)/(y 0.3)].
- The values shaded in green on the right are the result of the defined coordinates. They indicate that each of the four sides of the area is 10 m long.
- Because the **Show** box is selected, the area shows in the upper right as a red square.



### Important notes for defining walls and areas

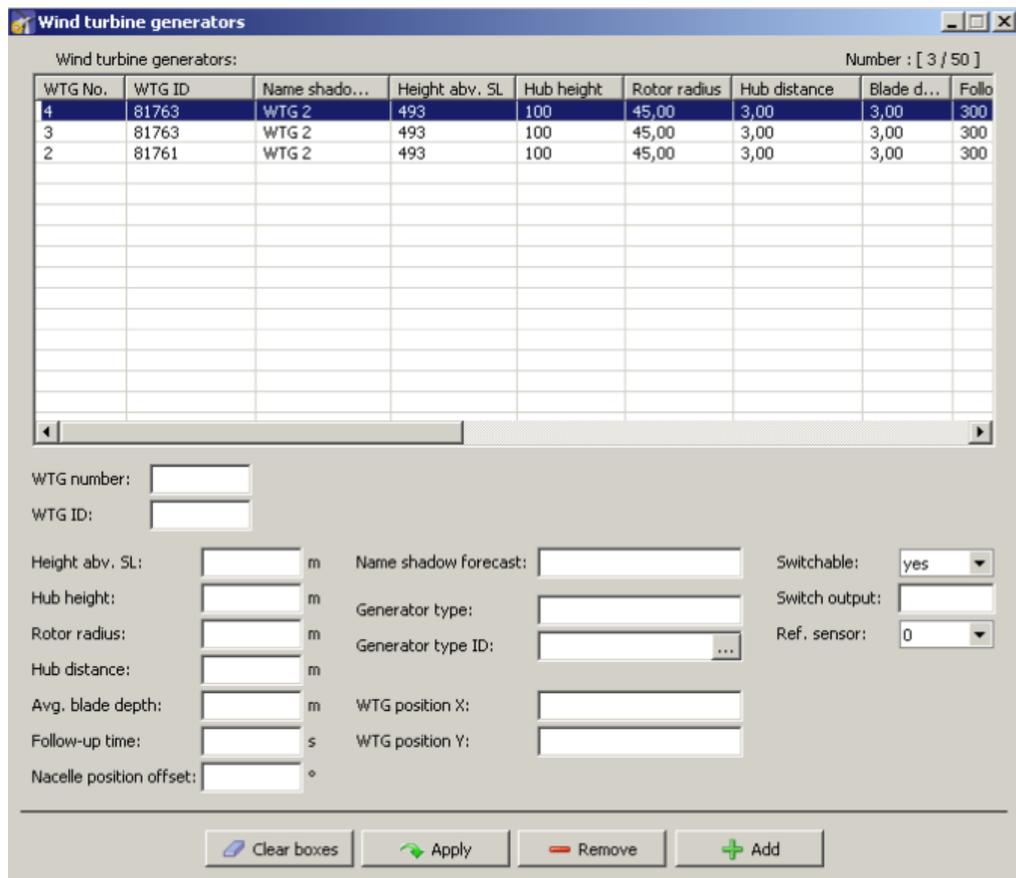
- The points defining area must be entered **clockwise**: by no means should they be entered in a criss-cross manner.
- The blue line in the field displaying walls and areas in the upper-right of the screen indicates the outside of a wall.
- If the parameter defining a wall or an area in meters (the field to the right of the coordinates fields) is shaded in red (instead of green), then the entered values are not plausible or the maximum length of a wall or side of an area has been exceeded. Check whether you entered the coordinates correctly. The maximum length of a wall or of the sides of an area is set in the **Configuration** menu under **Walls and areas**. For further information, please refer to section → 4.5.
- Walls and areas you have edited or created will only be saved and applied if you click the **Apply entry** button.
- The coordinates of all WTGs and PIs must be defined using the same metric coordinate system.
- The **Reset** button can be used to delete an entire area or wall with one click.



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

### 3.3 Wind turbine generators (WTG) window

To open this window, click on  or choose **View > Wind turbine generators**. This window is used to edit and display each WTG.



**list of WTGs (display area)**

**data of the WTG selected above (input area)**

**buttons**

Fig.: Wind turbine generators window

The upper part of the screen lists the WTGs already created. The information "3/50" in the upper-right corner of the screen means that 3 of 50 possible WTGs have been created so far.

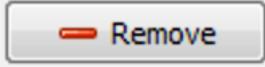
The lower part of the screen is used to create or edit WTGs. In addition, there are 4 buttons available.

The **Wind turbine generators** window offers the following information and setting options.

Wind turbine generators window	
<b>WTG number</b>	Freely definable number of the wind turbine generator
<b>WTG ID</b>	Unique ID number of the WTG as indicated on the outside of the tower. This is a mandatory field. The number entered in this field is used as the WTG name in the Shadow Impact Log.
<b>Height abv. SL</b>	WTG's height above sea level in meters
<b>Hub height</b>	WTG's hub height in meters
<b>Rotor radius</b>	Rotor radius in meters

Wind turbine generators window	
<b>Hub distance</b>	Distance between the hub and the centre of the tower in meters
<b>Avg. blade depth</b>	This parameter will be used in the future.
<b>Follow-up time</b>	The period of time in seconds during which a WTG after having been shut down by the SIM will not be started up even if the sky is clouding over.
<b>Nacelle position offset</b>	Difference between the nacelle position used by the park server and the actual position (orientation) in degrees.
<b>Name shadow forecast</b>	Name of the WTG as used in a shadow impact forecast which may have been created (reference only).
<b>Generator type</b>	<p>If shadow impact interface units (SIIU) are deployed, this parameter is used to obtain the right gear ratio for calculating the rotor speed. For this reason, it is important to adhere to the following notation:</p> <p>3.2M 3.4M GE 2.5-100 MM82 MM92</p> <p>If no SIIU is used, this is only for information.</p>
<b>Generator type ID</b>	<p>This parameter defines the way in which the shadow impact system can communicate with the WTG. The following is defined: method for transmitting start and stop commands to the WTG and the types of WTG operating data available for the shadow impact system.</p> <p>Some generator types do not transmit any operating data to the WTG. In this case the periods of shadow impact are calculated based on two assumptions: the rotor is always in a rectangular position to the direction of the sun's rays and the WTG is in permanent operation. The shadow impact periods determined by this method exceed the actual periods of shadow impact by 20-30 %.</p> <p>It is not possible to enter an ID that has not been pre-defined in the selection menu.</p> <p>The IDs <b>100, 101, 104, 106, 107, 109, 110, 111</b> as well as <b>113</b> through <b>118</b> are manufacturer-specific and serve special interfaces.</p> <p>The manufacturer-independent IDs have the following meaning:</p> <p><b>102</b></p> <p>The stop and start commands for the WTG are transmitted from the central unit (CU) to a light sensor. The light sensor (0-19) is selected under <b>Switch output</b>, see below.</p> <p>For this procedure, the light sensor's digital output must be connected to the control unit of the WTG using a coupling relay. Once the light sensor receives a stop command from the central unit, the digital output is activated. As soon as the stop command is cancelled, the digital output is reset. For this type of generator it is not possible to transmit WTG operating data to the shadow impact system.</p>

Wind turbine generators window	
	<p><b>103</b></p> <p>This generator type is selected if the preload caused by a WTG must be taken into account for the calculation. The shadow impact system can neither stop this WTG nor retrieve its operating data.</p> <p><b>105</b></p> <p>For this generator type, the central unit provides a floating relay contact (normally closed contact/normally open contact) for transmitting the stop and start commands to the WTG. If the shadow impact system monitors several WTGs of this type of, the digital signals have to be distributed via an park-internal optical waveguide (fibre optic cable) network.</p> <p>For this type of generator it is not possible to transmit WTG operating data to the shadow impact system.</p> <p><b>108</b></p> <p>This generator type is selected if a shadow impact interface unit (SIIU) is used to transmit the stop and start commands to the WTGs as well as to transmit the WTG operating data to the shadow impact system. The SIIU has 0-20 mA inputs for receiving data on nacelle position, current output, WTG gear or rotor speed as well as wind speed. This information is transmitted to the central unit using a network connection (TCP/IP) and taken into account for the calculation of the shadow impact periods. The start and stop commands are also transmitted using the network connection.</p> <p><b>112</b></p> <p>This generator type is selected if a shadow impact interface unit (SIIU) is used to transmit the stop and start commands to the WTGs. The start and stop commands are transmitted using the network connection (TCP/IP).</p> <p>For this type of generator it is not possible to transmit WTG operating data to the shadow impact system.</p>
<b>WTG position X</b> <b>WTG position Y</b>	<p>Coordinates of the WTG position.</p> <p><b>NOTE:</b> The coordinates of all WTGs and PIs must be defined using the same metric coordinate system.</p>
<b>Switchable</b>	<p>Drop-down list for selecting from: <b>no, yes</b></p> <p><b>NOTE: This parameter specifies whether it is possible for the SIM to switch (yes) the WTG or not (no).</b></p>
<b>Switch output</b>	<p>This parameter is relevant only for WTG types 102, 105 and 106.</p> <p>For WTG type 102 it specifies the light sensor to be used to switch the WTG. For WTG types 105 and 106 it specifies the digital output of the SIM to be used to switch the WTG.</p>
<b>Ref. sensor</b>	<p>Number of the light sensor whose measuring data are used by the SIM to determine whether a given WTG caused shadow impact or not. Reference sensors 0-19 can be defined. If this parameter is set to 99, then all light sensors will be taken into account as reference sensors.</p>
	Deletes the data you entered in the free text field of the selected WTG.
	<p>Applies the entered data.</p> <p><b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>

Wind turbine generators window	
	Deletes the WTG selected in the list. <b>Attention:</b> If you click this button, the WTG will be deleted immediately. There is no confirmation prompt.
	Used to add a new WTG No. Up to 50 WTGs can be configured.



### Important note on defining WTGs

- The coordinates used to define WTGs and PIs must be based on the **same metric coordinate system**.



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

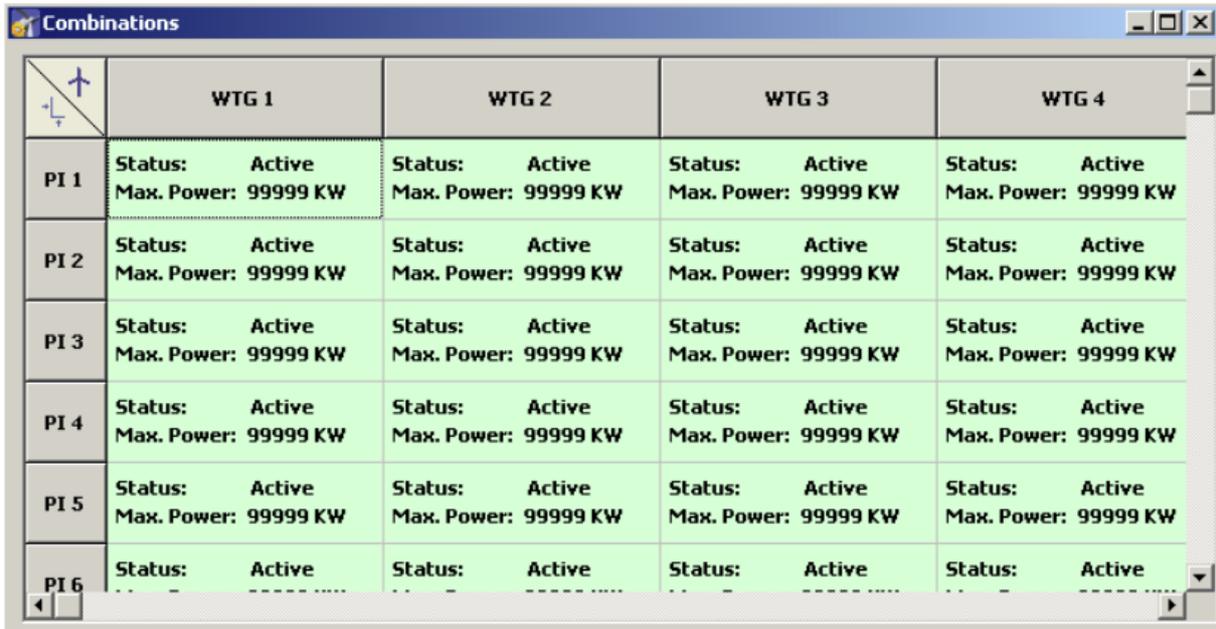
### 3.4 Combinations window

To open this window, click on  or choose **View > Combinations**.

To ensure that the shadow impact caused by a WTG will be related to a PI, the WTG and the PI must be combined with each other.

In the **Combinations** window, you can enable or disable any combination of any configured PI with any configured WTG. You can also specify a maximum power in KW for the respective combination.

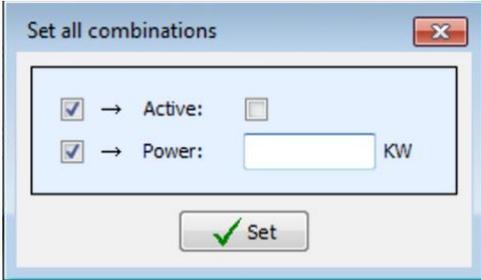
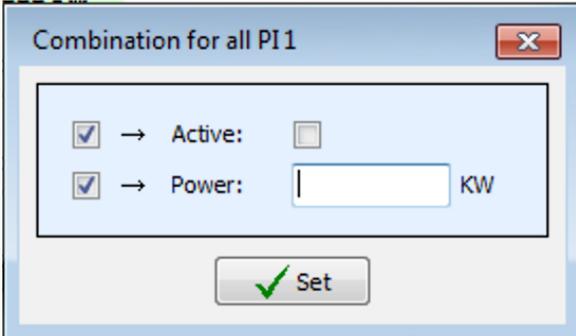
Upon configuration of WTGs and PIs, all combinations are set to **Active** by default. As a result, the SIM will assume that each WTG is able to cause shadow impact in each PI. However, if there is an obstacle between a WTG and a PI, the occurrence of real shadow impact is not possible in this place of immission. Nevertheless, the SIM will detect theoretical shadow impact. In order to avoid this, the corresponding combination should be deactivated.

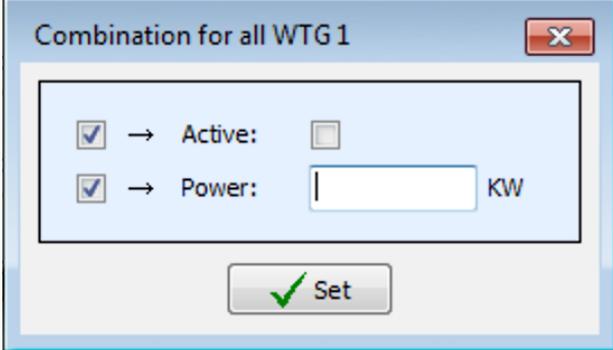
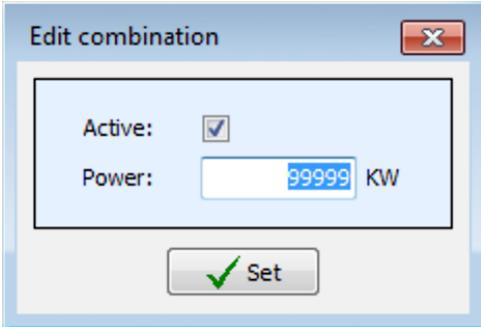


	WTG 1	WTG 2	WTG 3	WTG 4
PI 1	Status: Active Max. Power: 99999 KW			
PI 2	Status: Active Max. Power: 99999 KW			
PI 3	Status: Active Max. Power: 99999 KW			
PI 4	Status: Active Max. Power: 99999 KW			
PI 5	Status: Active Max. Power: 99999 KW			
PI 6	Status: Active Max. Power: 99999 KW			

Fig.: **Combinations** window

The **Combinations** window offers the following information and setting options.

<b>Combinations window</b>	
	<p><b>Edit all combinations at the same time</b></p> <p>If you click into the upper-left corner, the following window will be displayed:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;">  </div> <p>The two checkboxes on the left are used to define whether the parameter on the right should be changed or not.</p> <p>The checkbox to the right of <b>Active</b> is used to enable or disable combinations.</p> <p>The input field to the right of <b>Power</b> is used to define a power output limit in KW. If the power output of a WTG falls below this limit, the WTG will be shut down when it causes shadow impact even though the time limit at the PI may not have been exceeded yet. This way, you can avoid that a WTG currently producing low power output "eats up" the daily or yearly budget unnecessarily. If you don't want the power output to be monitored, enter 99999 (default).</p> <p>In order to activate all combinations at once for example, make sure the checkbox to the left of <b>Active</b> is selected, and then select the checkbox to the right of <b>Active</b>.</p> <p>In order to specify a power output limit for all combinations in one step, make sure the checkbox to the left of <b>Power</b> is selected and then enter the desired KW value on the right.</p>
<div style="background-color: #e0e0e0; padding: 5px; border: 1px solid #ccc; display: inline-block;"> <b>PI 1</b> </div>	<p><b>Edit all combinations with one PI at the same time</b></p> <p>Click into a PI field (PI 1 to N) in the far-left column to open the following window:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;">  </div> <p>The parameters in this window are configured in the same ways as the ones in the <b>Set all combinations</b> window above, except they apply only to the selected PI.</p>

Combinations window	
<div style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc; margin-bottom: 10px; text-align: center; font-weight: bold;">WTG 1</div>	<p><b>Edit all combinations with one WTG at the same time</b></p> <p>Click into a WTG field (WTG 1 to N) in the uppermost line to open the following window:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;">  </div> <p>The parameters in this window are configured in the same way as the ones in the <b>Set all combinations</b> window above, except they apply only to the selected WTG.</p>
<div style="background-color: #e0ffe0; padding: 5px; border: 1px solid #ccc; margin-bottom: 10px;">             Status: Active              Max. Power: 99999 KW         </div>	<p><b>Edit a single combination (combination of one PI with one WTG)</b></p> <p>If you click on one of the fields shaded in green (or red), the following window will be displayed:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;">  </div> <p>Enable or disable the combination using the <b>Active</b> checkbox, and specify a power output limit (KW) in the <b>Power</b> field if so desired.</p>

### 3.5 Overview map window

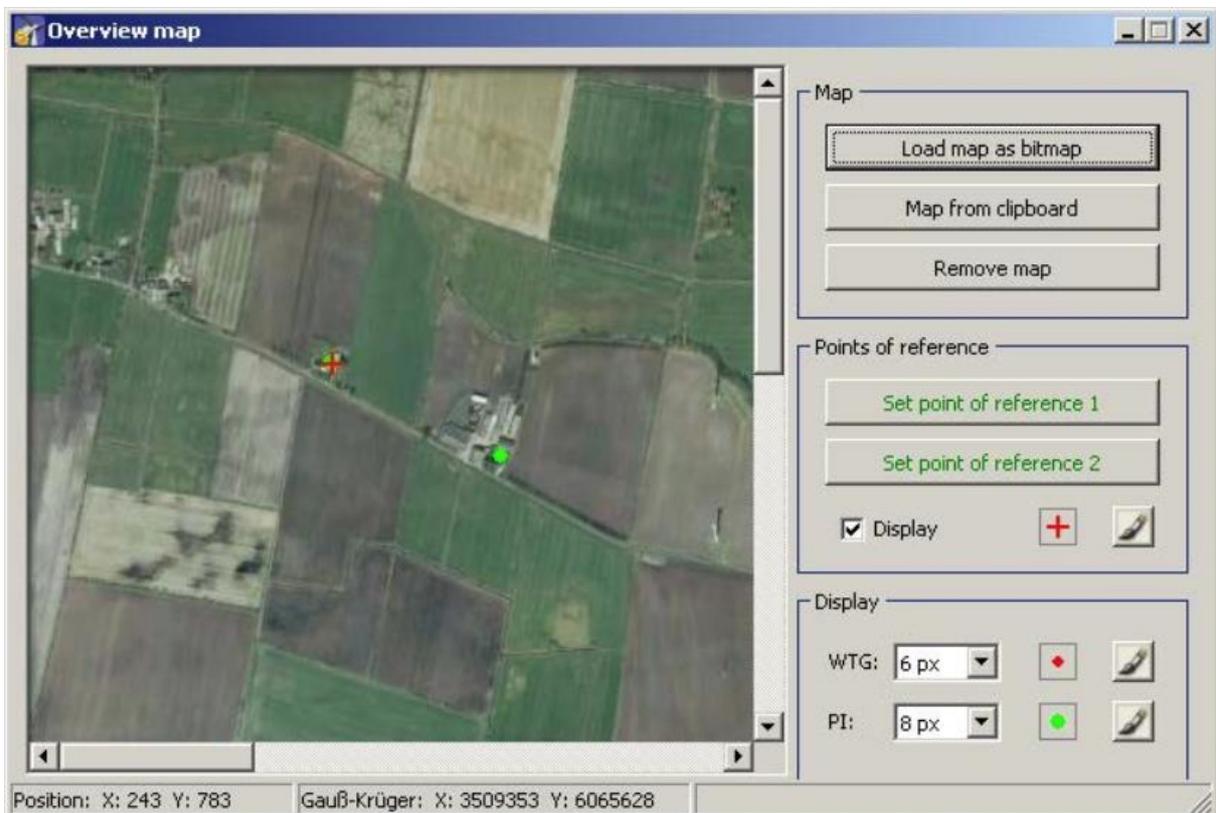
To open this window, click on  or choose **View > Overview map**.

In the **Overview map** window, you can import a map in order to visually check that you have defined the WTGs and PIs correctly.

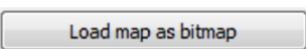
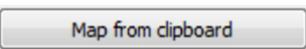
The left part of the window displays the WTGs and PIs you have defined in the respective configuration windows as well as the map (if you have imported one). In the right part of the window, you can load and remove a map (bitmap), define reference points and change the display settings for the WTGs and PIs.

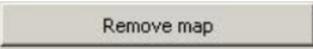
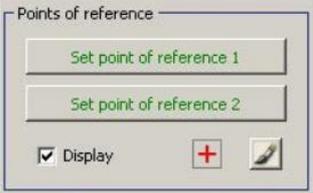
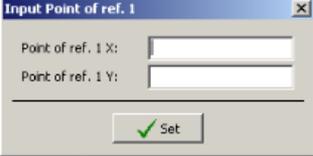
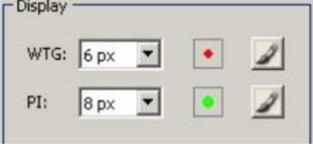


**Loading a background map and setting reference points works only if the Gauss-Krüger coordinate system is used.**



The **Overview map** window offers the following options.

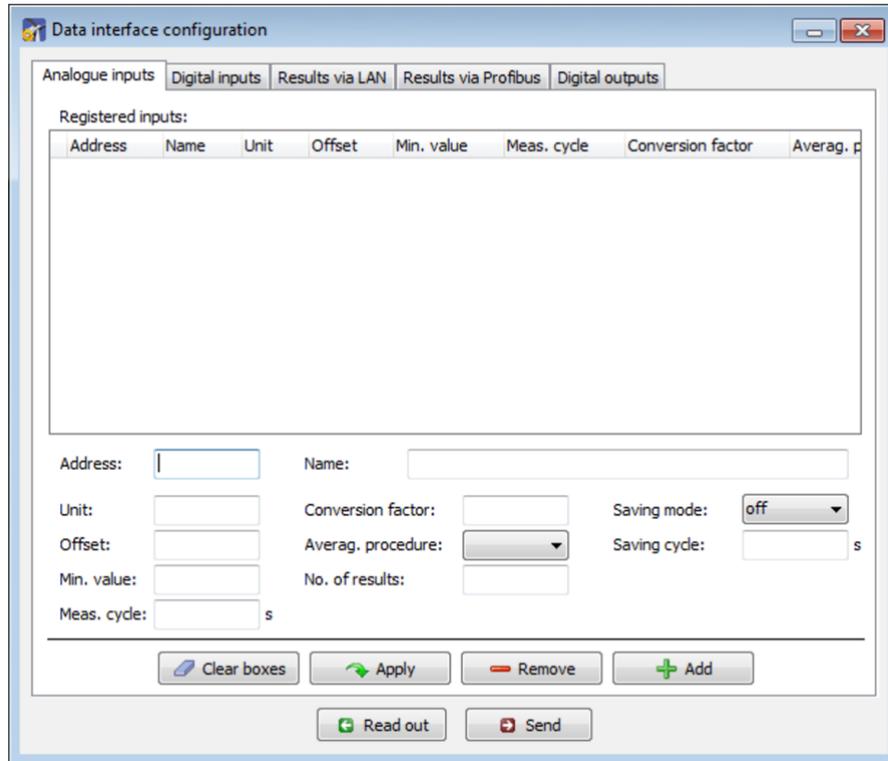
Overview map window	
	Click this button to load a map to be displayed in the left part of the window. The format of the map must be bitmap.
	Click this button to paste a map from the clipboard. The format of the map must be bitmap.

Overview map window	
	<p>Click this button to remove the map.</p>
	<p>After a background map has been loaded, you must define points of reference within the map. Otherwise the WTGs and PIs may not be displayed in the correct place.</p> <p>To optimise the accuracy, the reference points should be as far apart from each other as possible.</p> <p>The reference points must be defined according to the Gauss-Krüger format.</p> <p>Click on <b>Set point of reference 1</b> to set the first reference point. The button will flash. Move the mouse pointer to the desired place in the map and click.</p> <p>For more information, see next line.</p>
	<p>A window will open in which you have to enter the Gauss-Krüger coordinates of the reference point. After you have entered the coordinates, click on <b>Set</b>. The entered coordinates are applied and the button name colour of <b>Set point of reference 1</b> switches from red to green. Repeat the above steps for second reference point.</p>
	<p>In the <b>Display</b> area on the right you can change the pixel size of the WTGs and PIs by clicking on the respective drop-down list to select a different value.</p> <p>To change the colours, click on the brush buttons on the right.</p>
<p><b>Position</b></p>	<p>The current position of the mouse pointer is displayed at the lower edge of the window.</p>
<p><b>Gauss-Krüger</b></p>	<p>The current position of the mouse pointer is displayed at the lower edge of the window in Gauss-Krüger coordinates.</p>

### 3.6 Data interface configuration window

To open this window, click on  or choose **View > Data interface configuration**.

The **Data interface configuration** window is used to define various analogue and digital signals.



list of inputs/signals (display area)

data of the inputs/signals selected above (input area)

buttons

This section of the manual is in progress. For details on configuring data interface, please contact NorthTec for now.

### 3.7 Switching conditions window

To open this window, click on  or choose **View > Switching conditions**.

The **Switching conditions** window is used to define conditions other than shadow impact as criteria for shutting down a WTG. Here you can for instance define the criterion of “wind speed” in order to comply with bat protection requirements.

The creation of switching conditions involves two steps:

- Creating condition blocks, e.g. date range, time, wind speed
- Combining created condition blocks with each other using AND or OR

Accordingly, the **Switching conditions** window comprises two tabs: **Condition blocks** and **Block combinations**.

On the next page, the **Condition blocks** tab is described first, followed by the **Block combinations** tab.

“Switching conditions” window, “Conditions blocks” tab

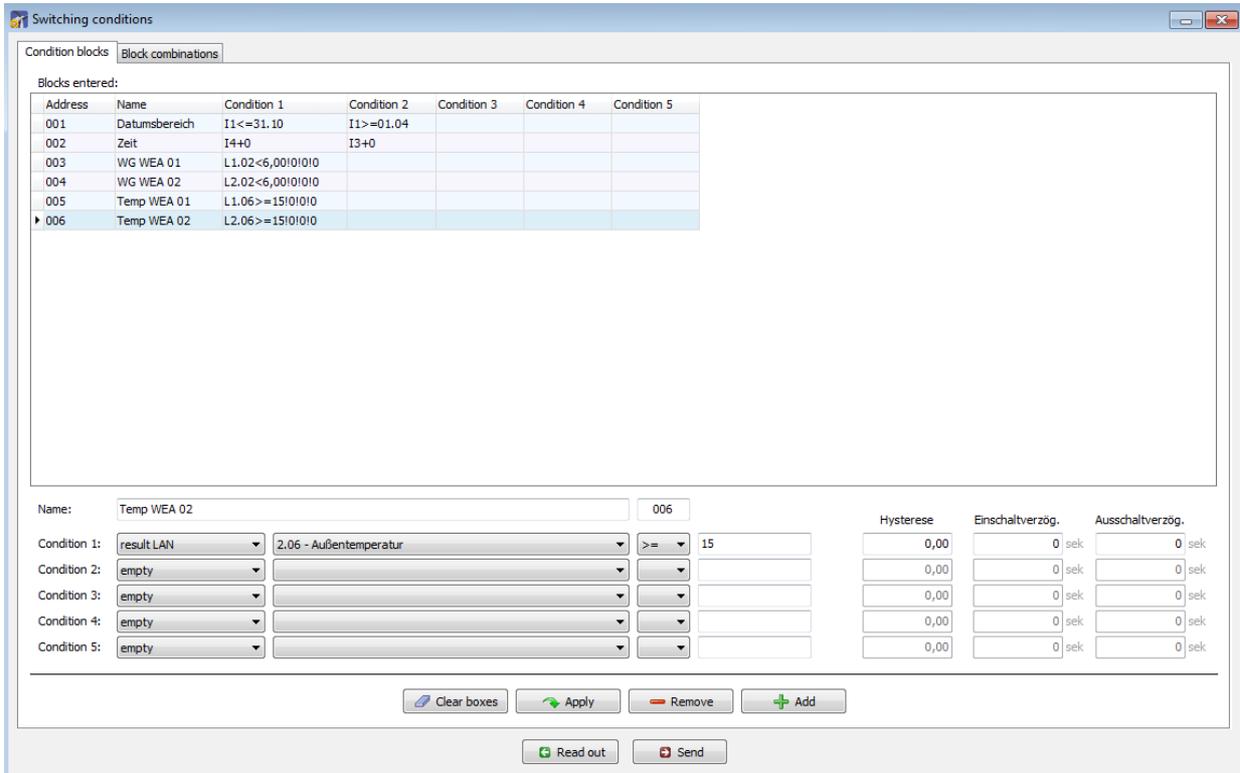


Fig.: Switching conditions window, Condition blocks tab

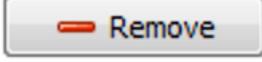
Notes on the above tab

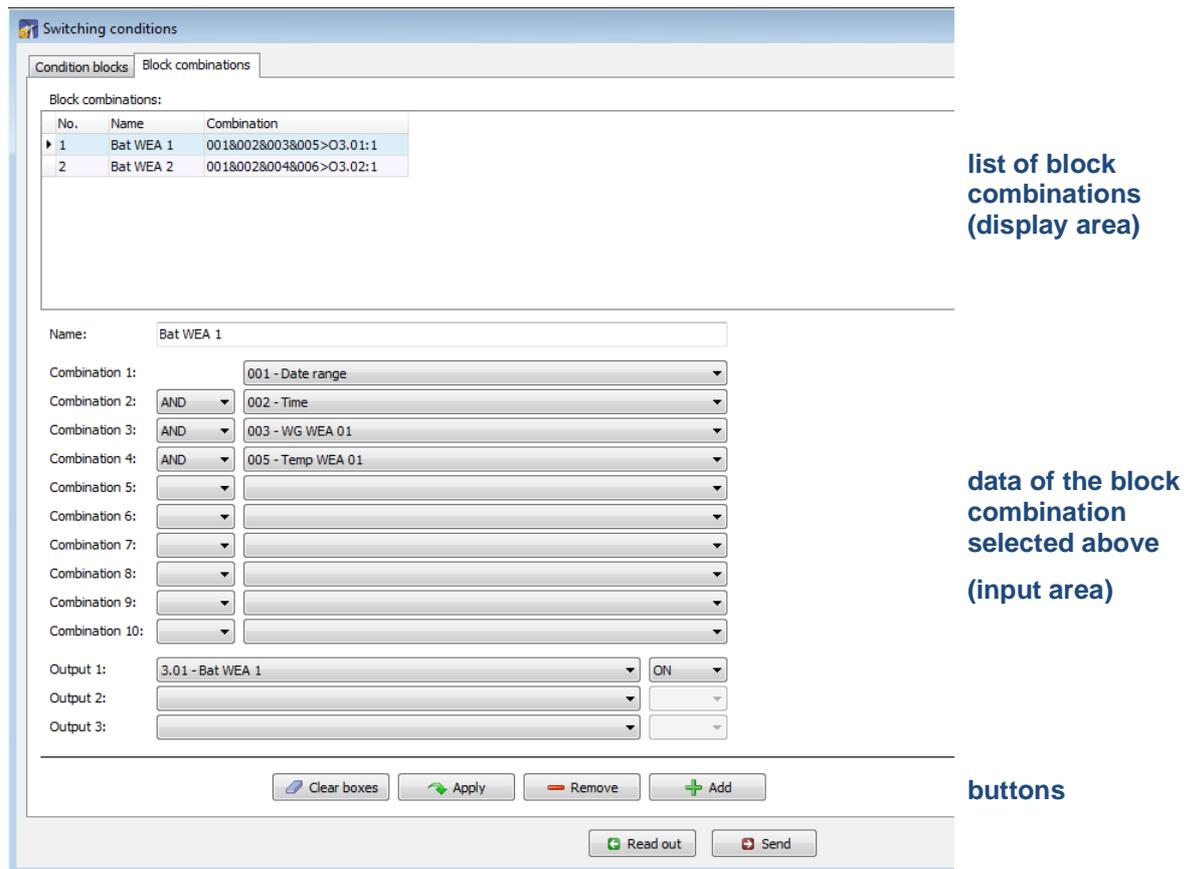
- In the upper half of the screen of the **Condition blocks** tab, blocks that have already been created are displayed in list form; editing is **not** possible here.
- In the lower half of the screen you can edit the block selected above or add a new block.

A more detailed explanation of the input fields and buttons can be found in the table on the next page.

The following input fields and buttons are available in the lower half of the **Condition blocks** tab of the **Switching conditions** window.

Switching conditions window, Condition blocks tab	
<b>Name</b>	Use the left-hand white field to enter a name (free text) for the condition block. Special characters cannot be entered. The right-hand white field displays a serial number that is generated automatically.
<b>Condition #</b>	<p>This line offers the following input and selection options (from left to right):</p> <p>Select one of the following interfaces from the first drop-down list: <b>module internal, digital input, analogue input, result LAN , result via Profibus.</b></p> <p>If you have selected <b>module internal</b>, the next drop-down list will offer the following criteria: <b>Date, Time, Sunrise, Sunset, Elevation angle, Azimuth.</b></p> <p>If you have selected <b>module internal</b>, choose an operator to be applied to the condition from drop-down list at the far right: = equal to, &gt; greater than, &lt; less than, &lt;&gt; unequal to, &gt;= greater than or equal to, &lt;= smaller than or equal to.</p> <p>Enter the value for the selected criterion in the respective format as follows:</p> <p><b>Date:</b> DD/MM (there is <b>no</b> period after the month)</p> <p><b>Time:</b> HH:MM:SS</p> <p><b>Sunrise:</b> Enter an integer to specify the minutes. Example: -60 causes a shutdown one hour before sunrise.</p> <p><b>Sunset:</b> Enter an integer to specify the minutes. Example: +60 causes a shutdown one hour after sunset</p> <p><b>Elevation angle:</b> in degrees</p> <p><b>Azimuth:</b> in degrees</p>
<b>Hysteresis</b>	<p>You can also define a hysteresis for each limit value.</p> <p>The hysteresis defines the desired permissible difference between the switching points for start-up or respectively shutdown.</p> <p>Example: <b>Wind speed</b></p> <p>To ensure that the WTG will not be switched too frequently during times when the readings are unstable (e.g. gusty winds), you can delay the response by specifying a hysteresis.</p> <p>Only positive values can be entered. The direction in which the hysteresis value works depends on whether the value refers to a "less than" or "greater than" condition.</p> <p>If a value of <b>6 m/s</b> with a hysteresis of <b>1 m/s</b> is set for wind speed, this has the following effect:</p> <p><i>The respective WTG is switched off if the wind speed falls below 6 m/s, but is started up again only if a wind speed of more than 7 m/s is measured.</i></p> <p><b>Input:</b> 0 to 100</p>

<p><b>Response delay</b></p>	<p>To ensure that the WTGs are not switched too frequently (high wear and tear) when conditions relating to wind speed or temperature are involved, you can specify here that the shutdown conditions need to be met <b>continuously</b> over a specific period of time before a WTG will actually be shut down.</p> <p><b>Example:</b> If 1800 seconds is entered here, then the respective WTG is shut down only after the wind speed measured has been below the defined limit value of, for example, 6 m/s continuously for half an hour.</p> <p><b>Input:</b> 0 to 3600 seconds</p>
<p><b>Release delay</b></p>	<p>To ensure that the WTGs are not switched too frequently (high wear and tear) when conditions relating to wind speed, precipitation or temperature are involved, you can specify here that the shutdown conditions <b>must NOT be present</b> for a specific period of time before a WTG is actually started up again after having been shut down due to a special shutdown.</p> <p><b>Example:</b> If 1800 seconds is entered here, then the respective WTG, after having been shut down due to a special shutdown, is started up again only after a wind speed of, for example, 6 m/s or more has been measured continuously for half an hour.</p> <p><b>Input:</b> 0 to 3600 seconds</p>
	<p>Deletes the values selected/entered in the lower part of the screen.</p>
	<p>Applies the entered/selected values. <b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>
	<p>Deletes the condition block selected in the list. <b>Attention:</b> If you click this button, the condition block will be deleted immediately. There is no confirmation prompt.</p>
	<p>Adds a new condition block. Up to 100 condition blocks can be configured.</p>
	<p>Reads out the switching condition from an SIM.</p>
	<p>Sends the switching conditions to an SIM.</p>



list of block combinations (display area)

data of the block combination selected above (input area)

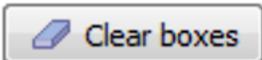
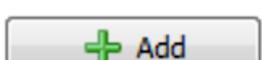
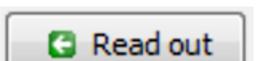
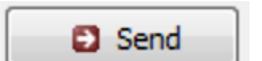
buttons

Fig.: Switching conditions window, Block combinations tab

The upper part of the **Block combinations** tab lists the block combinations already created. The lower part of the screen is used to create or edit block combinations. In addition, there are 6 buttons available.

The **Block combinations** tab of the **Switching conditions** window offers the following information and setting options.

Switching conditions window, Block combinations tab	
<b>Name</b>	Here you can enter a name (free text) for the block combination; special characters are allowed.
<b>Combination 1</b>	Here you select one of the condition blocks you have configured in the <b>Condition blocks</b> tab from the drop-down list.
<b>Combination 2 to N</b>	Select <b>And</b> or <b>Or</b> from the drop-down list on the left-hand side. Select one of the condition block configured before from the drop-down list on the right-hand side.

Switching conditions window, Block combinations tab	
<p><b>Output 1 to 3:</b></p>	<p>The shadow impact module recognises three types of digital outputs:</p> <p>X=1 Actuates the digital outputs 1–12 of the display relay board. The display relay board is an integral part of the central unit.</p> <p>X=2 Actuates the digital outputs 1–30 of an optional output board.</p> <p>X=3 This is selected to activate virtual outputs. Virtual outputs are used if the wind turbine generator is to be actuated by way of an interface (e. g. MODBUS/TCP). The second digit designates the number of the WTG.</p>
	<p>Deletes the values selected/entered in the lower part of the screen.</p>
	<p>Applies the entered/selected values. <b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>
	<p>Deletes the block combination selected in the list. <b>Attention:</b> If you click this button, the block combination will be deleted immediately. There is no confirmation prompt.</p>
	<p>Adds a new block combination. Up to 50 block combinations can be configured.</p>
	<p>Reads out the switching condition from an SIM.</p>
	<p>Sends the switching conditions to an SIM.</p>



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

### 3.8 Time slice shutdown window

Bat protection requirements can be so complex that different conditions apply in different time periods of the night. To meet such requirements, SM1 offers the possibility of dividing the night into time slices so that different shutdown conditions can be defined for each of these time slices.

The time slices and their respective shutdowns are defined in the **Time slice shutdown** window. To open this window, click on  or choose **View > Time slice shutdown**.

The **Time slice shutdown** window includes the following two tabs:

- **Time slices**  
This is where individual time slices and their respective limit values are configured.
- **Assignments**  
This is where time slices defined in the **Time slices** tab are assigned to the project's WTGs.

On the next page, the **Time slices** tab is described first, followed by the **Assignments** tab.

**Time slice shutdown window, Time slices tab**

Individual time slices and their respective limit values are configured in this tab.

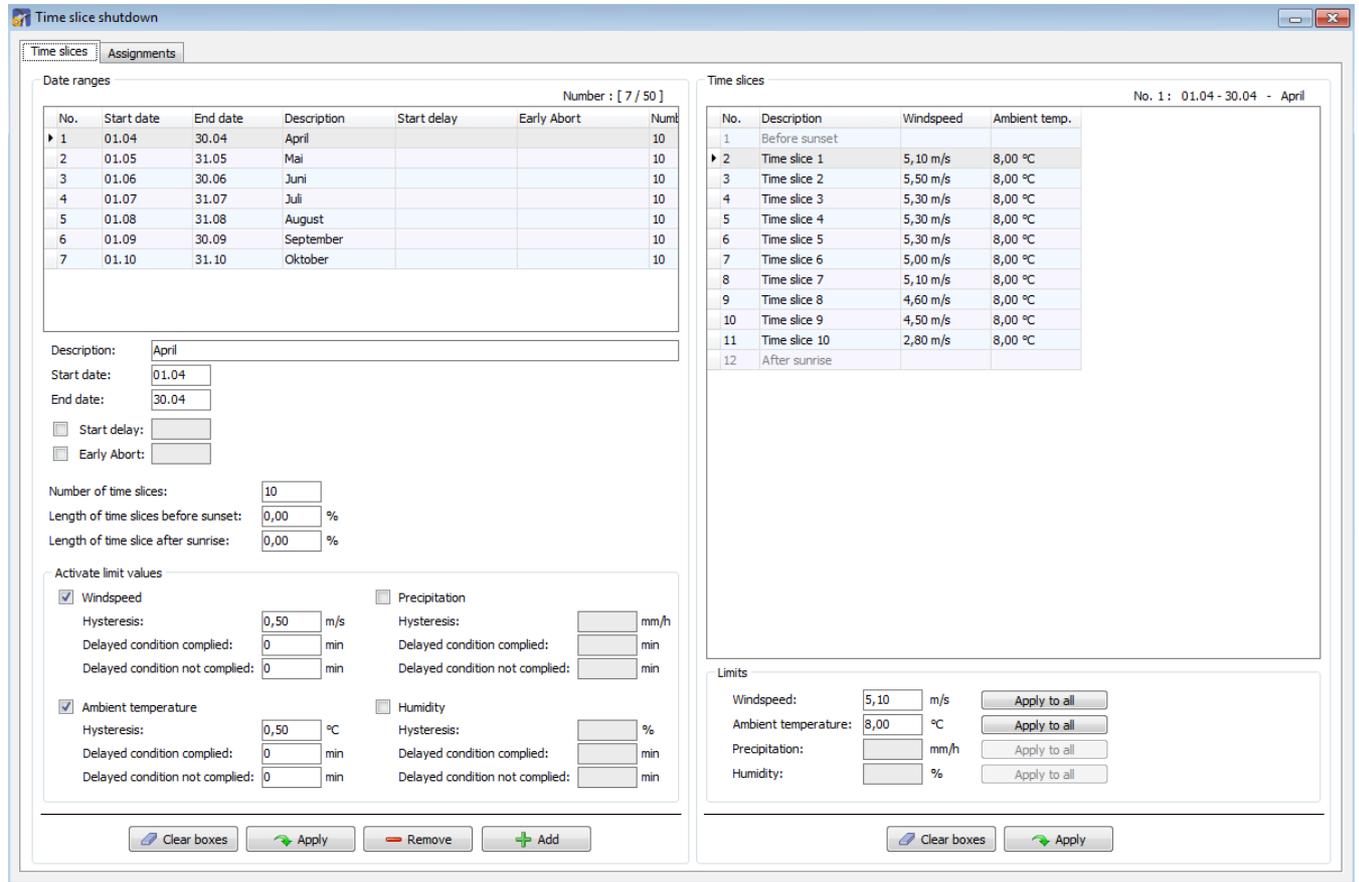


Fig.: Time slice shutdown window, Time slices tab

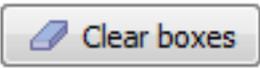
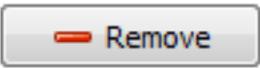
Notes on the above tab

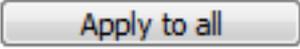
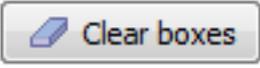
- **In the upper area**, the list of already defined date ranges is displayed on the left and the list of time slices on the right – editing is **not** possible in the lists.
- **Below the list** of date ranges, you can change, remove or add ranges and also specify the limit values that should be activated for the respective range.
- Below the list of time slices you can define the previously activated limit values.

A more detailed explanation of the input fields can be found in the table on the next page.

The following input fields and buttons are available in the **Time slices** tab.

Time slice shutdown window, Time slices tab	
<b>Description</b>	Here you give a name to the date range you want to define. <b>Input:</b> Enter any characters.
<b>Start date</b>	Start date of the date ranges <b>Input:</b> DD/MM (there is no period after the month) (if Windows region setting = English)
<b>End date</b>	End date of the date range <b>Input:</b> DD/MM (there is no period after the month) (if Windows region setting = English)
<b>Start delay</b>	If you enter a value of e.g. 30 here, the time slice shutdowns will not take effect until <b>half an hour after sunset</b> . <b>Input:</b> 0 to 59 minutes
<b>Early abort</b>	If you enter a value of, for example, 30 here, the time slice shutdowns stop to take effect <b>half an hour before sunrise</b> . <b>Input:</b> 0 to 59 minutes
<b>Number of time slices</b>	<b>Input:</b> integer 1 to 20
<b>Length of time slices before sunset</b>	The input defines the percentage of the total duration of the night (time between sunset and sunrise). If you do not make an entry here, this time slice will not be used. <b>Input:</b> 0.00 to 50.00 percent
<b>Length of time slices after sunrise</b>	The input defines the percentage of the total duration of the night (time between sunset and sunrise). If you do not make an entry here, this time slice will not be used. <b>Input:</b> 0.00 to 50.00 percent
<b>Activate limit values</b>	Here you can activate up to 4 limit values and in thus enable <ul style="list-style-type: none"> <li>• a "<b>less</b> than" condition for Wind speed</li> <li>• a "<b>less</b> than" condition for Precipitation</li> <li>• a "<b>greater</b> than" condition for Ambient temperature</li> <li>• a "<b>less</b> than" condition for Humidity</li> </ul> <p>The actual values are entered in the right half of the screen under <b>Limits</b>.</p> <b>Input:</b> set/remove checkmark

Time slice shutdown window, Time slices tab	
<p><b>Hysteresis</b></p>	<p>You can also define a hysteresis for each limit value.</p> <p>The hysteresis defines the desired permissible difference between the switching points for start-up or respectively shutdown.</p> <p><u>Example: Wind speed</u> To ensure that the WTG will not be switched too frequently during times when the readings are unstable (e.g. gusty winds), you can delay the response by specifying a hysteresis.</p> <p>Only positive values can be entered. The direction in which the hysteresis value works depends on whether the value refers to a "less than" or "greater than" condition.</p> <p>If a value of <b>6 m/s</b> with a hysteresis of <b>1 m/s</b> is set for wind speed, this has the following effect:</p> <p><i>The respective WTG is shut down if the wind speed falls below 6 m/s, but is started up again only if a wind speed of more than 7 m/s is measured.</i></p> <p><b>Input:</b> 0.00 to 10.00</p>
<p>Delayed condition complied with</p>	<p>To ensure that the WTGs are not switched too frequently (high wear and tear) when conditions relating to wind speed, precipitation or temperature are involved, you can specify here that the shutdown conditions need to be met continuously over a specific period of time before a WTG will actually be shut down.</p> <p><u>Example: Wind speed</u> If 30 seconds is entered here, then the respective WTG is shut down only after the measured wind speed has been below the defined limit value of, for example, 6 m/s continuously for half an hour.</p> <p><b>Input:</b> 0 to 60 minutes</p>
<p>Delayed condition not complied with</p>	<p>To ensure that the WTGs are not switched too frequently (high wear and tear) when conditions relating to wind speed, precipitation or temperature are involved, you can specify here that the shutdown conditions must NOT be present for a specific period of time before a WTG is actually started up again after having been shut down due to a special shutdown.</p> <p><u>Example: Wind speed</u> If 30 minutes is entered here, then the respective WTG, after having been shut down due to a special shutdown, is started up again only after a wind speed of, for example, 6 m/s or more has been measured continuously for half an hour.</p> <p><b>Input:</b> 0 to 60 minutes</p>
	<p>Used to delete the entries made below the list of date ranges.</p>
	<p>Used to confirm the entries made below the list of date ranges.</p> <p><b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>
	<p>Deletes the date range selected in the list.</p> <p><b>Attention:</b> If you click this button, the date range will be deleted immediately, there is <b>no</b> confirmation dialog.</p>

Time slice shutdown window, Time slices tab	
	<p>Adds a new block combination. Up to 50 block combinations can be configured.</p>
<p><b>Limits</b></p>	<p>Here you define the limit values that were previously activated for the respective period (left half of the screen). Limits that are not activated are greyed out.</p>
	<p>If you click this button for a limit value entered, the entry is applied to all time slices.</p>
	<p>Used to delete the entries made in the <b>Limits</b> area.</p>
	<p>Used to confirm the entries made in the <b>Limits</b> area.</p> <p><b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>

**Time slice shutdown** window, **Assignments** tab

This is where time slices defined in the **Time slices** tab are assigned to the project's WTGs.

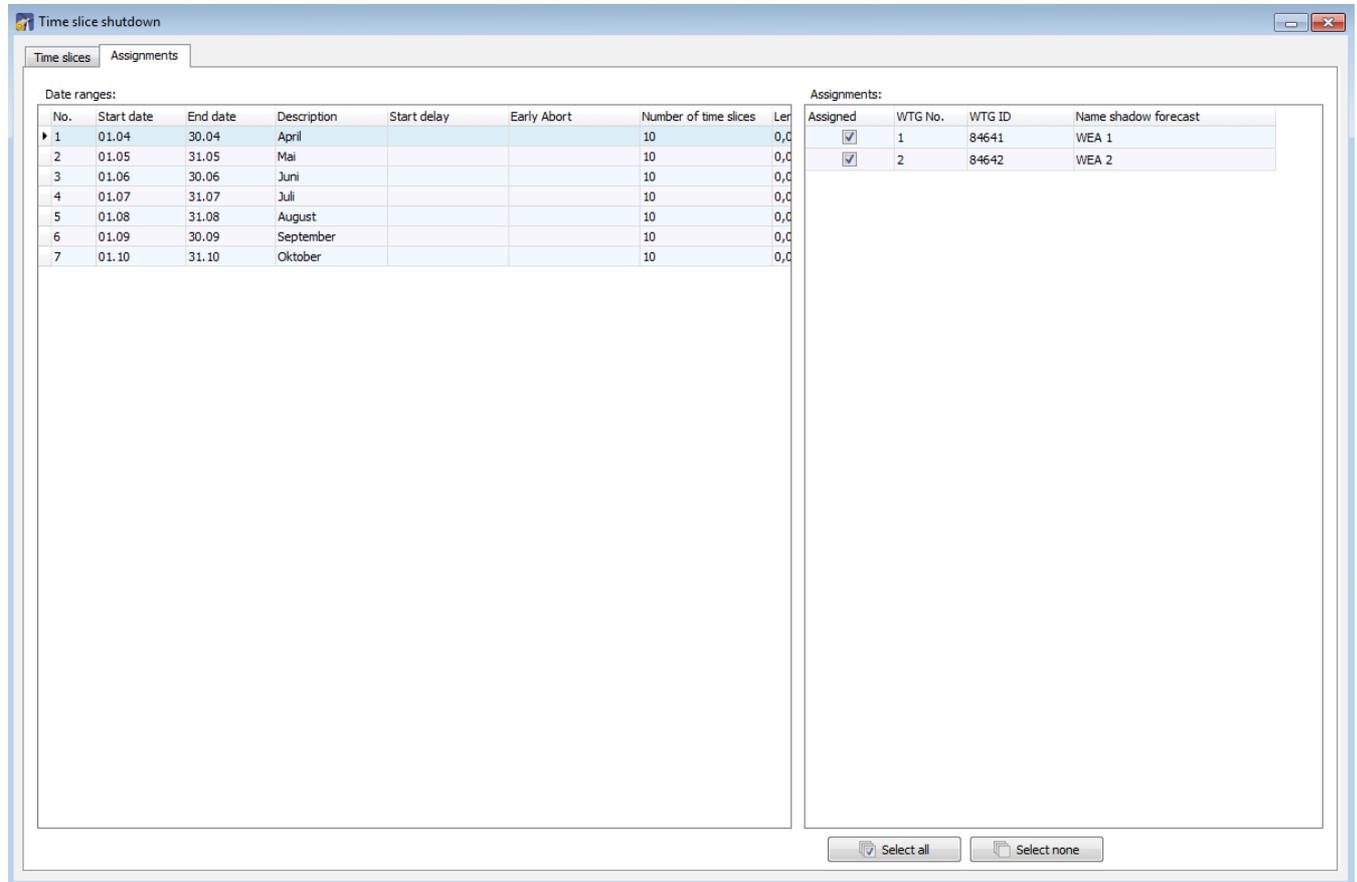


Fig.: **Time slice shutdown** window, **Assignments** tab

Notes on the above tab

- The **left half of the screen** displays a list of the date ranges defined in the **Time Slice** tab including all parameters.
- In the **right half of the screen**, you can activate or deactivate a currently selected date range for each WTG of the project individually by checking or unchecking the **Assigned** box.
- To easily manage large projects with many WTGs, the buttons **Select all** and **Select none** are available at the bottom right.

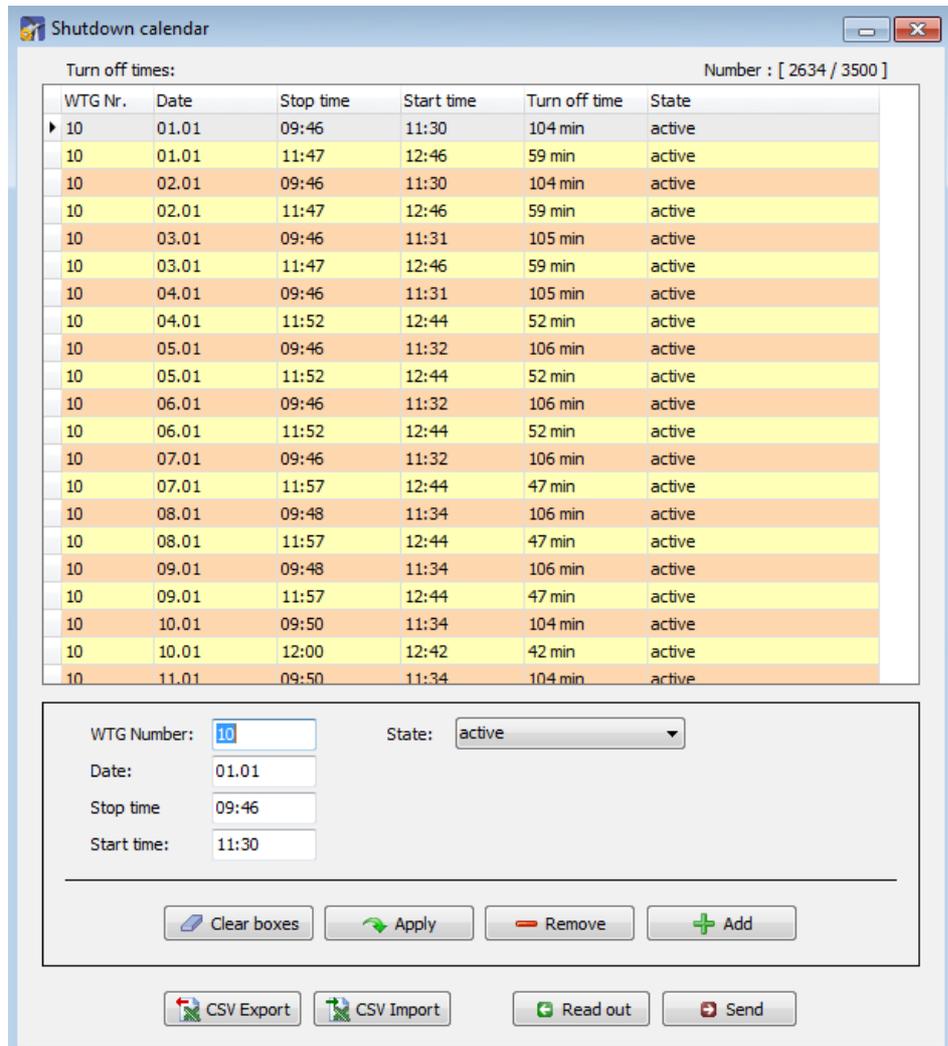


**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

### 3.9 Shutdown calendar window

To open this window, click on  or choose **View > Shutdown calendar**.

The **Shutdown calendar** window is used to define fixed shutdown times to be applied without taking into account other conditions, such as position of the rotor with respect to the direction of the sun's rays. The only condition that can be configured in addition to time is "sun is shining".



The screenshot shows the 'Shutdown calendar' window with the following components:

- Table of shutdown periods:** A table with columns: WTG Nr., Date, Stop time, Start time, Turn off time, and State. It lists 20 entries for WTG Nr. 10 across dates 01.01 to 11.01.
- Input area:** Fields for WTG Number (10), State (active), Date (01.01), Stop time (09:46), and Start time (11:30).
- Buttons:** Clear boxes, Apply, Remove, Add, CSV Export, CSV Import, Read out, and Send.

**list of shutdown periods (display area)**

WTG Nr.	Date	Stop time	Start time	Turn off time	State
10	01.01	09:46	11:30	104 min	active
10	01.01	11:47	12:46	59 min	active
10	02.01	09:46	11:30	104 min	active
10	02.01	11:47	12:46	59 min	active
10	03.01	09:46	11:31	105 min	active
10	03.01	11:47	12:46	59 min	active
10	04.01	09:46	11:31	105 min	active
10	04.01	11:52	12:44	52 min	active
10	05.01	09:46	11:32	106 min	active
10	05.01	11:52	12:44	52 min	active
10	06.01	09:46	11:32	106 min	active
10	06.01	11:52	12:44	52 min	active
10	07.01	09:46	11:32	106 min	active
10	07.01	11:57	12:44	47 min	active
10	08.01	09:48	11:34	106 min	active
10	08.01	11:57	12:44	47 min	active
10	09.01	09:48	11:34	106 min	active
10	09.01	11:57	12:44	47 min	active
10	10.01	09:50	11:34	104 min	active
10	10.01	12:00	12:42	42 min	active
10	11.01	09:50	11:34	104 min	active

**data of the shutdown period selected above (input area)**

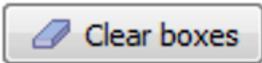
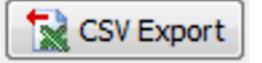
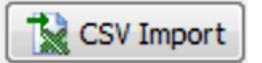
**buttons**

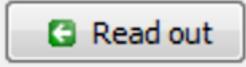
Fig.: **Shutdown calendar** window

The upper part of the screen lists the shutdown periods already created. The information "2634/3500" in the upper-right corner of the screen means that 2634 of 3500 possible shutdown periods have been created so far. However, the standard version of the SIM can process no more than 2,500 shutdown periods.

The lower part of the screen is used to create or edit shutdown periods. In addition, there are 8 buttons available.

The **Shutdown calendar** window offers the following information and setting options.

Shutdown calendar window		
<b>WTG Number</b>	Enter the number of the WTG you want to be shut down during fixed periods of time.	
<b>State</b>	Select one of the following 3 options from the drop-down list:	
	<b>Option</b>	<b>Effect</b>
	inactive	The configured shutdown period is not applied.
	active (light sensor = 1)	The configured shutdown period is applied only if the light sensor signals "sun is shining".
	active	The configured shutdown period is applied regardless of any other condition.
<b>Date</b>	Specify the day on which you want the respective WTG to be shut down. Format: DD.MM (example: to have the WTG shut down on 20 April enter 20.04).	
<b>Stop time</b>	Specify the time at which you want the shutdown period to end (24-hour format HH:MM). Always enter the times based on winter time (non daylight saving).	
<b>Start time</b>	Specify the time at which you want the shutdown period to start (24-hour format HH:MM). Always enter the times based on winter time (non daylight saving).	
	Deletes the values selected/entered in the lower part of the screen.	
	Applies the entered/selected values. <b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.	
	Deletes the shutdown time selected in the list. <b>Attention:</b> If you click this button, the shutdown time will be deleted immediately. There is no confirmation prompt.	
	Adds a new shutdown time. Up to 50 shutdown times can be configured.	
	Click this button to export fixed shutdown times to an Excel sheet*.	
	Turn off times: click this button to import fixed shutdown times from an Excel sheet*.	

Shutdown calendar window	
	Reads out the shutdown times from an SIM.
	Sends the shutdown times to an SIM.

\*The Excel sheet (.csv) must be created as follows:

WTG No.	Date	Stop time	Start time	Turn off time	State
---------	------	-----------	------------	---------------	-------

	<p><b>Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.</b></p>
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### 3.10 Module State window

To open this window, click on  or choose **View > Module State**.

In the **Module State** window, you can read out live data from the shadow impact module and test stop and start commands for WTGs.

The **Module State** window includes the following two tabs:

- **Status**  
Here, live data from the shadow impact module is read out and displayed (states of digital inputs and outputs, states of the sensors and internal status data).
- **Operating Data**  
Here, live operating data such as power, rotor speed, nacelle position, etc. are read out from the shadow impact module and displayed. You can also test stop and start commands here.

On the next page, the **State** tab is described first, followed by the **Operating Data** tab.

**Module State** window, **Status** tab

Live data from the shadow impact module is read out and displayed (states of digital inputs and outputs, states of the sensors and internal status data) in this tab.

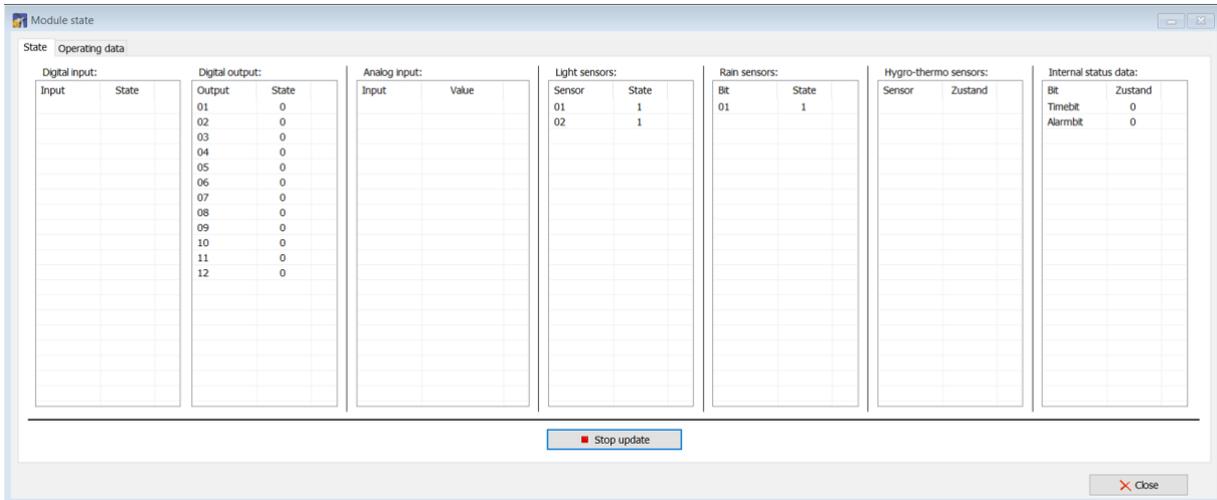


Fig.: **Module State** window, **Status** tab

Notes on the above tab

- The screenshot above shows how the **Status** tab may look when the data are being read out, i.e. the **Start update** button has already been clicked, so it is now called **Stop update**. Values are displayed in some columns.
- The cycle in which the state data is queried depends on the setting in the **Module State** window (**Configuration** menu > **Module State**).
- Once you click **Start update**, the values will be retrieved at the specified cycle until you click **Stop update** or the connection to the SIM is lost for some other reason.

The meaning of the displayed values is explained in the following table

<b>Digital inputs/outputs</b>	0 = low, 1 = high	
<b>Analog Inputs</b>	Reading	
<b>Light sensors, Rain sensors, Hygro-thermo sensors</b>	1 = OK, 0 = error	
<b>Internal status data</b>	<b>Time bit</b>	0 = GPS time signal reception OK 1 = GPS time signal reception error
	<b>Alarm bit</b>	0 = there is no alarm message 1 = there is an alarm message, please check the operation log

## Module State window, Operating Data tab

In this register, the following WTG live data are read out from the shadow impact module and displayed:

**Power, Rotor speed, Nacelle position, Wind speed, Ambient temperature and Stop command**

WTG Nr.	Power	Rotation speed	Nacelle position	Wind speed	Ambient temperature	Stop command
01	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
02	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
03	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
04	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
05	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
06	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
07	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
08	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released
09	2857 kW	5,0 rpm	89,0 °	3,0 m/s	-4,0 °C	released

Fig.: Module State window, Operating Data tab

Notes on the above screenshot

- In the above example, you can see that the data is being read out, i.e. the **Start update** button (bottom right) has already been clicked, so that it is now called **Stop update**, and the columns show the corresponding values for each WTG.
- The cycle at which the operating data is queried depends on the setting in the **Module State** window (**Configuration** menu > **Module State**).
- Once you click **Start update**, the values will be retrieved at the specified cycle until you click **Stop update** or the connection to the SIM is lost for some other reason.
- You can select (click) a WTG in the WTG list to test one or more stop commands for it by clicking on **Stop WTG**. If the test is successful, the value of the **Stop command** column for this WTG changes from **released** to **stopped**, see example on the next page.

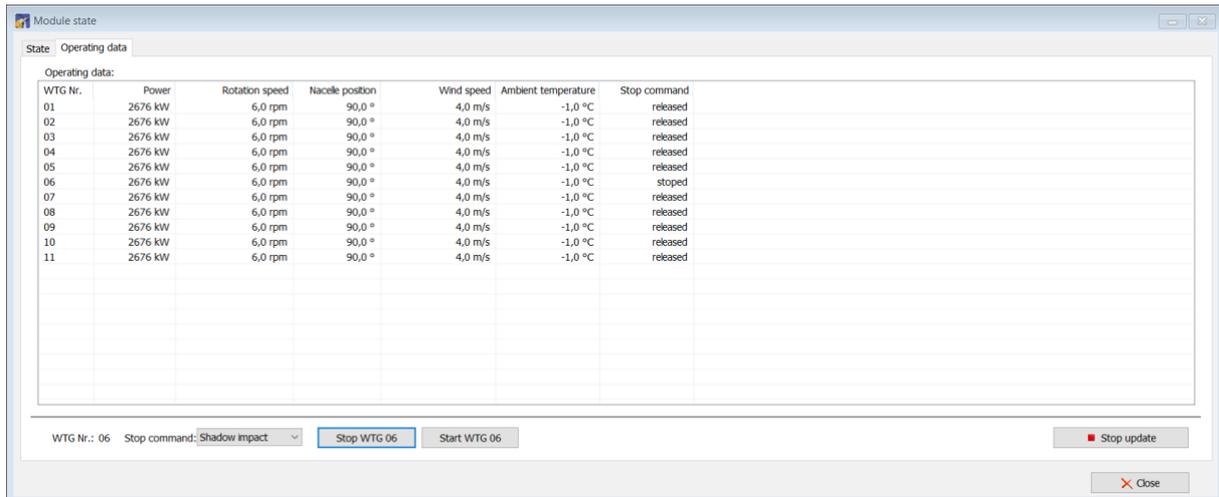


Fig.: Module State window, Operating Data tab

The above screenshot shows the following:

- WTG 06 has been selected so that the buttons **Stop WEA** and **Start WEA** now show the corresponding number.
- **Stop WTG** has already been clicked for the selected WTG in order to test the stop command (in this case shadow impact) and as the test was successful, the **Stop Command** column for WTG 06 now shows **stopped**.
- In order to test a different stop command for the same WTG, first click **Start WT 06**, then select the desired command from the **Stop Command** drop-down list, and finally click **Stop WT 06** again.



If, after successfully stopping a WTG, the connection to the SIM is lost before the WTG could be restarted, it will still be restarted in a timely manner because:

**If the respective WTG, after having been shut down by Shadow Manager 1, does not receive an update request for a period of 5 minutes, it is automatically released.**

## 4 The communications windows

The **Configuration** menu offers various windows you may use to display or edit the data Shadow Manager requires to communicate with various hardware components.

### 4.1 SIM connection window

To open this window, select **Configuration > SIM connection**.

Use this window to enter the data for the communication to the SIM.

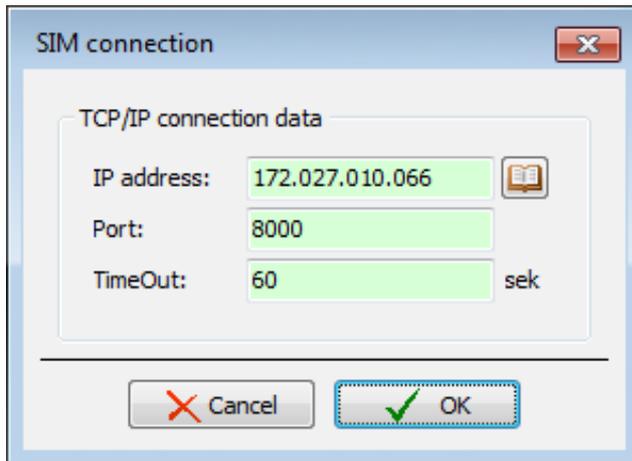


Fig.: **SIM connection window**

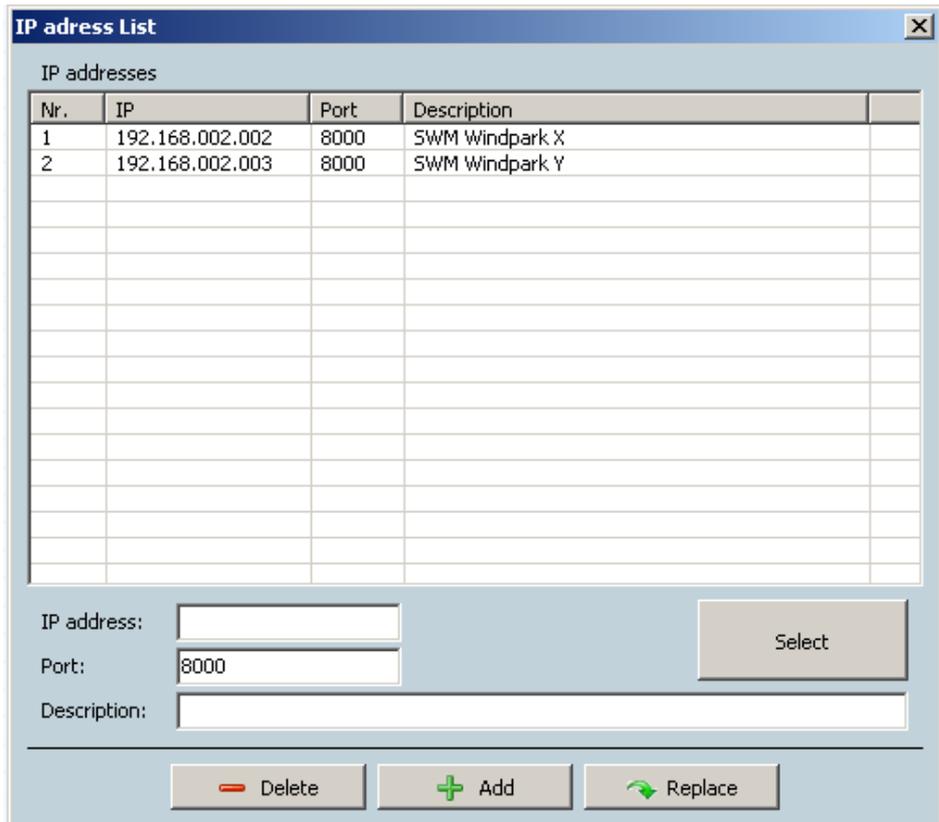
The basic configuration of the **SIM connection** window is described under → Set up Shadow Manager on page 7.

SIM connection window	
<b>IP address</b>	Enter the IP address of the SIM you want to communicate with. <b>Input:</b> 4 numbers, separated by a point, example: 192.0.2.42
<b>Port</b>	Enter the IP address of the SIM you want to communicate with. <b>Input:</b> number from 1 to 65535
<b>Timeout</b>	Period for establishing a connection to the SIM: If a connection cannot be established during this time, the attempt will be aborted.

## 4.2 IP address list window

If you click on  in the **SIM connection** window, the **IP address list** window will be displayed.

Use this window to configure Shadow Manager for communication with more than one shadow impact module (SIM). If you enter the connection data for the individual SIMs in this window, you can easily select them by their descriptive name later instead of having to enter the exact IP address of an SIM.



**list of configured connection data (display area)**

**set of connection data selected above (input area)**

**buttons**

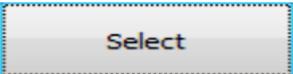
Fig.: **IP address list** window

**The upper part of the screen** lists the connection data already created.

**The lower part of the screen** is used to create or edit connection data. In addition, there are 4 buttons available.

The **IP address List** window offers the following information and setting options.

IP address list window	
<b>IP address</b>	Enter the IP address of the SIM you want to communicate with.
<b>Port</b>	Enter the port number of the SIM you want to communicate with.
<b>Description</b>	Specify a descriptive name for the SIM you want to communicate with.

IP address list window	
	<p>If you have selected a set of connection data (upper part of the screen) and then click this button, Shadow Manager will communicate with the respective SIM from now on.</p>
	<p>Deletes the connection data selected in the list. <b>Attention:</b> If you click this button, the connection data will be deleted immediately. There is no confirmation prompt.</p>
	<p>Adds a new set of connection data.</p>
	<p>Applies the entered/selected values. <b>Attention:</b> If you close this window before you have clicked this button, all entries/changes you may have made will be discarded.</p>

### 4.3 Communication window

To open this window, select Configuration > **Communication**.

The **Communication** window is used only if the wind turbine generators to be monitored are part of a wind park and if there is a park server.

The screenshot shows the 'Communication' window with the following settings:

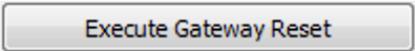
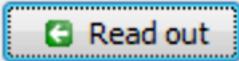
- SIM communication:** IP Address: 192.168.044.201, Subnet mask: 255.255.000.000, Port: 8000, Gateway: 192.168.044.235. Button: Execute Module Reset.
- Park server communication:** IP Address: 000.000.000.000, Subnet mask: 255.255.255.000, Port: 502. Button: Execute Gateway Reset.
- Profibus communication:** IP Address: 000.000.000.000, Software ver.: -. Button: Execute Gateway Reset.

At the bottom of the window are 'Read out' and 'Send' buttons.

Fig.: **Communication** window

The **Communication** window offers the following setting options and features.

Communication window	
<b>IP address (SIM communication, Park server communication, PROFIBUS communication)</b>	Enter the IP address of the SIM, park server or PROFIBUS gateway, depending on the communication type.
<b>Subnet mask (SIM communication, park server communication)</b>	Enter the subnet mask of the SIM or park server, depending on the communication type. The settings for communicating with the park server are provided by the WTG manufacturer.
<b>Port (SIM communication, park server communication)</b>	Enter the port number of the SIM or park server, depending on the communication type. The settings for communicating with the park server are provided by the WTG manufacturer.
<b>Gateway</b>	This setting is provided by the WTG manufacturer.

Communication window	
<b>Software ver.</b>	Displays the software version of the PROFIBUS gateway.
	<p>Triggers a restart of the SIM.</p> <p>If you click on this button, you will be prompted to enter the password stored in the SIM.</p> <p>After you have entered the password, the following dialog box is displayed.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <p style="text-align: right; margin: 0;">Information <span style="float: right;">×</span></p> <div style="text-align: center; margin: 5px 0;">  <span>Reset wird ausgeführt</span> </div> <div style="text-align: center; margin: 10px 0;"> <input type="button" value="OK"/> </div> </div> <p>Confirm the reset by clicking OK.</p>
	<p>Triggers a restart of the PROFIBUS gateway.</p> <p>If you click on this button, you will be prompted to enter the password stored in the SIM.</p> <p>After you have entered the password, the following dialog box is displayed.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <p style="text-align: right; margin: 0;">Information <span style="float: right;">×</span></p> <div style="text-align: center; margin: 5px 0;">  <span>Reset wird ausgeführt</span> </div> <div style="text-align: center; margin: 10px 0;"> <input type="button" value="OK"/> </div> </div> <p>Confirm the reset by clicking OK.</p>
	Reads out the communication data from an SIM.
	Sends the communication data to an SIM.

#### 4.4 Light sensor window

To open this window, select Configuration > **Light sensor**.

If the SIM is connected to one or several light sensors via Ethernet, obtain the IP address, subnet mask and port number of the light sensor from the WTG manufacturer.

The light sensor data can be retrieved via an RS485 interface or over the network.

This window can be used to configure, read in or read out the data for setting up a connection to a light sensor. Up to 20 light sensors can be configured.

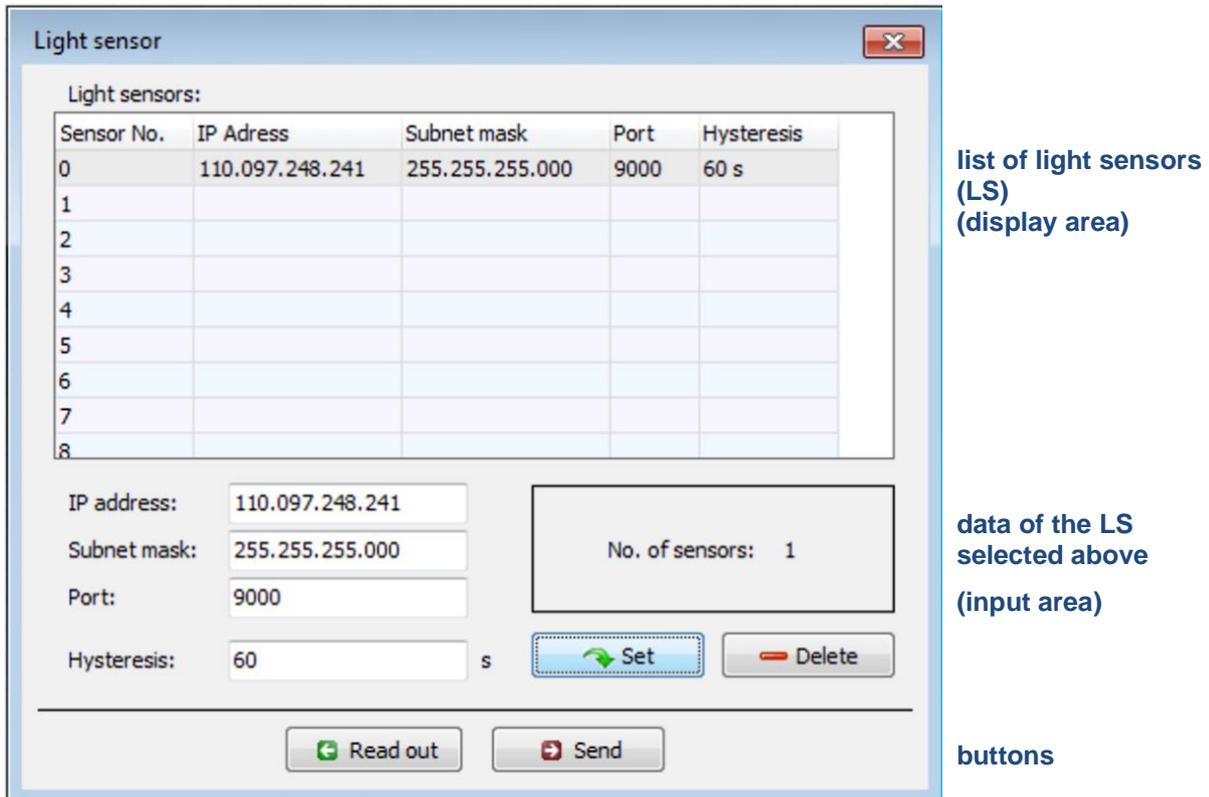


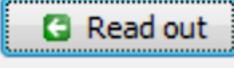
Fig.: Light sensor window

**The upper part of the screen** lists the light sensors already configured.

**The lower part of the screen** is used to create or edit light sensors. In addition, there are 4 buttons available.

The **Light sensor** window offers the following setting options and features.

Light sensor window	
<b>IP address</b>	<p>Enter the IP address of the light sensor.</p> <p>If the data are retrieved by way of an RS485 interface, enter 000.000.000.000.</p> <p>If the data are retrieved over the network, ask the WTG manufacturer for the IP address information.</p>

Light sensor window	
<b>Subnet mask</b>	<p>If you have entered 000.000.000.000 for <b>IP address</b> above (retrieval via RS485 interface), this parameter is ignored.</p> <p>If the data are retrieved over the network, ask the WTG manufacturer for the IP address information.</p>
<b>Port</b>	<p>If you have entered 000.000.000.000 for <b>IP address</b> above (retrieval via RS485 interface), this parameter is ignored.</p> <p>If the data are retrieved over the network, ask the WTG manufacturer for the port number information.</p>
<b>Hysteresis</b>	<p>Only after the period defined by the hysteresis has elapsed, a change of condition from "shadow impact" to "no shadow impact" or vice versa will be taken into account. The hysteresis is preset to 60 seconds. To prevent the WTGs from being shut down and released in short intervals due to unsettled weather conditions, the hysteresis should not be set too short.</p> <p>Value range: 0 to 999 s</p>
	Click to apply the settings and add the sensor.
	Deletes a sensor.
	Reads out the light sensor data from the SIM.
	<p>Sends the data of all sensors to the SIM.</p> <p>Before the data are sent to the SIM, the SIM password, you will be prompted to enter the SIM password. If a password has not been set, enter the default password 0000.</p>

## 4.5 Walls and areas window

To open this window, select **Configuration > Module State**.

In this window, you can limit the length of walls and area sides. By configuring this parameter you can avoid defining a wall or area that is much larger than the actual wall/area. Defining walls/areas that are too large can result in unnecessary shutdowns of WTGs.

Use this setting to avoid defining incorrect wall and area data in the **Places of immission > Edit walls and areas** window.

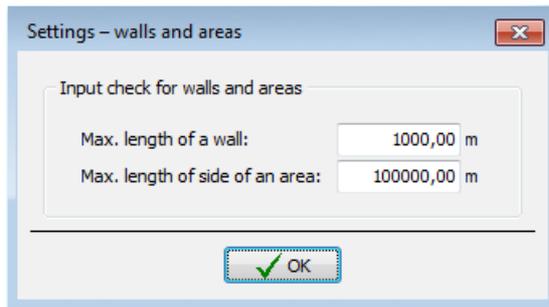


Fig.: **Walls and areas** window

Notes regarding the window above:

- Defaults: 15.00 and 20.00 m
- Value range: 0.00 to 999999.99 m

## 4.6 Module State window

To open this window, select **Configuration > Module State**.

In this window you set the cycle at which the data in the two tabs of the **Module State** window (**View** menu > **Module State**) are queried.

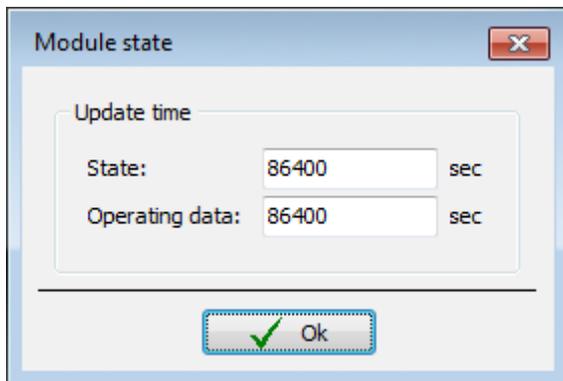


Fig.: **Module State** window

Notes regarding the window above

- The **Status** and **Operating data** input fields correspond to the tabs in the **Module State** window.
- The following input range applies to both input fields: 0 to 86400 seconds.

## 5 Typical configuration examples

Read this chapter to get familiar with the configuration options in Shadow Manager by exploring typical configuration examples. For each example, only the case-specific configuration steps to be carried out within the configuration windows are described.



Please note that due to technical reasons, Shadow Manager uses decimal commas instead of decimal points.

For information on the basic steps to be carried out to prepare every configuration session, please refer to the following sections: → 2.2 Preparing the communication with the SIM on page 7 and → 2.5 Overview of the configuration procedure.

### 5.1 Set up a new WTG with a new PI

A WTG is added to an existing project (sample project). Within the range of that WTG, there is a PI which has not been defined yet. At this PI, there is a patio that has to be protected from excessive shadow impact caused by the new WTG.

The situation described above requires carrying out the following steps:

#### Prepare the session

1. Start Shadow Manager.
2. Click on  or choose **File > Open project**, and select the sample project (.swk).
3. Select **Configuration > SIM connection** and enter the IP address of the SIM.
4. Click on  or choose **File > Read out configuration**. This way, you make sure that changes that may have been done directly on the SIM don't get lost.

#### Configure the new WTG

5. Click on  or choose **View > Wind turbine generators**.
6. Configure the parameters of the new WTG in the **Wind turbine generators** window. For configuration details, please refer to section → 3.3.
7. Click on  to display the new WTG in the list of WTGs above.
8. Close the **Wind turbine generators** window

#### Configure the new PI

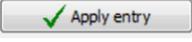
9. Click on  or choose **View > Places of immission**.
10. Configure the parameters of the new PI in the **Places of immission** window. For configuration details, please refer to section → 3.2.
11. Click on  to display the new PI in the list of PIs above.
12. Select the IO with the patio to be protected from the list in the upper part of the window, and then click on  .

13. Enter the coordinates of the patio in the **Edit walls and areas** window. The coordinates must be entered in the lower part of the window in the field of a free area. An area is defined by 4 points; each point is defined by entering two coordinates (x and y).
14. Activate the area – if the status of the area you just defined is **Inactive**, set it to **Active**.
15. Check your entry: make sure the **Show** checkbox of the area you have just defined is selected. In the upper-right part of the window, the area is shown as a red square. Check visually, that the new area are has been defined correctly.



#### Important notes for defining walls and areas

- The points defining area must be entered **clockwise**: by no means should they be entered in a criss-cross manner.
- If the parameter defining a wall or an area in meters (the field to the right of the coordinates fields) is shaded in red (instead of green), then the entered values are not plausible or the maximum length of a wall or side of an area has been exceeded. Check that you have entered the coordinates correctly.
- The coordinates of all WTGs and PIs must be defined using the same metric coordinate system.

16. In the **Edit walls and areas** window, click on  and then close the window.

17. In the **Places of immission (IO)** window, click on  and then close the window.

#### Send the data to the SIM

18. To send the data of the changed configuration to the SIM, click on  or choose **File > Send configuration**.

For further information, please refer to → 3.2 Places of immission (IO) window.



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

## 5.2 Checking whether PIs and WTGs have been defined correctly

You want to check visually whether the WTGs and PIs of an existing project have been defined correctly. To do this, you want to import map (bitmap format).

The situation described above requires carrying out the following steps:

### Prepare the session

1. Start Shadow Manager.
2. Click on  or choose **File > Open project**, and select the sample project (.swk).
3. Select **Configuration > SIM connection** and enter the IP address of the SIM.
4. Click on  or choose **File > Read out configuration**. This way, you make sure that changes that may have been done directly on the SIM don't get lost.

### Load the map (bitmap format)

5. Click on  or choose **View > Overview map**.
6. Click on **Load map as bitmap** and select the map. The map will now be displayed.

OR

7. If the map is saved in the clipboard, click on **Map from clipboard**. The map will now be displayed.

### Set two reference points



#### Important notes on setting reference points

- After a background map has been loaded, you must define points of reference within the map. Otherwise the WTGs and PIs may not be displayed in the correct place. To optimise the accuracy, the reference points should be as FAR APART FROM EACH OTHER as possible.
  - The reference points must be defined according to the Gauss-Krüger format.
  - The coordinates of all WTGs and PIs must be defined using the same metric coordinate system.
8. Click on **Set point of reference 1** to set the first reference point.
  9. The button will flash. Move the mouse pointer to the desired place in the map and click.
  10. A window will open in which you have to enter the Gauss-Krüger coordinates of the reference point.
  11. After you have entered the coordinates, click on **Set**.

The entered coordinates will then be applied and the button name colour of **Set point of reference 1** will switch from red to green.

12. Repeat the above steps for second reference point.

### Check visually, that the WTGs and PIs have been defined correctly

After you have set the second reference point, the WTGs and PIs will be displayed in the map.

If all WTG and PI symbols appear displaced from their actual position, you should check the reference points. If only some of the symbols are displaced, you should check the coordinates of the respective WTG or PI.

For further information, please refer to → 3.5 Overview map window on page 28.



**Loading a background map and setting reference points works only if the Gauss-Krüger coordinate system is used.**

### 5.3 Configure changed allowable shadow impact periods for the PIs

The authorities have changed the load limits for a PI. In addition, this PI, which has been used as residential building until this day, will be used commercially from now on. The configuration of the project has to be adjusted accordingly in Shadow Manager.

The situation described above requires carrying out the following steps:

#### Prepare the session

1. Start Shadow Manager.
2. Click on  or choose **File > Open project**, and select the sample project (.swk).
3. Select **Configuration > SIM connection** and enter the IP address of the SIM.
4. Click on  or choose **File > Read out configuration**. This way, you make sure that changes that may have been done directly on the SIM don't get lost.

#### Change the maximum impact periods

1. Click on  or choose **View > Places of immission**.
2. Select the PI whose load times have changed from the list of PIs in the **Places of immission** window. The data of the respective PI will now be displayed in the lower part of the screen.
3. Enter the new value in minutes at **Max. permissible daily load**.
4. Enter the new value in minutes at **Max. permissible annual load**.
5. Select **Commercial** from the **Building type** drop-down list.
6. Select **Mon-Fri** from the **Weekday selection** drop-down list.
7. In the **Places of immission (IO)** window, click on  and then close the window.

#### Send the data to the SIM

1. To send the data of the changed configuration to the SIM, click on  or choose **File > Send configuration**.

For further information, please refer to → 3.2 Places of immission (IO) window.



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## 5.4 New bat protection requirements

The authorities issue new bat protection requirements for the range of a wind park:

From 1 April until 31 October WTG 01 and WTG of the wind park must be shut down from sunset to sunrise when the wind speed is lower than 6.00 m/s and the temperature is below 15 °C during this time.

The situation described above requires carrying out the following steps:

### Configuration in the **Condition blocks** tab of the **Switching conditions** window

In order to comply with bat protection requirements, you first have to configure the following 6 condition blocks under **Switching conditions** window, **Condition blocks** tab:

#### Condition block 1

Name:	Date range	001		
Condition 1:	module internal	Date	<=	31.10
Condition 2:	module internal	Date	>=	01.04
Condition 3:	empty			

Select time from 1 April to 31 October.

#### Condition block 2

Name:	Time	002			
Condition 1:	module internal	Sunset	+	0	min
Condition 2:	module internal	Sunrise	+	0	min
Condition 3:	empty				

Select time from sunset to sunrise.

#### Condition block 3

Name:	WS WTG 01	003			
Condition 1:	result LAN	1.02 - Windgeschwindigkeit	<	6,00	m/s
Condition 2:	empty				
Condition 3:	empty				

Select wind speed of less than 6.00 m/s for WTG 01 (Windgeschwindigkeit = Wind speed).

#### Condition block 4

Name:	WS WTG 02	004			
Condition 1:	result LAN	2.02 - Windgeschwindigkeit	<	6,00	m/s
Condition 2:	empty				

Select wind speed of less than 6.00 m/s for WTG 02 (Windgeschwindigkeit = Wind speed).

### Condition block 5

Name:	Temp WTG01	005		
Condition 1:	result LAN	1.06 - Außentemperatur	>=	15
Condition 2:	empty			
Condition 3:	empty			

Select ambient temperature of more than 15 °C for WTG 01 (Außentemperatur = Ambient temperature).

### Condition block 6

Name:	Temp WTG 02	006		
Condition 1:	result LAN	2.06 - Außentemperatur	>=	15
Condition 2:	empty			
Condition 3:	empty			

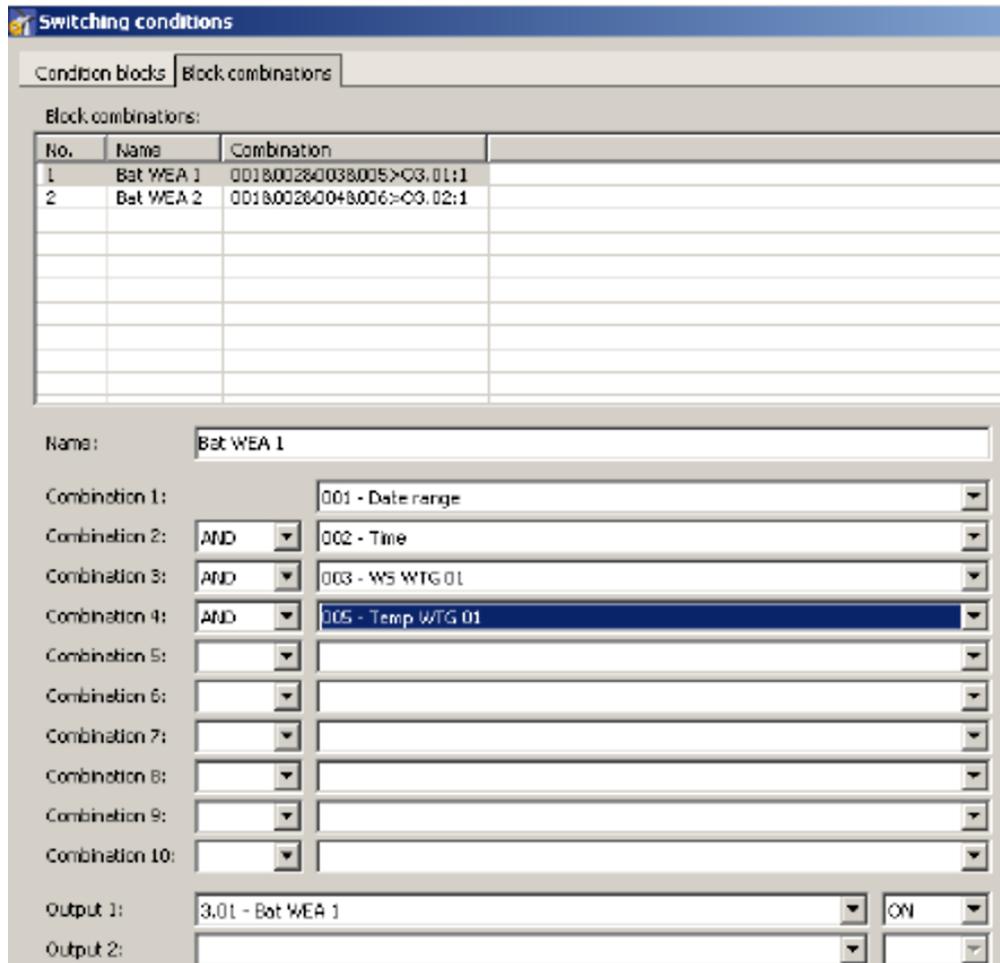
Select ambient temperature of more than 15 °C for WTG 02 (Außentemperatur = Ambient temperature).

All other settings must be configured in the **Block combinations** tab, see next page.

Configuration in the **Block combinations** tab of the **Switching conditions** window

In the **Block combinations** tab of the **Switching conditions** window, you must combine the conditions you just configured to a block for WTG 01 and another block for WTG 02.

**Block combination 1**



Thanks to the above block combination for WTG 01 will be shut down if condition 1 (date range from 1 Apr to 31 Oct), condition 2 (time from sunset to sunrise), condition 3 (wind speed WTG 01) and condition 5 (temperature WTG 01) are met.

With block combination 2 (without picture), you combine condition 1, 2, 4 and 6 for WTG 02 in the same way.

After you have configured all condition blocks and block combinations required, send the changed configuration to the SIM by clicking on  or choose **File > Send configuration**.

For further information, please refer to [➔ 3.7 Switching conditions window](#).



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## 5.5 Editing the combination of PIs and WTGs

Within the range of an existing project, WTG 2 used to cause shadow impact at IP 4. Meanwhile, a tall building has been erected between PI 04 and WTG 02 which will prevent WTG 02 from causing shadow impact at PI 04.

Furthermore, you were informed that for an indefinite period, nobody will live in PI 02, a residential building.

To reflect these changes for the automatic shutdown control, you have to deactivate the combination of WTG 02 and PI 04 as well as any combinations with PI 02 in Shadow Manager.

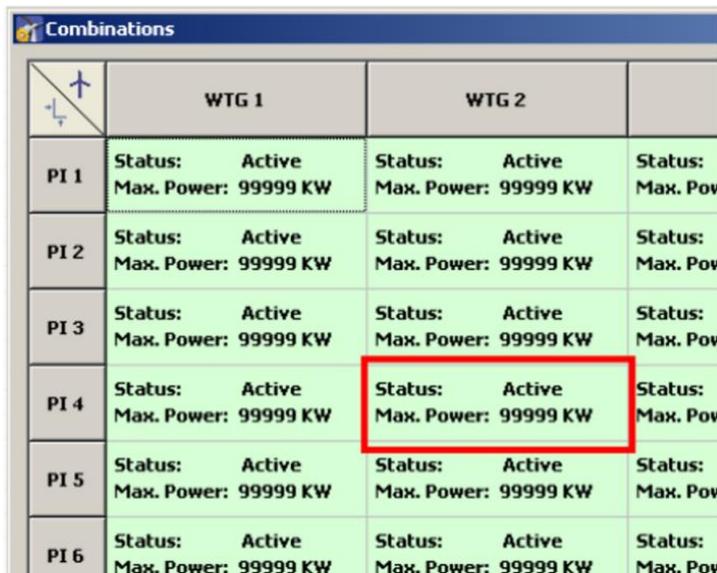
The situation described above requires carrying out the following steps:

### Prepare the session

1. Start Shadow Manager.
2. Click on  or choose **File > Open project**, and select the sample project (.swk).
3. Select **Configuration > SIM connection** and enter the IP address of the SIM.
4. Click on  or choose **File > Read out configuration**. This way, you make sure that changes that may have been done directly on the SIM don't get lost.

### Disable the combination of WTG 02 with PI 04:

5. Click on  or choose **View > Combinations**.
6. In the **Combinations** window, click on the field marked red in the following screenshot:



	WTG 1	WTG 2	
PI 1	Status: Active Max. Power: 99999 KW	Status: Active Max. Power: 99999 KW	Status: Max. Pov
PI 2	Status: Active Max. Power: 99999 KW	Status: Active Max. Power: 99999 KW	Status: Max. Pov
PI 3	Status: Active Max. Power: 99999 KW	Status: Active Max. Power: 99999 KW	Status: Max. Pov
PI 4	Status: Active Max. Power: 99999 KW	Status: Active Max. Power: 99999 KW	Status: Max. Pov
PI 5	Status: Active Max. Power: 99999 KW	Status: Active Max. Power: 99999 KW	Status: Max. Pov
PI 6	Status: Active Max. Power: 99999 KW	Status: Active Max. Power: 99999 KW	Status: Max. Pov

7. The **Edit combination** window will open: In this window, deselect the **Active** checkbox and click on **Set**. The window closes, and the combination of PI 04 with WTG 02, instead of being shaded in green, will now be shaded in red. This shows you that the combination has been disabled successfully.

### Disable any combination with PI 02:

8. Click on  or choose **View > Combinations**.
9. At the left-hand edge of the **Combinations** window, click on PI 02
10. The **Combination for all PI 02** window will open. In this window, deselect the checkboxes to the left and to the right of **Active**, and click on **Set**.

The window is closed, and in the second line of the combinations with PI 02 **Max.Power:** changes from **99999 KW** to **0 KW**. This shows you that the combination has been disabled successfully.

### Send the data to the SIM:

11. To send the data of the changed configuration to the SIM, click on  or choose **File > Send configuration**.

For further information, please refer to [➔ 3.4 Combinations window](#).



**Please be very careful when entering values in Shadow Manager. Incorrect parameter values may result in unnecessary wear and tear, loss of earnings, problems with authorities/residents and in the worst case force operators to decommission wind turbine generators. If in doubt, call us in order to avoid making mistakes.**

## 6 Troubleshooting

If you should encounter any problems with the use of Shadow Manager, please read the information in this chapter. You may be able to quickly find the cause and solution for your problem.

In the case where the information provided does not solve your problem, you can reach us at +49 46 39 78 33 0.

Problem/error message	Possible cause and solution
<p><b>Read out configuration</b></p> <p>The data cannot be read out via network connection (wired or WLAN).</p> <p>Error message: "Connection to the module failed."</p>	<p>The cable used for a physical connection is not suitable. Check if the cable used to connect the PC to the SIM complies with the following requirements:</p> <p>The cable used is a crossed Ethernet cable.</p> <p>The cable is in a good condition (not kinked or porous).</p> <p>The cable is connected firmly.</p> <p>The IP addresses used are wrong:</p> <p>When reading out the data using a physical connection (cable), the first three number sets of the IP addresses of computer and SIM must match.</p> <p>In this case, the fourth number set must not be identical.</p> <p><b>Note:</b> If you are not sure whether the IP information on the inside of the SIM cabinet door is still up-to-date, you can also check this information directly on the SIM. To do this, open menu 2.8.2 on the SIM display.</p>
<p><b>Send configuration</b></p> <p>Error message when trying to send data to the SIM or when trying to retrieve data from the SIM:</p> <p>"The connection to the module was interrupted."</p>	<p>Check the cable.</p> <p>The SIM may not be able to reach other network parties (e.g. light sensor, WTG or park server), or it cannot process the request from Shadow Manager within the time limit. There may also be a general network failure or a network access problem. A network analysis is necessary to identify the cause of the problem.</p>
<p><b>Send configuration</b></p> <p>The <b>Send configuration</b> button is not available (grayed out).</p>	<p>You have not added a valid license.</p> <p>In order to configure an SIM using Shadow Manager, you have to purchase a product key from us. If you want to use Shadow Manager to configure several SIMs, you need a separate product key for each SIM (or for each project in Shadow Manager).</p> <p>Choose <b>Help &gt; Licenses</b> to add a valid product key (sent to you by email).</p> <p>For further information, please refer to → 2.2 Preparing the communication with the SIM.</p>

Problem/error message	Possible cause and solution
<p><b>Edit walls and areas</b></p> <p>When I enter the coordinates for the length of a wall or the side of an area in the <b>Edit walls and areas</b> window, the field displaying the value in meters is shaded in red.</p>	<p>If the parameter defining a wall or an area in meters (the field to the right of the coordinates fields) is shaded in red (instead of green), the maximum length of a wall or side of an area has been exceeded. Check that you have entered the coordinates correctly. The maximum length of a wall or of the sides of an area is set in the <b>Configuration</b> menu under <b>Walls and areas</b>.</p> <p>For further information, please refer to → section 4.5.</p>
<p><b>Edit walls and areas</b></p> <p>The coordinates I entered <b>Edit walls and areas</b> window to define the length of a wall or an area side make no sense.</p>	<p>The coordinates of all WTGs and PIs must be defined using the same metric coordinate system. You may have used values based on different coordinate systems.</p> <p>For further information, please refer to → <b>Error! Reference source not found.</b></p>
<p><b>Password</b></p> <p>When sending the configuration data to the SIM, I am asked to enter a password.</p>	<p>Before the data are sent to the SIM, you will be prompted to enter the SIM password. The default password is 0000.</p>



Please note that due to technical reasons, Shadow Manager uses decimal commas instead of decimal points.