Area scanning distance sensor rotoScan RS 3

Configuration software for Windows 95/98/NT

1   General Information

1.1   About the RS3 Configuration Software

The software described here is intended for the configuration of the rotoScan RS3, using a PC.

The present version of the RS3 configuration software has been completely revised for Microsoft Windows 95/98/NT.

The software allows you to trace the RS3's scan on a plot, which permits immediate identification of possible violations of safety fields. The program permits the definition of safety fields and their modification to suit the respective environment.

A simple parameterization permits the RS3 to be configured for a wide variety of applications.

1.2   Explanation of Symbols

The symbols used in this manual are explained below.

Attention
This symbol appears in front of text which must be carefully observed. Failure to heed this information can lead to injuries to personnel or damage to the equipment.

Note!
This symbol indicates text which contains important information.

1.3   Contact address

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2   Installation of Hardware and Software

2.1   Hardware

2.1.1   Prerequisites

To be able to configure the rotoScan via a PC, you need the base unit (RS3) and a cable wired to suit the interfaces X1 at the RS3 and RS 232 at the PC.

The connection of the RS3 will only be described briefly here. Detailed information may be found in the Technical Description of the rotoScan RS3.
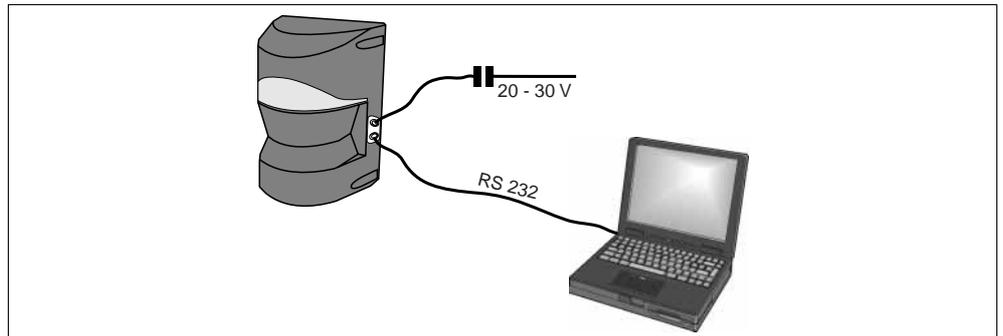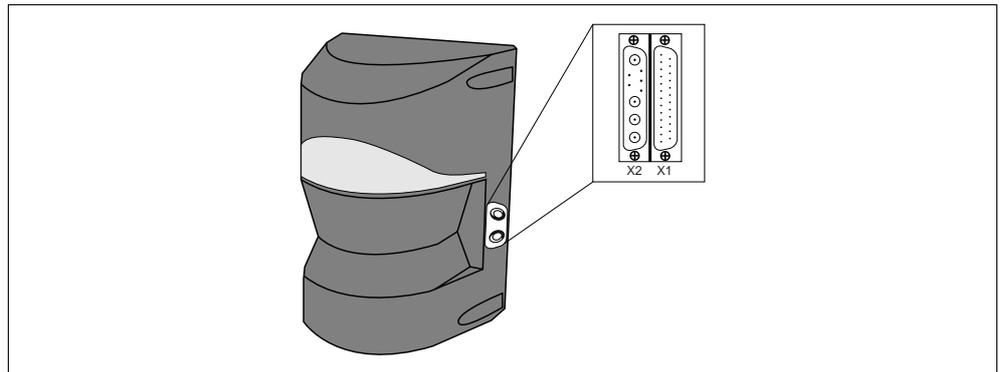
2.1.2   Pin allocation of the X1 interface connector
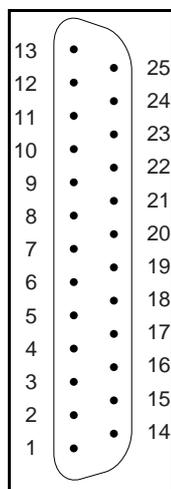
Only the pins listed in the table are required to configure the RS3 via a PC.

PIN	Signal	Description
1	**GND**	**Ground (voltage supply)**
2	**U$_B$**	**20 - 30 V DC**
3	**Opto_GND**	**Ground (optocoupler)**
6	**COM_GND**	**Ground (interface)**
7	**RXD**	**RS 232 receive data**
14	**active**	**Transmitter ON (input)**
19	**TXD**	**RS 232 transmit data**

2.1.3   Pin allocation of the RS 232 interface connector
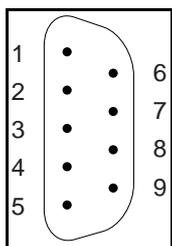
Only the pins listed in the table are required to configure the RS3 via a PC.

PIN	Signal	Description
2	**TXD**	**RS 232 transmit data**
3	**R x D**	**RS 232 receive data**
5	**COM_GND**	**Ground (interface)**
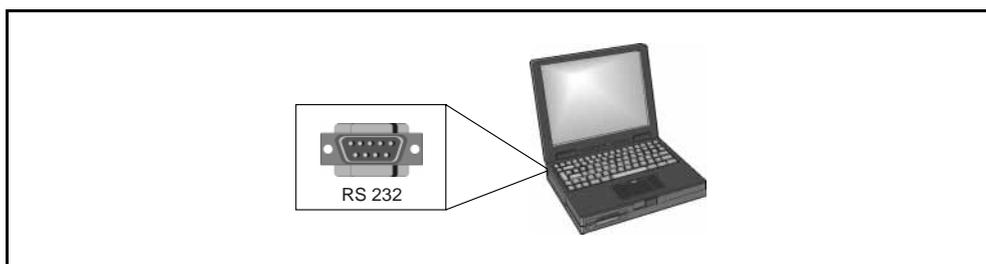
2.1.4   Wiring the two connectors

Wire the two connectors as shown in the following diagram.

The interface cable available as an accessory is shipped in the same configuration.
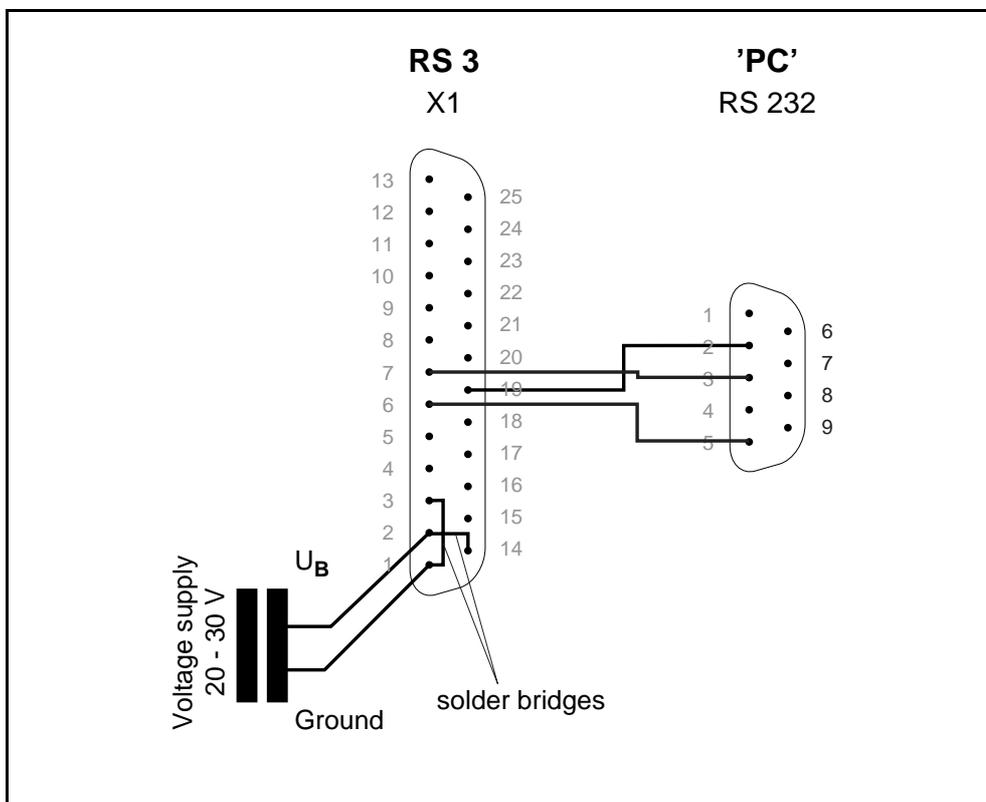
2.2 Software

2.2.5 System requirements

- An Intel® processor at Pentium® level or faster (or compatible models, e.g. AMD® or Cyrix®)
- At least 8 MB RAM
- A 3½'' floppy drive
- A harddrive with at least 8 MB of free space.
  If you intend to save area or configuration parameters, you may require additional disk space.
- A mouse
- An unused RS 232 interface (serial)
- Microsoft® Windows 95/98/NT®

2.2.6 Installation

To install the RS3 configuration software, you need the three installation disks included.

The first disk contains the setup program.
This program launches a self-explanatory installation routine.

After the installation, the program is ready to be launched.

3　First Steps

⚠️ ***Attention!***
Verify that the connectors for the X1 und RS 232 interfaces are wired correctly.
An incorrect wiring of the X1 interface at the rotoscan RS3 may result in serious and possibly irreparable damage to the equipment.
If the RS 232 connector is wired incorrectly, configuration data will either be corrupted or not be transferred at all.

ℹ️ ***Note****!*
Before launching the RS3 configuration software, you should switch on the RS3's power supply. Otherwise, it will be impossible to receive data from the unit.
However, even if the RS3 is not connected to the PC, you may still define parameters and save them to disk. You may also evaluate data that has been saved to disk.

3.1　Launching the Program

To launch the RS3 configuration software, select the entry **RS3 configuration** from the menu **Start** → **Programs** → **Leuze electronic** → **RS3 configuration**.

Downloading configuration data from the RS3

After the launch, your computer establishes a connection to the rotoScan RS3 with the help of the software, and loads the current configuration data from the RS3 into the software.

During the download, the following window appears on the screen:

> The configuration is being loaded from the RS3.
>
> 0%　　　　　　　　　　　　　　　　　100%
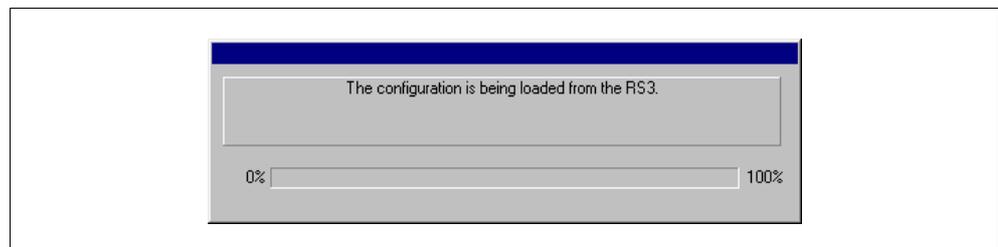
ℹ️ ***Note****!*
If the download is unsuccessful, then the unit is either not ready for operation or the connecting cable is wired incorrectly.

Defining the authority level

In the next step, the program will ask you to declare your authority status by selecting a authority level and by entering a password defined for this level.

The default authority level "user" does not require a password. As user, you may change certain parameters or evaluate data that has been saved (see Chapter 4.3 "Authority Levels").

The program's user   Once your access authority has been confirmed, the actual user interface of
interface   the configuration software appears:

menu bar

tabs

tool bar
(different for each tab)

display of safety area
parameters on a grid
(units in meters)

position of the last
cursor action

shift or reset the
display

read/write
status of the
configuration

status display in hierarchy levels

protection area and/ or
warn area selected
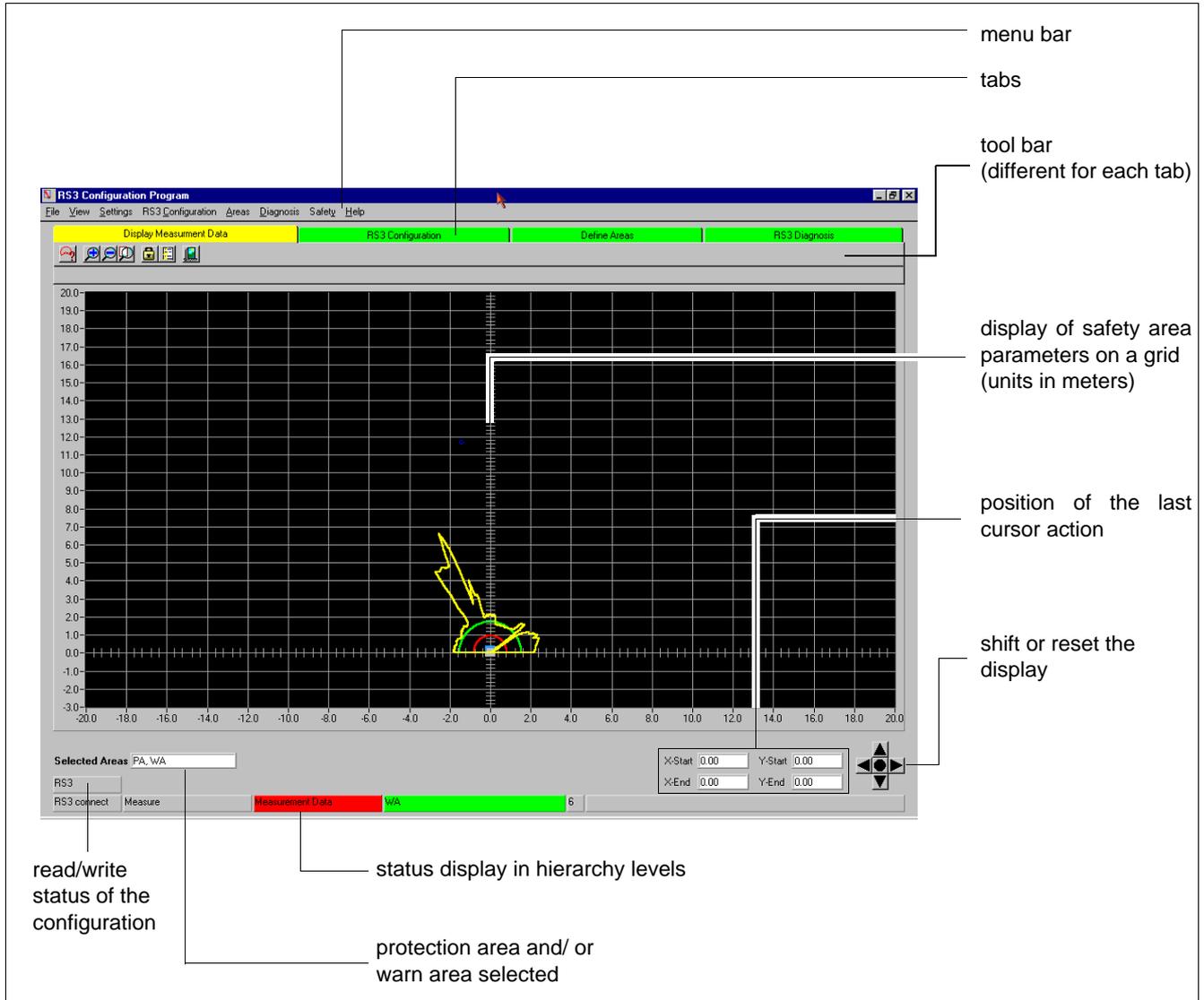
3.2   Description of the User Interface

3.2.1   The Menu Bar

All of the program's commands are accommodated in a variety of menus.

You may regard the menu names as heading for the commands within them.

○
⊥   *Note!*
Some commands are only available from the associated tab.

The following chapters deal in more detail with the usage of the individual
commands.

The following overview gives you a brief explanation of the commands contained in the menus.

Command	Sub-Commands	Function
File menu		
Load Area		Load area parameters that have been saved
Save Area		Save active area definition
Load Configuration		Load a configuration that has been saved
Save Configuration		Save active configuration
Exit Program		Exit RS3 configuration
View menu		
Zoom		Zoom in
Unzoom		Zoom out
Total		Zoom to 100%
Save Diagram		Save current view as bitmap
Settings menu		
Operation Mode	Display Measurement Values	
	RS3 Configuration	Change between the four operating modes (tabs)
	Define Areas	
	RS3 Diagnosis	
PC Configuration	Interface	Selection and parameterization of the serial interface
	Language	Selects the language (German/ English) → extendable
	Switch Diagram Color	Selects the background color (black/ white)
Protection Areas		Selects the visible areas (warn / protection area)
RS3 configuration menu		
Get		Download configuration from RS3
Transfer		Upload new configuration to the RS3
Change		Change the equipment parameters
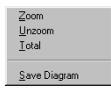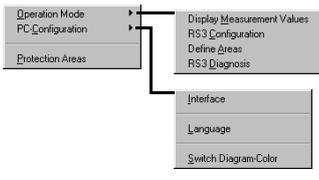
Areas menu

Command	Sub-Commands	Function
Select Area		Selects the area that is to be defined
Show Minimal Area		Displays the smallest area that can be defined
Define	Define Area	Defines an area via corners, circle, rectangle, polygon, and surrounding contour
	Circle	
	Rectangle	
	Polygon	
	Teach In	
Modify	Change Segment	Reshapes an existing area
	Cut	Cuts the sides of an existing area
	Fade out Segment	Deactivates individual segments of the area
Delete		Deletes the area selected
Transfer		Upload newly defined area to the RS3

Diagnosis menu
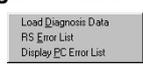
Command	Sub-Commands	Function
Load Diagnosis Data		Display RS3 diagnosis values (equipment parameters and errors)
RS Error List		Displays the most recent RS3 equipment errors
Display PC Error List		Displays the most recent software errors

Safety menu

Command	Sub-Commands	Function
Change Authority Level		Changes the authority level
Change Password		Changes password for the authority level
Determine Password		Displays the password as an encrypted number that may be forwarded to the Leuze Customer Service

Help menu

Command	Sub-Commands	Function
Contents		Contents of the help system
Search		Help system index
Info		Information about the RS3 configuration software

3.2.2 The Tab and Tool Bars

To make working with the RS3 configuration software easier for you, the user interface is divided into several categories.

These categories correspond to the four modes of operation in **Settings →
Operation Mode** and are displayed as tabs.

Each tab (i.e. every mode of operation) has its own tool bar. The display of the area values also depends on the mode of operation selected.

You can select the mode of operation either by clicking on the respective tab, or via the menu entry **Settings → Operation Mode**.

The symbols in the tool bar provide easy access to commands that you can also select via the menu bar.

The tool bars are divided into general and special commands. The general commands are available on all of the four tool bars.

General commands　The following figure shows the general symbols that are always the last symbols on display on the tool bars:
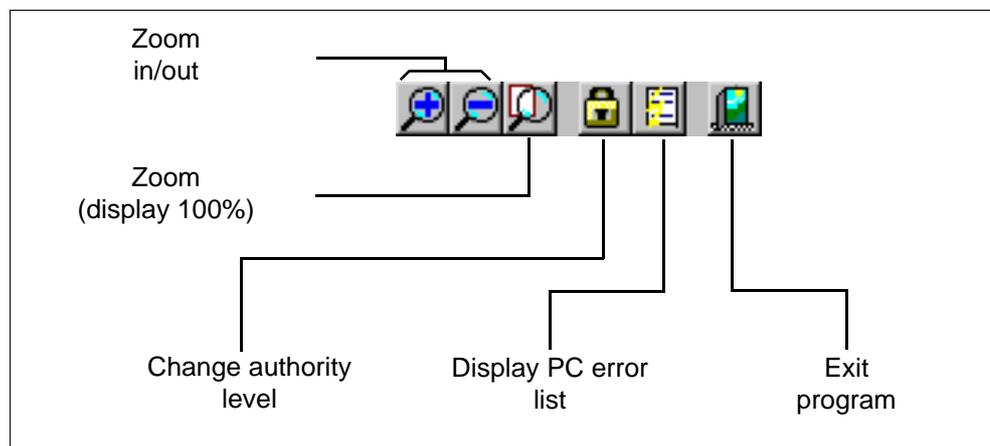
Special commands　Even if some of the special command symbols may look similar, they have different meanings. For example, there are two versions of the "Save" and "Load" symbols:
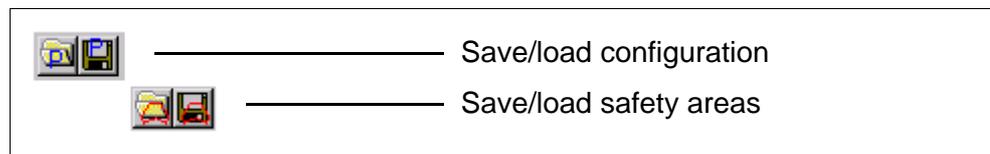
All other command symbols will now be described briefly in the following figures, sorted by the tab they belong to:

Special symbol for the "Display Measurement Data" tab

select areas to be displayed

Special symbols for the "RS3 Configuration" tab

change RS3 configuration parameters

transfer current RS3 configuration

get new configuration to RS3

Special symbols for the "Define Areas" tab

Protection Area

select area to be edited (protection area, warn area)

transfer new area to RS3

delete current area

fade out segments of the area

cut area

change area segment

teach in area

edit area by drawing a polygon line

edit area by drawing a rectangle

edit area by drawing a circle

define area by entering distance values for left, right, and front
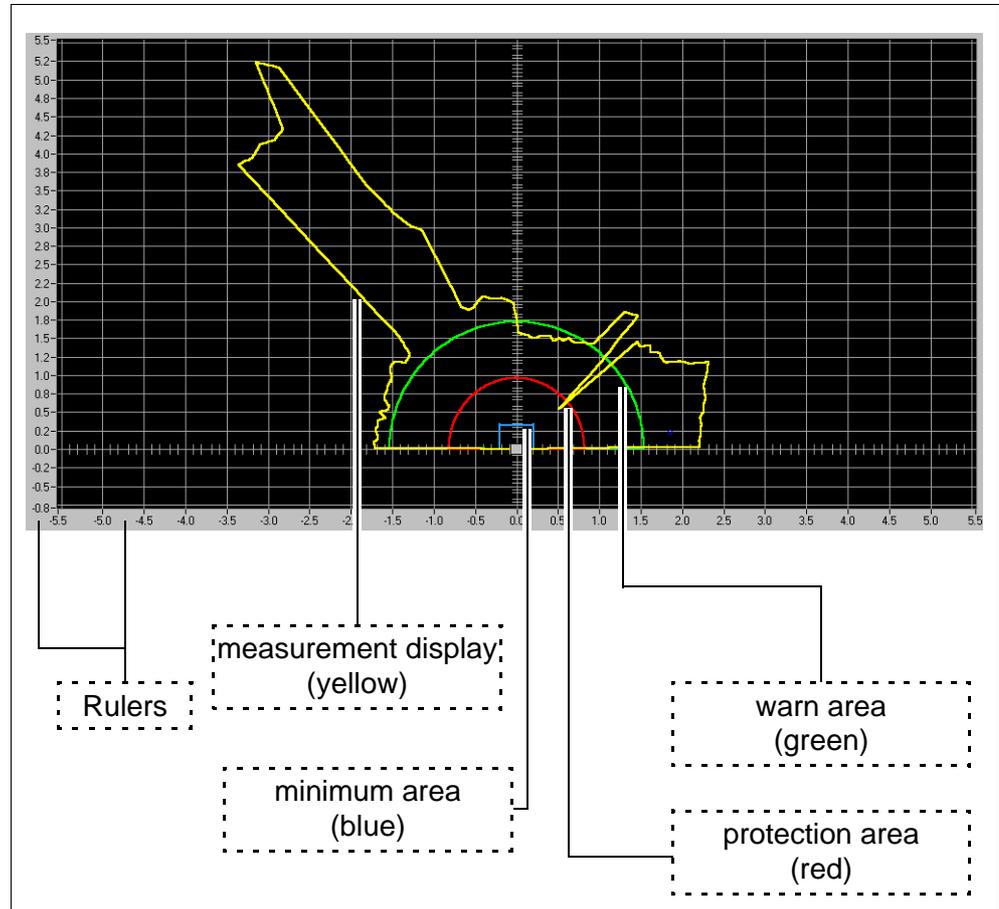
Special symbols for the "RS3 diagnosis" tab

display RS3 error list

display RS3 diagnosis values (equipment parameters and errors)

3.2.3   Display of Area Values (Window)

The program's actual window comprises different components and mainly serves as a display for the measurement values and for the definition of the protection and warn areas.

Rulers   The dimensions on the rulers are in meters. When you zoom in or out, the dimensions change in accordance with the respective zoom level.

Display of measurement values   The tab "Display measurement values" shows the RS3's current measurements as a yellow curve. The unit's laser probes the surroundings with a scan rate of 100ms. If an object enters the scanning area, it will be detected by the laser after no more than 100 ms. The object is shown on the display as soon as it is detected by the laser.

Note!
The display of the measurement values on the screen reflects the orientation of the RS3. If, e.g., a person or an object enters the scan field from the right (with respect to the direction in which the RS3 is facing), the plot curve on the right will change.

The modes of operation "RS3 configuration", "Define Areas", and "RS3 diagnosis" freeze the last plot curve measured before switching to the respective mode.

Warn area and protection area

The two types of areas define the detection field of the RS3. The warn area detects non-safety-relevant objects at a distance of up to 15 m. The protection area is used for safety-relevant objects and detects these at a distance of up to 4.0 m. The protection area must not be smaller than the minimum area. The minimum area defines the smallest field that an area must encompass. The minimum area results from the specified parameters that you can view and modify in the RS3 configuration (see Chapter 4.2.1 "Safety-critical parameters").

Each area is shown in a different color and has a different mnemonic in the area display of the status bar.

- warn area = green [OSF, object safety field]

- protection area = red [PSF, personal safety field])

- (minimum area = blue)

In "Display measurement values", you are always able to monitor an object that approaches or violates the respective area. A violation of the respective area exists when the yellow measurement plot curve enters the green or red area respectively:
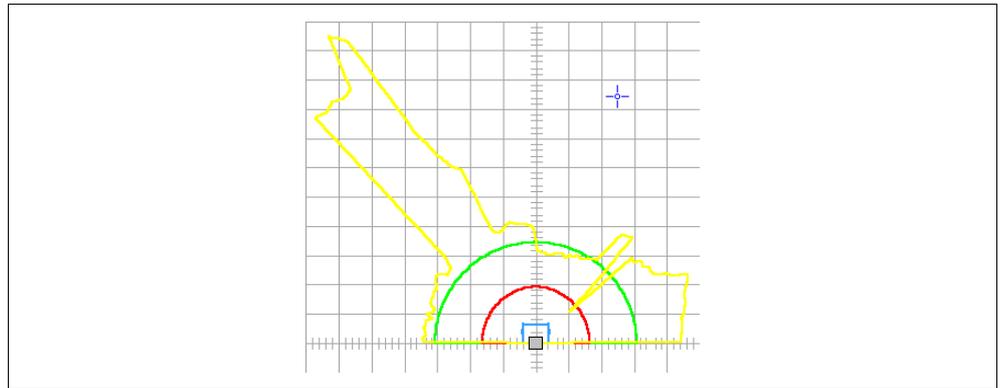
If you only wish to monitor a single area on the screen, you can turn off the display of the other area via the menu item **Settings** → **Protection Areas** or the respective symbol on the "Display measurement values" tab.

○
ⁿ *Note!*
Turning off the display of an area has no influence on its monitoring! If a violation of an area occurs, the outputs are switched as usual, even if the area is not displayed.
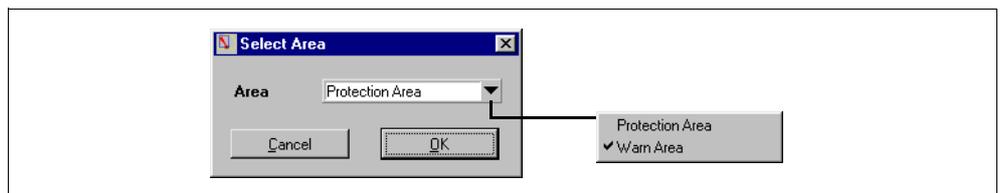
To adapt the two areas to your application, you may edit and change them in the "Define areas" mode of operation.

Write/read status of the configuration	This field shows from where the current configuration data was loaded, and to where it was last written.

Display	Description
	Configuration parameters have not been loaded or saved, e.g. when the RS3 is not ready and the software is started.
RS3	Data was downloaded from the RS3 or was saved in the RS3.
File	Data was loaded from - or saved to - a file.

○
⫝̸ ***Note!***
The display also changes if only part of the configuration data is loaded or saved (e.g. only the area).

The Status bar   The status bar informs you about the current status of the RS3's inputs and outputs.

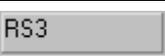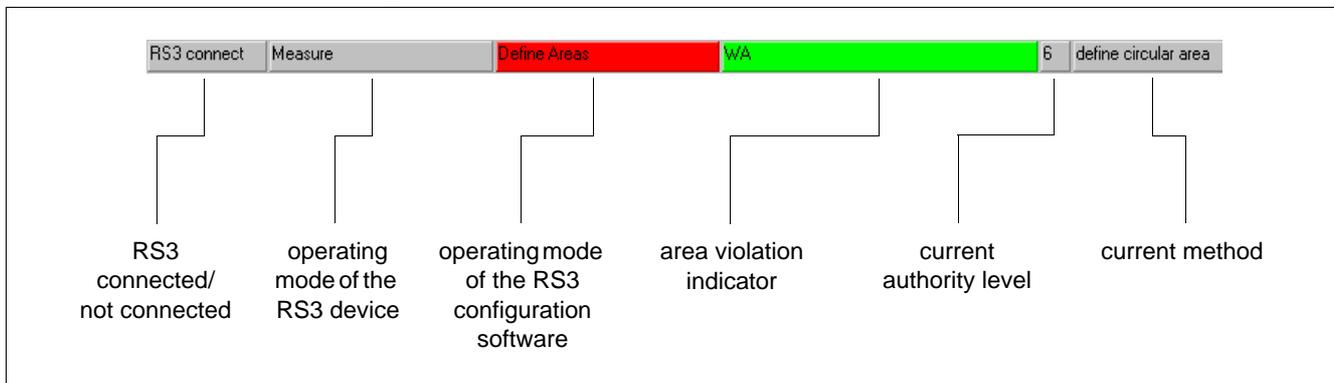The first field tells you the operational status of the RS3. The following field shows you the mode of operation (Scanning) and possible error messages. The next field contains the PC program's active mode of operation. The fourth field is reserved for indications of area violations. If this field is green (OSF), a violation of the warn area exists. A red (PSF, OSF) display of the field indicates a violation of both areas.

The number in the next field shows your current authority level:

- 1 = user
- 2 = maintenance
- 6 = authorized user
- 7 = Leuze QS
- 8 = Leuze Development

RS3 is not ready				
RS3 disconnect		Define Areas		6

The unit is connected and no area is violated (standard)				
RS3 connect	Measure	Measurement Data		6

None of the two outputs is switched.

Warn area is being violated				
RS3 connect	Measure	Measurement Data	WA	6

Output 1 is switched

Both areas are being violated				
RS3 connect	Measure	Measurement Data	PA, WA	6

Outputs 1 and 2 are switched

RS3 error (will be shown in field 2)				
RS3 connect	Error: 401	Measurement Data	PA, WA	6

Restart is inhibited - both outputs are switched

3.3 Configuration of the PC

3.3.4 Parameterizing the serial interface

The menu **Settings** → **PC Configuration** → **Interface** permits you to define the RS232 interface that is to be used. The transfer rate is fixed at 9600 Baud and cannot be changed.
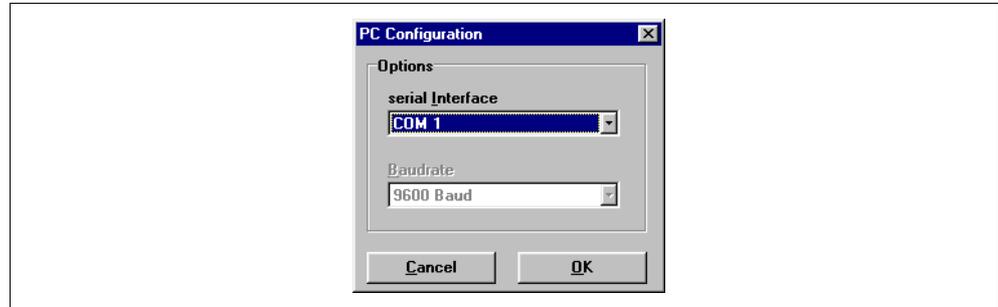
3.3.5 Defining the program language

Use the menu **Settings** → **PC Configuration** → **Language** to select the language used by the program. You have a choice between English and German.

3.3.6 Selecting the background color

A black background is recommended for better viewing of the yellow plot curves. However, white is the better color for setting the area parameters. To select from these two colors, click on **Settings** → **PC Configuration** → **Switch Diagram Color**. A tick in front of the command indicates that "white" is the chosen color.

4 Configuring the Unit's Parameters

The rotoScan RS3 is a versatile protection device and may thus be configured for a wide variety of applications (see the "Technical Description" of the RS3 for examples).

The default factory settings and their other possible settings are listed in the following table:

parameter	default	possible settings
method	standard	default
		side detection
		car park wall
		car park ceiling
left edge	100 mm	100 mm - 3500 mm
right edge	100 mm	100 mm - 3500 mm
velocity	360 mm/s	300 mm/s - 2500 mm/s
response time	400 ms	100 ms - 22500 ms
braking distance	100 mm	100 mm - 3500 mm
measuring error	100 mm	100 mm - 1500 mm
frequency channel	1	1-5
average from (number of scans)	1	1-15
restart	100 ms	100 ms
		manual
ctrl delay	0 ms	0 - 500 ms
RS3 password	RS3LEU	arbitrary (6 characters)
protection area	semi-circle with r = 4.5 m	
warn area	semi-circle with r = 0.8 m response time = 400 ms	
RS 232	continuous data transmission (unconditional) 90° distance measurement values (2° sectors, 180° area)	

4.1 Current RS3 Configuration

Download configuration   If you had the RS3 connected to the PC when you launched the program, the unit will automatically transfer the current parameters to the PC. This also applies if the unit was temporarily disconnected from the PC (e.g. during replacement of the unit) and the program detects it via the serial interface.

If you made changes to the configuration and you didn't transfer the previous configuration to the unit, you may manually load the configuration stored in the RS3.

For this purpose, choose **RS3 Configuration** → **Get** from the menu bar or click on the button 🔴 on the "RS3 configuration" tab. This results in a fresh download of the unit's parameters.

⚠️ ***Attention***

Save current configurations before making changes! This allows you to restore the original settings if you entered wrong data. More detailed information regarding the saving of configurations may be found in Chapter 4.4 "Loading/Saving the Configuration".

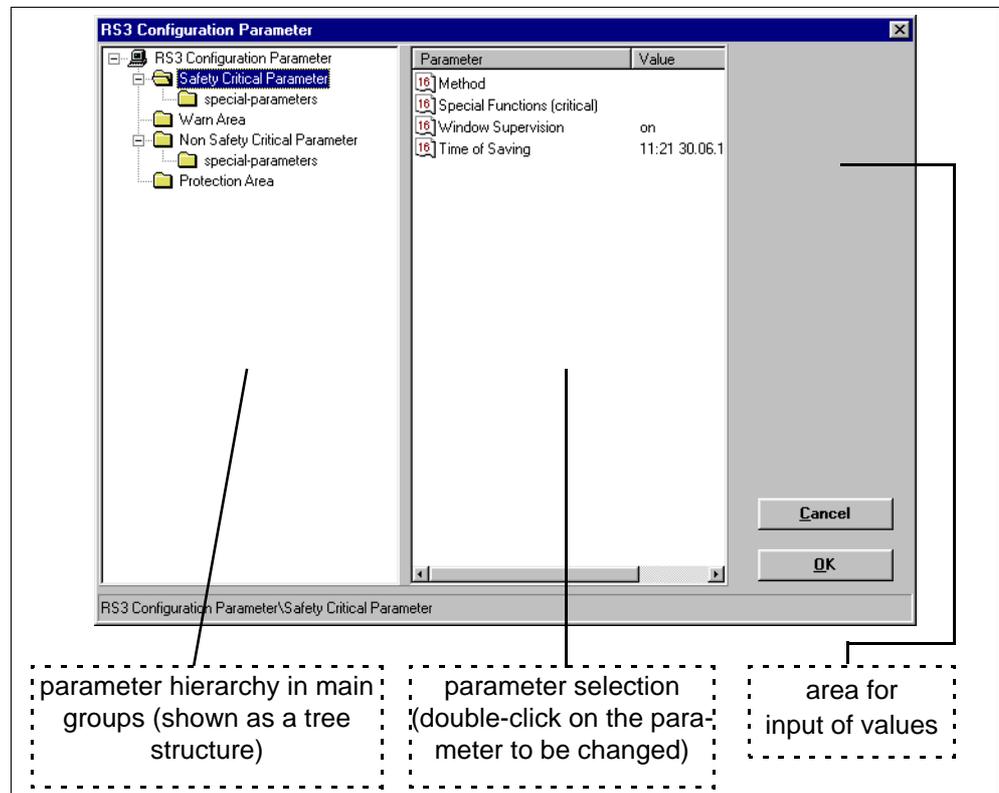## 4.2 Change RS3 Configuration Parameters

○
⫙ ***Note***
You require the authority level "authorized user" or above to view or change the unit's configuration.

To modify the RS3's configuration parameters, open the dialog window "RS3 configuration parameters" as follows:

• Select the tab "RS3 configuration" and then the command **Change** from the menu **RS3 Configuration**, or

• click on the symbol 🅿 in the tool bar of the tab "RS3 configuration".

A dialog window appears. It consists of the three parts shown in the following figure:

parameter hierarchy in main groups (shown as a tree structure) | parameter selection (double-click on the parameter to be changed) | area for input of values

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To change a parameter, choose the desired hierarchy level on the left side and select the parameter on the right by double-clicking on it.

There are two ways of editing a parameter.

Some parameters may contain multiple values. In this case, a separate dialog window will be opened when the parameters is selected. The values may then be entered into that dialog window.

Other parameters may contain one changeable value only. In this case, the selection takes place in the area designated for the input of values. The bottom field there permits the selection or the input of new values.

4.2.1　Safety-critical parameters

Method　　The adherence to safety-critical minimum values requires the input of application-specific data under the "method" parameter.
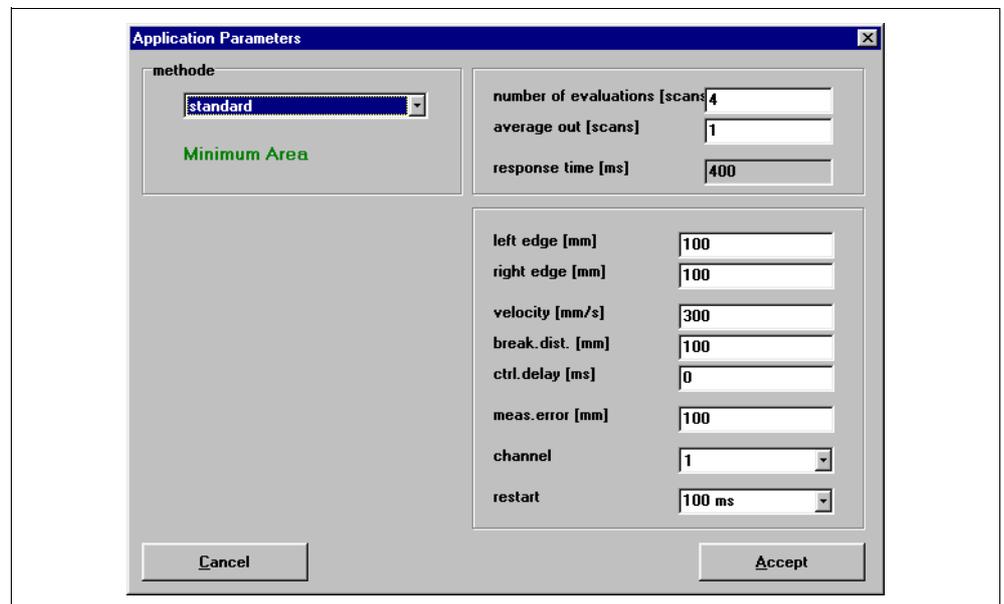
Selection box "Method"

The selection box offers you four different methods that you may configure in accordance with the RS3's application.

This configuration determines how the RS3 evaluates the measurement values obtained, and when the outputs are to be activated.

Method	Description
Standard	This method continuously compares the measurements with the area contours stored. If an area violation occurs beyond the duration of the configured response time, the respective outputs are switched. You must define a minimum area (see next section).
side detection	This method is used mainly for rail-guided vehicles and under special construction-related conditions. The description of this method may be found on page 36 of the "Technical Description" of the RS3. A special protection area is defined.

Method	Description
Car park wall	This evaluation method has the advantage that even shiny objects are reliably detected. The RS3 is mounted on, e.g., a wall and monitors a space. If a different distance is measured in one of the sectors, the outputs are switched to "presence". This method gives you the option to specify certain margins that apply to the detection of an object. tolerance tol. front [mm] 1 tol. behind [mm] 1 timing [ms] 100
Car park ceiling	This method is rather similar to the previous one. The difference is that in this method, the RS3 is used like a photoelectric sensor. The unit is mounted on a ceiling and monitors the area underneath from this position. Walls or pillars may be excluded later during the definition of the area (see Chapter "Fade out area segment"). This method also permits the specification of additional margins.

Computing the minimum area

The values from the "application selection" are used by the program to compute the minimum area for the protection of persons. The smallest minimum value possible is 200 mm straight ahead and 200 mm to the side for the default method, and 600 mm for the "side detection" method. The maximum value for the area is 4.5 m straight ahead and 3.5 m to the side.

The minimum area is calculated from the dimensions of the hazardous machine parts and their speed.

The maximum depth of a rectangular area for a given range is limited by the maximum range and is calculated according to the following formula:

$$\mathrm{maxDepth} = \sqrt{(\mathrm{maxRange}^2 - \mathrm{edgeDistance}^2)}$$

Value	Description
maxDepth	maximum possible area depth
maxRange	maximum range of 4.5 m
edgeDistance	distance between sensor and edge of the danger area (e.g. vehicle edge in the case of a vehicle)

After taking response times and safety margins into account, one obtains the area depth to be set:

$$\mathrm{areaDepth} = \mathrm{velocity} \times (\mathrm{responseTime} + \mathrm{ctrlDelay} + \mathrm{brakeDistance}) \times 1,1 + \mathrm{measError}$$

Value	Description
velocity	maximum velocity of vehicle (max. velocity allowed: 2.5 m/s) or approach velocity of 1.6 m/s in case of an area
responseTime	the response time of the rotoScan RS3 is calculated from the following formula: $responseTime = numberofevaluation \times 100ms \times averageevaluation$. **Example:** You want the area to trigger when an average of two out of four successive scans show a presence. For this purpose, the "number of evaluation" must be set to 4 (x 100 ms scanning rate of the RS3) and the "average out (number of evaluation)" must be set to 2. The formula above yields a response time of 800 ms.
ctrl delay	controller response time
braking distance	distance travelled between application of the brake and vehicle coming to a halt
measuring error	margin added to the area
factor 1.1	margin added to account for possible wear of the brakes

The minimum depth for the area protection is computed as follows:

$$areaDepth = 1, 6 \times (responseTime + ctrlDelay + brakeDistance) \times 1, 1 + measError$$

Frequency channel

If you are using several rotoScans next to each other, the measurement values may be corrupted through mutual interference between the units. To avoid this, you should operate neighbouring units on different frequency channels. You may choose from up to 5 channels.

Restart

When the rotoScan has switched its output contacts following a violation of the protection area, it can either release the contacts automatically, or wait for a release by the operator. For the automated release, the parameter "restart" must be set to a value of 100 ms, i.e. the protection area has to be vacant for at least 100 ms for the output contacts to be released.

In various applications (e.g. side detection), the protection area must be reset by external action. For this purpose, choose the setting "manual".

○
〗 *Note!*
When using the method "side detection", all necessary values for the areas are defined in the application selection. None of the areas created on the "Areas" tab will be taken into account.

Special safety-critical functions   By double-clicking on "Special functions (critical)", you can open the dialog window of the same name that permits you to carry out the following settings:
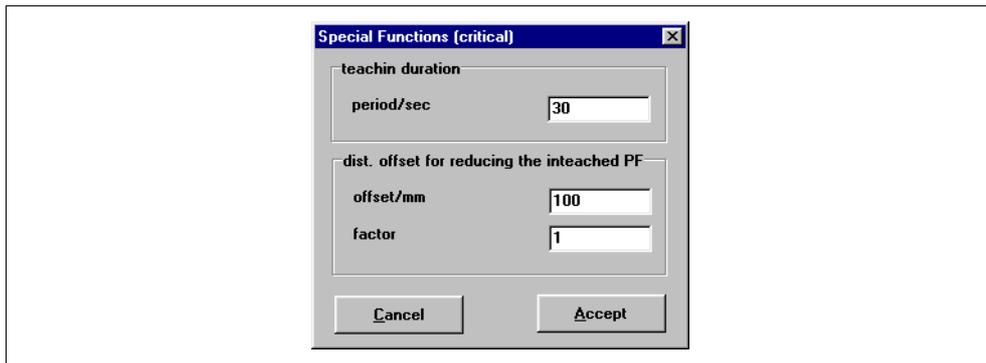
Value	Description
period / sec	This allows you to set the time (duration) of the teaching process (10 s - 500 s). This duration applies to teaching with the PC **and** the hand-held terminal.
offset / mm	To generate an area, the surrounding contour must be reduced, i.e. it must be reduced in the radial direction until **no** erroneous detections caused by **static** environmental conditions occur. For this purpose, you may enter a reduction value in millimeters.
factor	The actual value of the reduction for the area taught is the product of *value / mm* and the *factor*. **Test for at least 30 minutes that the RS3 does not report erroneous detections with the number chosen.**

Window supervision

To be able to detect persons or objects in time, the front cover of the RS3 must be free from dirt. The RS3 has a special supervision circuit, that is intended as a protection against contamination. The switched outputs X1-15 (equipment fault) and X1-18 (warning) communicate the information from the circuit to the output equipment connected.

The function "Window supervision" gives you the option of disabling this circuit.
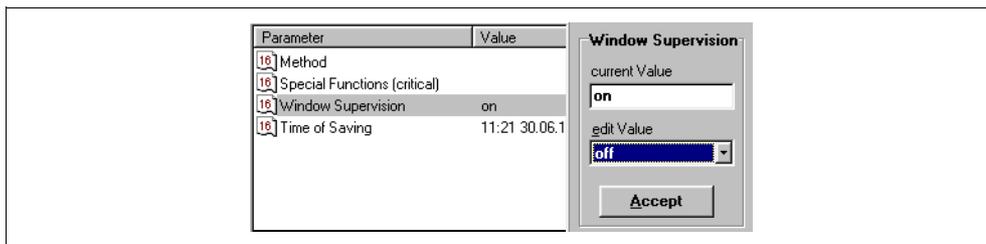
⚠ ***Attention***!
Dark-colored materials are no longer detected as contamination increases. This carries the risk that persons will not be detected, or will be detected too late! You should therefore enable window monitoring whenever possible!

Sub-folder "Special Parameters (critical)"

Normally, you cannot carry out any settings here.

An exception are certain RS3 equipment specifications that have been set by LEUZE Customer Service.

Contact LEUZE Customer Service to find out which settings you can carry out in these specifications.

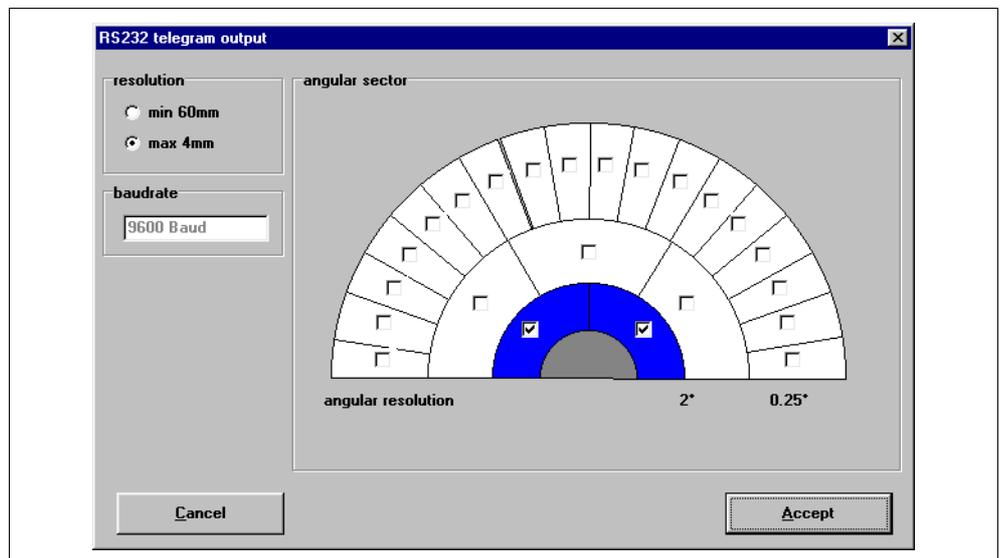### 4.2.2 Non-safety-critical parameters

The non-safety-critical parameters include all parameters that have no influence on the area function:

- the serial number
- various comments
- the evaluation of the RS 232 telegram
- various special functions.

The serial number and the comments may be viewed via their current values. The comments are empty except in units with additional, customer-specific applications.
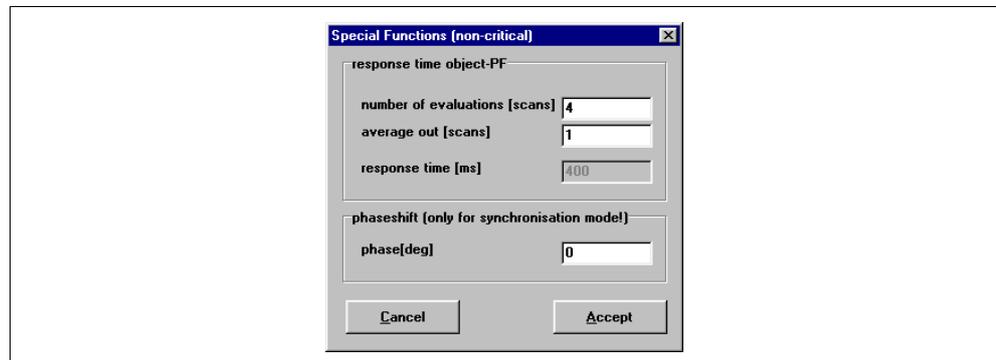
Evaluation of the RS 232 telegram

The distance data only needs to be output via a serial interface for purposes of an additional external evaluation. To set these values, double-click on the entry "RS232 telegram".

Value	Description
Resolution	In the default case, the measurement values are transferred in two bytes to achieve a maximum distance resolution of 4 mm. To reduce the transfer time, you may change this value to 60 mm and thus switch to 1 byte transfer.
Baud rate	This shows the transfer rate of your serial interface. (9600 Baud). The Baud rate cannot be changed.
Angular sectors	Using the mouse, click on the fields to select sub-areas (sectors) that you want to use for external evaluation. The two inner semi-circles (2 and 3 sectors) are intended for the transfer of measurement values in 2° steps. The outer semi-circle is divided into 18 sectors that yield measurements in 0.25° steps. You may combine the sectors in any way you wish.

Non-safety-critical special functions

By double-clicking on "Special functions (non-critical)", you can open the dialog window of the same name that permits you to carry out the following settings:

Value	Description
response time	Similar to the safety-critical functions, the response time is computed from the number of scans and the average from the scans $$responseTime = numberofevaluation \times 100ms \times averageevaluation.$$ Further explanations and an example may be found in Section "Computing the minimum area" on page 20.
phase shift	If you are networking several units together, the deflection mirrors will synchronize with respect to each other to avoid mutual interference. To allow the mirrors to rotate with an offset, you may define a horizontal offset angle at this point. **Remark!** Networking of several units is only possible with the synchronizable version rotoScan RS3-09. Furthermore, you will require special networking software, which may be ordered from LEUZE Customer Service.

Sub-folder "Special Parameters (non-critical)"

Normally, you cannot carry out any settings here.

An exception are certain RS3 equipment specifications that have been set by LEUZE Customer Service.

Contact LEUZE Customer Service to find out which settings you can carry out in these specifications.

4.3 Authority Levels

As described in Chapter 3.1 "Launching the program", you have to log in before you can use the program.

The login takes place using pre-defined authority levels, each of which are protected against unauthorized access by a password (except "user" level).

The passwords are stored in the RS3. Hence, the two authority levels "maintenance" and "authorized user" can only be accessed if the RS3 is connected.

At the various authority levels, the following acccess authorities are available to you:

Level	Password	Access
User	no password	• general settings may be carried out • measurement values may be evaluated • changes to the configuration are not possible
Maintenance	IGOY	• area parameters may be loaded from a disk and uploaded to the RS3. • parameter changes are not possible!
Authorized user	RS3LEU	• Full access to all functions and parameters

Note!

Since the default password of the authority level "authorized user" is a known standard, it should be changed by an authorized person prior to the RS3's commissioning.

All functions that are not accessible from a particular authority level are blurred in the program.

The status bar shows you the current user status (see Section "Status bar" on page 14).

Changing the password To change the password, click on the command "Change password" in the menu "Safety". Enter a six-character password in the following dialog window, re-enter the password, and confirm the input by clicking on OK.

Attention!

*If you should lose the password, choose **Safety→ Determine Password**. This outputs the password in an encrypted format. If you contact LEUZE Customer Service with this code, it will be decrypted and you will be told your actual password.*

Changing the authority level

If you wish to change your authority level during operation, choose the command "Change authority level" from the "Safety" menu, or click on the symbol 🔒 in which you will find on any of the four tool bars. Change to the desired level in the following dialog window, enter the password required, and confirm the action with OK.

Change Authority Level	☒
Authority	Authorised User ▼
Password	
Cancel	OK

4.4   Loading/Saving the Configuration

To save the parameters you have changed, choose the command **Save configuration** from the **File** menu, or click on the button 💾 on the "RS3 configuration" tab.

In accordance with standard Windows procedure, you will be able to give a name to the file and choose a folder in which to save it.

To re-load an existing configuration, choose the command **Load configuration** from the **File** menu, or click on the button 📂 on the "RS3 configuration" tab. Select the folder and the file, then click on "Load".

The parameters saved in this file are now read into the program.

4.5   Uploading a New Configuration to the RS3

Initially, the modified configuration parameters are only stored in your PC's volatile memory.

⚠ *Attention*

Always save the modified configuration. This enables you to re-load the changed settings in case of transfer errors or program crashes.

To store the modified data in the RS3, you must transfer them to the unit. The data transfer may be initiated either via the menu bar (**RS3 configuration** → **Transfer**) or via the toolbar of the "RS3 configuration" tab (symbol 🔳).

Before the transfer, you will be shown the safety-critical parameters from the application selection (see Chapter 4.2.1) in a dialog window.
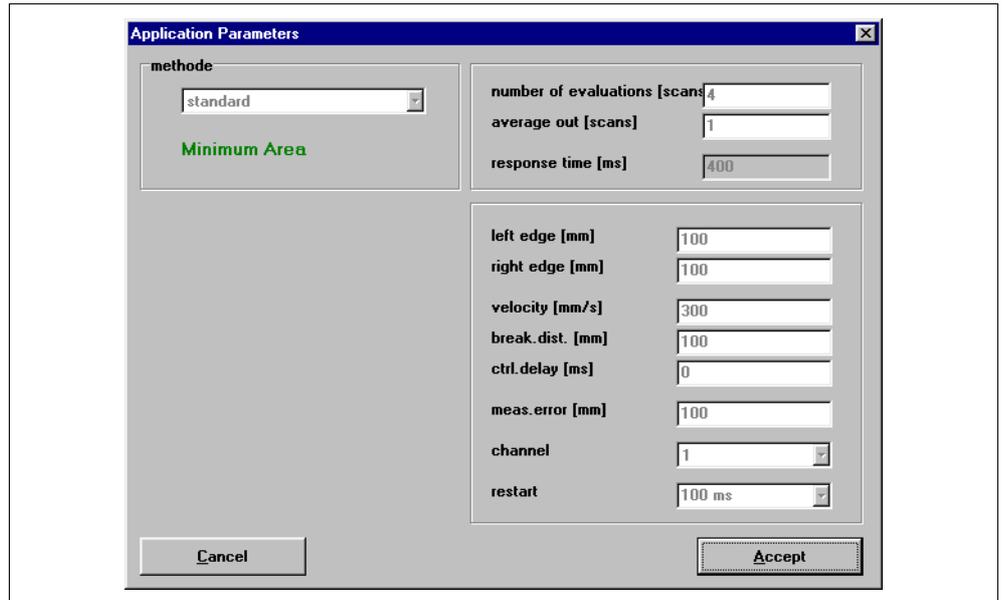
The window allows you to compare the values entered with the intended values. If there are values that differ from the intended ones, you may abort at this point and change the values in the program. If all values have been entered correctly, click OK.

After the confirmation, you will be shown the protection area data to be transferred (see Chapter 5.2.4):
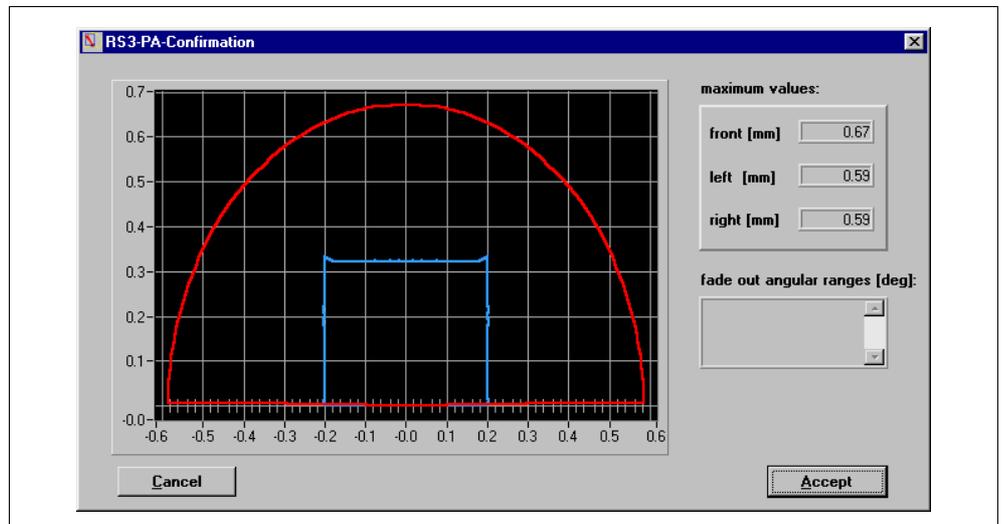
Verify that the values have been entered correctly and then click on "Accept". This stores the configuration data in the RS3.

Note!

If you are using the method "side detection", it is not possible to change the definition of the protection area. All values for the area are set in the application selection.

If transfer errors occur, check the PC error list (**Diagnosis → Display PC error list**) to find the type of error and try to eliminate the problem (see Chapter 6.3 "PC error list").
After solving the problem, try the upload again.

5 Definition of Areas

5.1 General Information

5.1.1 Determining the position

Optical position display   To be able to determine the exact position for certain points on the screen, the status bar features four different fields that display the cursor position.

cursor position at the start of an action

X-Start	-15.15	Y-Start	17.42
X-End	9.18	Y-End	-3.44

cursor position during and at the end of an action
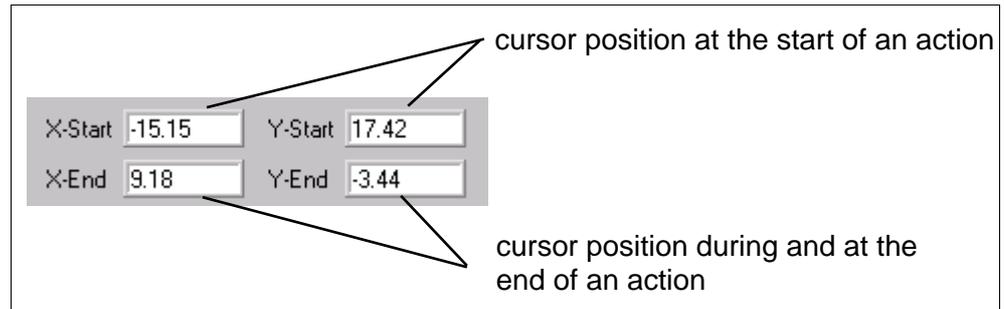
If you click anywhere within the working area, the click position will be displayed in the fields "X start" and "Y start". The click position will also be marked by a blue circle ⊕ (position indicator).

This allows you to obtain exact values from the measured curves.

The two lower values mainly serve as an aid for the exact positioning when areas are drawn manually.

Rulers   The rulers offer another means of determining positions.
They are scaled in meters.

5.1.2 Increasing or decreasing the working area

The zoom functions of the program permit you to adapt the size of the working area.

The program features two versions of zoom:

- automatic, discrete zoom, and
- manual continuous zoom.

Automatic zoom   By clicking the buttons ⊕ and ⊖ (or via the menu command **View → Zoom /Unzoom**), you can zoom in or out of the working area in discrete steps. There are 26 steps, each of which increases or decreases the original view of the working area by 10%.

Manual zoom   This version of the zoom caters for the direct enlargement of areas on the screen.

You can only use it to zoom in! To zoom out, use the automatic zoom.

To enlarge a certain part of the working area, proceed as described below:

1.
Click here with the left mouse button and keep it pressed.

2.
Drag the mouse, e.g., to this position and release the mouse button.

The area enclosed by the yellow rectangle that is generated, is enlarged such that it fills the entire window.
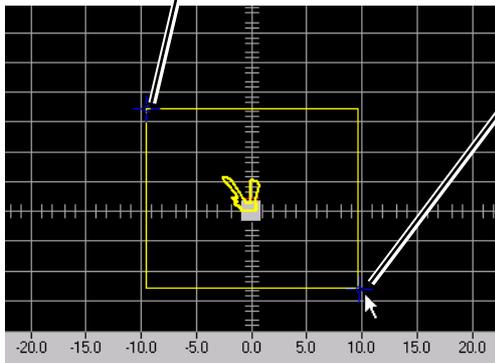
Restore entire view To change from any of the zoom levels to the global view, choose the command **Total** from the **View** menu or click on on the tool bar.

If you click on the point in the center of the display control (bottom right), the view is scaled to the size of the display of the measurement values.

 Click on the point in the center to make the view fit the screen.

5.1.3 Shifting the display

The display may be shifted in the horizontal and vertical directions using the display control.

 Click on the arrows according to the desired direction of movement.

Pressing the **F1** key activates a mode that permits you to shift the displayed area with the mouse. To do so, click into the center of the display and drag in the direction you wish to shift the area to, keeping the left mouse button pressed. The length of the line shown during this action corresponds to the shifting distance.
The position indicator is displayed in "red" during this action.

5.2 Define Areas

The RS3 scans the environment and displays the measured environment contour as a curve in the working area. Furthermore, it continuously compares the contour measured with the area definitions stored in the unit. These areas may be configured using the RS3 configuration software or the hand-held terminal. Consult the manual "Technical Description" for the RS3 about configuration using the hand-held terminal.

To define areas using the software, select the tab "Areas".

The tool bar field `Protection Area` ▼ lets you choose whether you want to redefine the warn or the protection area. This selection may also be made via the menu bar: **Areas** → **Select Area**

○　　*Note*
Ⅱ　　*You can only edit the areas if you have the necessary authority!*

Save the original area definitions before redefining them!

○　　*Note!*
Ⅱ　　*If the method "side detection" is used, the areas defined here will be ignored.*

The symbols in the tool bar are sorted by topic and are identical to the commands in the menu **Areas**.

5.2.4 Drawing areas

You can adapt the shape of the areas to the requirements of your application. For this purpose, the following functions are available to you:

| Designation	Symbol	Menu
Define areas		**Areas** → **Define area** → **Define area**
Circle		**Areas** → **Define area** → **Circle**
Rectangle		**Areas** → **Define area** → **Rectangle**
Polygon		**Areas** → **Define area** → **Polygon**
Teach In		**Areas** → **Define area** → **Teach In**

The following sections explain the usage of the shapes and give hints regarding possible shapes.

Define area　　The scan area of the RS3 is usually equally large to the left and to the right side. However, it may happen that one of the sides is smaller or larger than the other side. For such cases, the area definition procedure "Define area" is used.

To define the area, proceed as follows:

- Select the function "Define area" from the menu or the tool bar. The following input mask will appear on the screen:
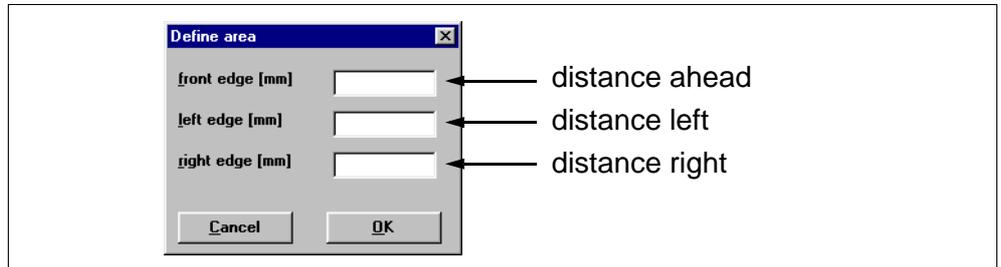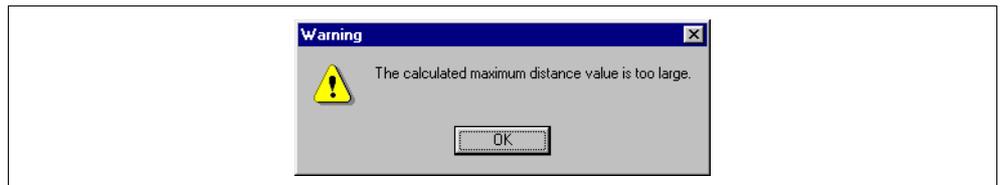

- Enter the required dimensions (in mm) into the mask and confirm your input with **OK**.

- The resulting area has a rectangular shape and has all features of the area type "Rectangle".

Note!
If one of the dimensions you chose is too large, you will be alerted to this by an error message.

Confirm the message and check the values you entered.

Attention!
For protection areas, the maximum size a rectangle may be set to is 3.5x2.5 m.

Circle   The area definition "Circle" is suitable for many applications, except for applications that are based on the "side detection" method.

You may define a circular area as follows:

- For the settings, you require the height (Y value) and the radius (X value) of the circle.
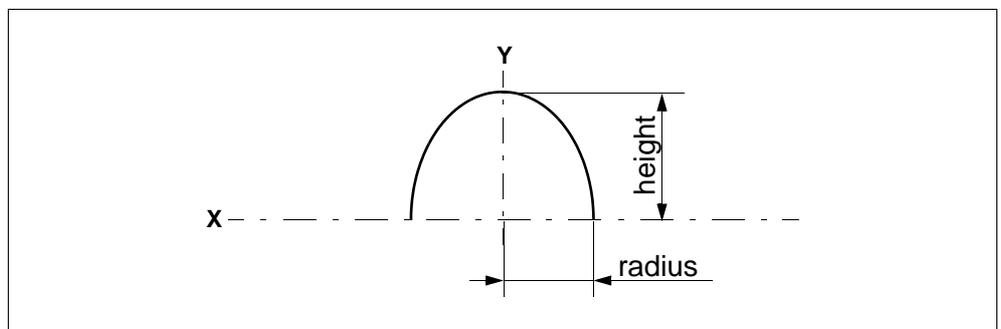
- Locate the two values on the working area (in the example shown, the values are X=3.0 m and Y=3.0 m) and click on the point for fast location later. The position indicator (blue circle) is placed at this position, and the optical position display shows its current coordinates.

• Select the function **Circle** from the menu bar or the tool bar.

• Click on the previously marked point and leave the mouse button pressed for exact positioning.

area being generated

mouse click coordinates
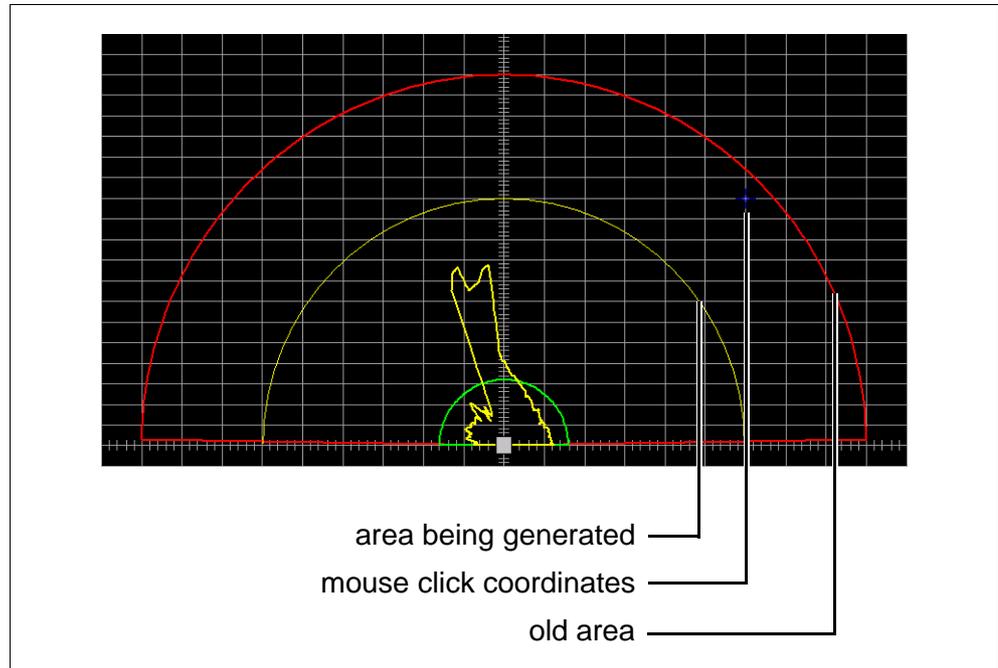
old area

• For the positioning, rely on the optical position display.

X-Start 3.00   Y-Start 3.00
X-End -3.00   Y-End -3.00

values that are required for positioning
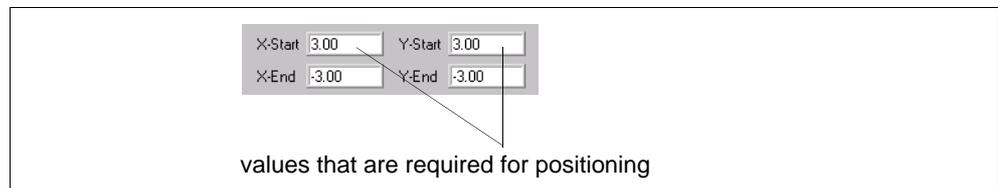
• Only when you release the mouse button, the old area definiton will be deleted from the screen and the new area will be displayed.

⚠ ***Attention!***
For protection areas, the maximum radius that can be set for a circle is 4.5 m.

Rectangle   Similar to the circular areas, you have two values that play a role in the setting, height and width. The width must be halved for positioning as it is set for one side of the X-axis only.
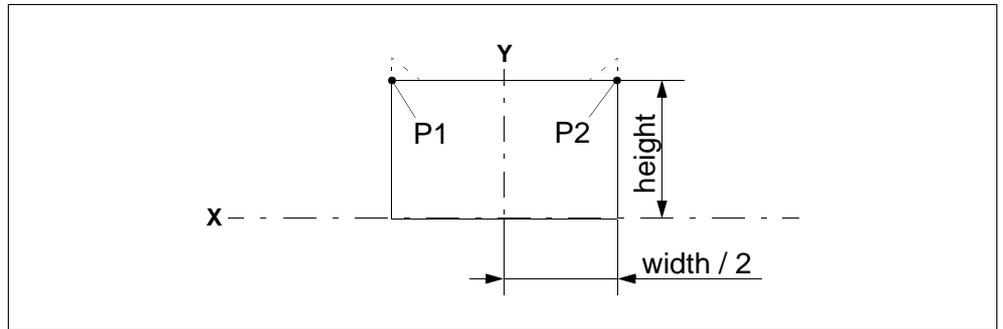
Select the function "Rectangle" from the menu bar or the tool bar.

The rest of the definition is performed in the same way as for the area type "Circle".
Consult the previous section for the necessary steps.

After the area is created, the corners of the rectangle are shifted upward. The extra height depends on the size of the area. This measure is taken because of the RS3's angular resolution (2°). If objects or persons enter the corner areas during a scan, it could happen that they are detected too late. By extending the area at its corners, this area is covered and a threat to objects or persons is excluded.
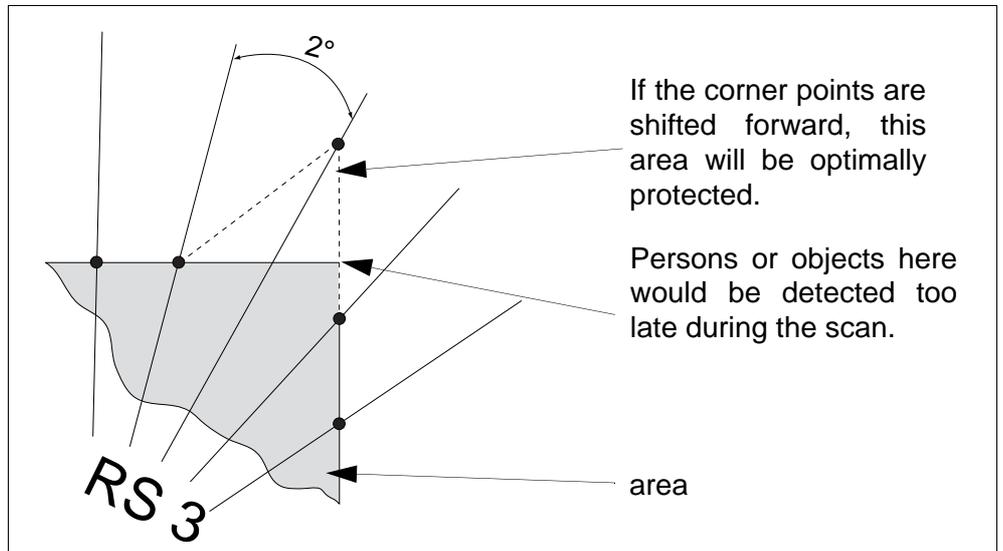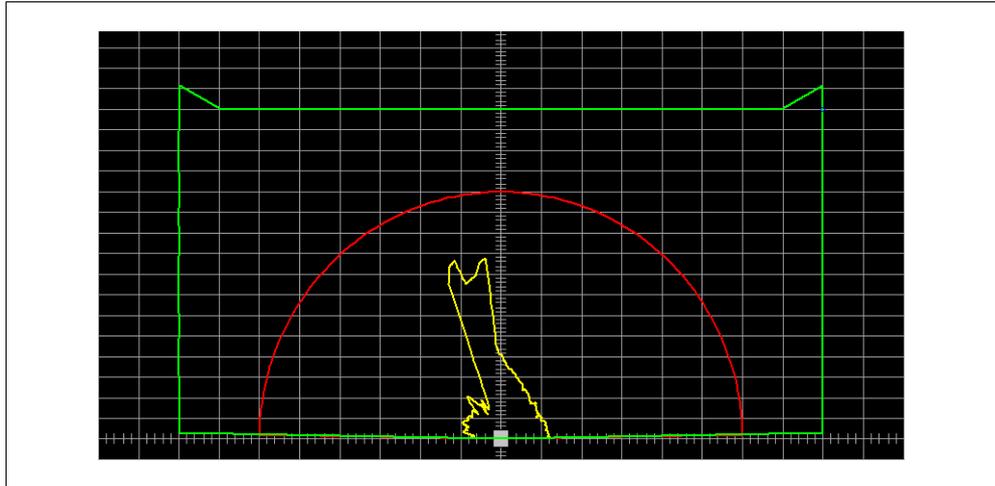
Polygon   For the area shape "Polygon", you set the corners of the area directly. This permits you to mask certain objects that are permanently within the scan area (e.g. pillars).
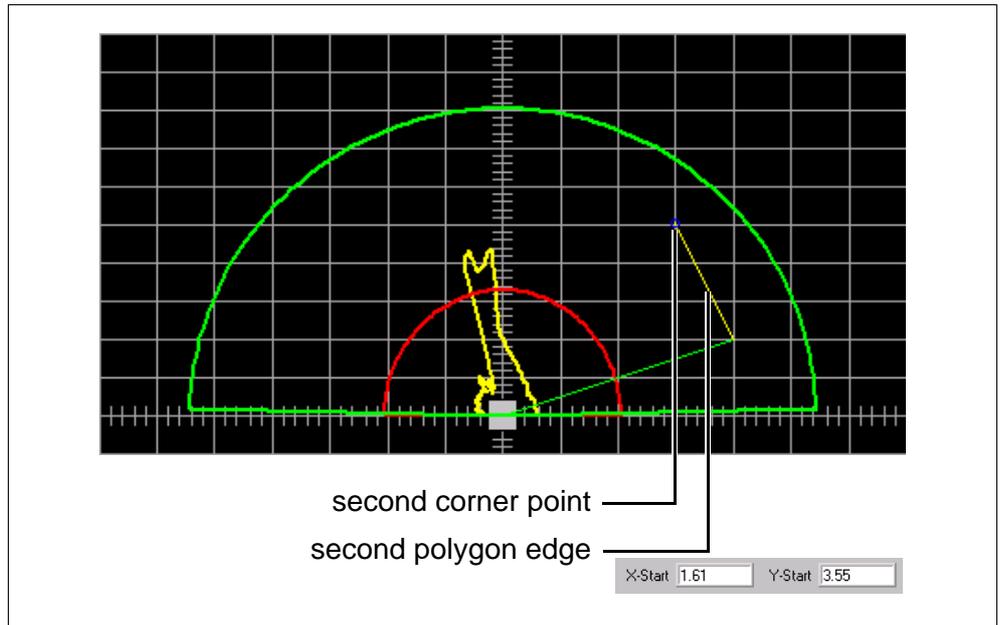
○   *Note!*
Ĭ   *Before you define the area, measure the environment that is to be scanned and note the positions of the corner points.*

When defining a polygonal area, proceed as follows:

• Select the function **Polygon** from the menu bar or the tool bar.

• On the working area, click on the first corner point of the area. If you keep the mouse button pressed, you may use the optical position display for precise positioning.

First polygon edge

first corner point

X-Start 2.92   Y-Start 2.53
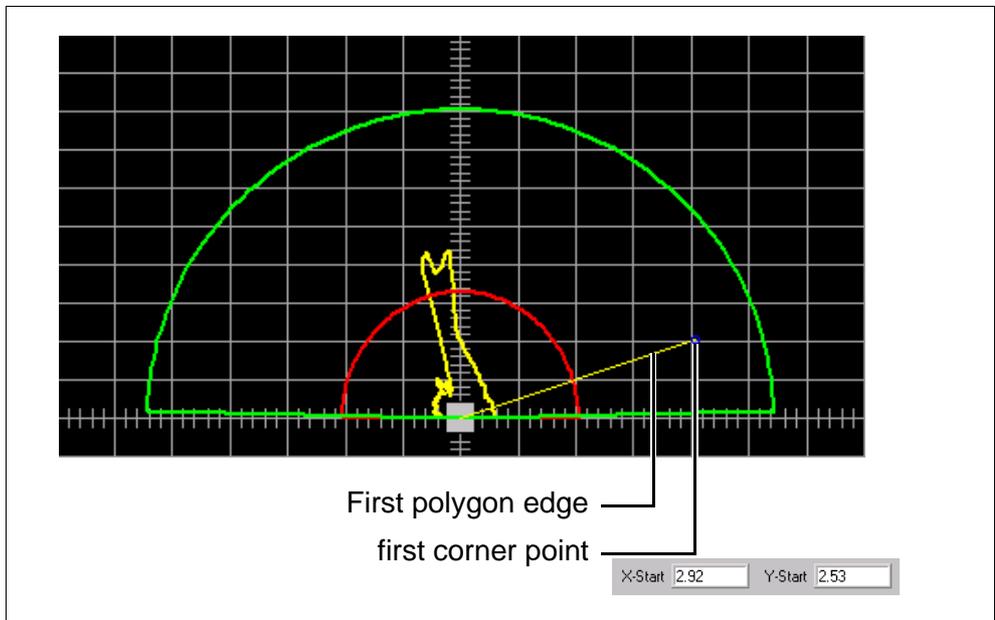
• Click on the next corner point.

second corner point ⎯⎯

second polygon edge ⎯⎯

X-Start `1.61`   Y-Start `3.55`

Set all other corner points in this way.

Once you have set the last corner point, **right-click** on the working area and the polygon will be closed. If you set the last corner point just below the zero line of the X axis, the polygon will be closed automatically and the following message will appear on the screen:

Define Outline

Endpoint of polygon reached. No more points can be defined.

OK

⚠ ***Attention!***
In the case of protection areas, all polygon lines must lie within the 4.5 m radius.

Teach in an area   During "Teaching", the RS3 scans its environment and generates an area from the current measurement curve. This function is used in particular for room monitoring.

○
ⅰ ***Note!***
Unlike the other functions, the teaching function immediately stores the areas in the RS3. You do not have to upload the area separately.

Teaching areas is very easy. Select the function **Teach In** from the menu bar or the tool bar. The RS3 now scans the environment and generates an area from the measurement contour. The following figure shows the progress bar during the generation of the area.
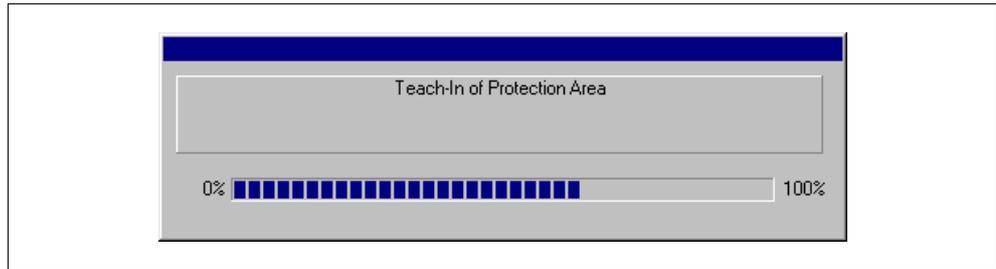
For safety reasons, this area is reduced by a certain value. You can view and modify this value in the safety-critical parameters (see "Special safety critical functions" on page 21).

this is how the warn area is taught in.
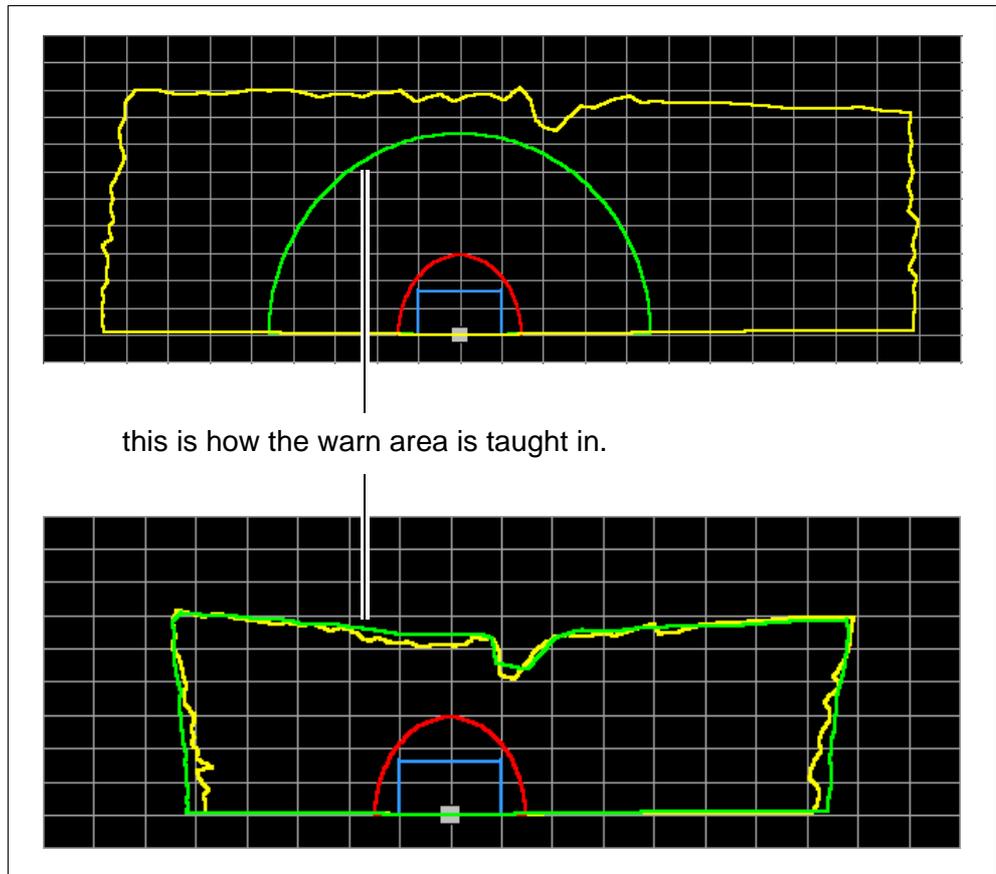
5.2.5 Changing areas

If you want to modify existing areas, you may use the following functions:

Designation	Symbol	Menu
Change area segment		**Areas → Change → Change segment**
Cut area		**Areas → Change → Cut**
Fade out area segment		**Areas → Change → Fade out segment**

The following sections explain the use of the functions.

Changing area segments

When areas are generated with "Define area", "Circle", and "Rectangle", only the pure geometrical shapes are generated. To adapt these shapes to environmental conditions, you may use the function "Change segment".

Proceed as follows during the modification:
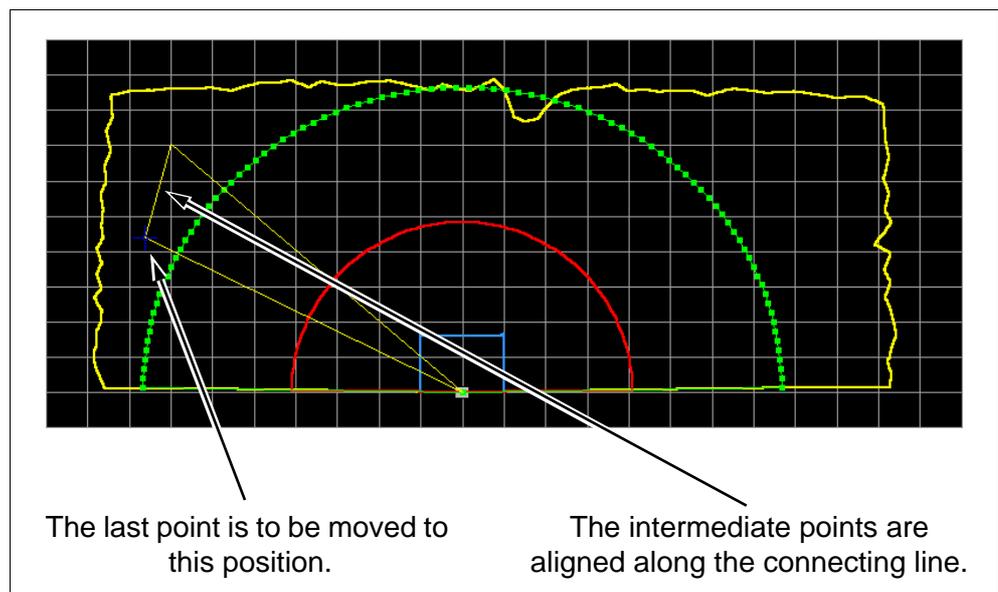
- The following scenario is used as an example:

warn area   measured contour protection area
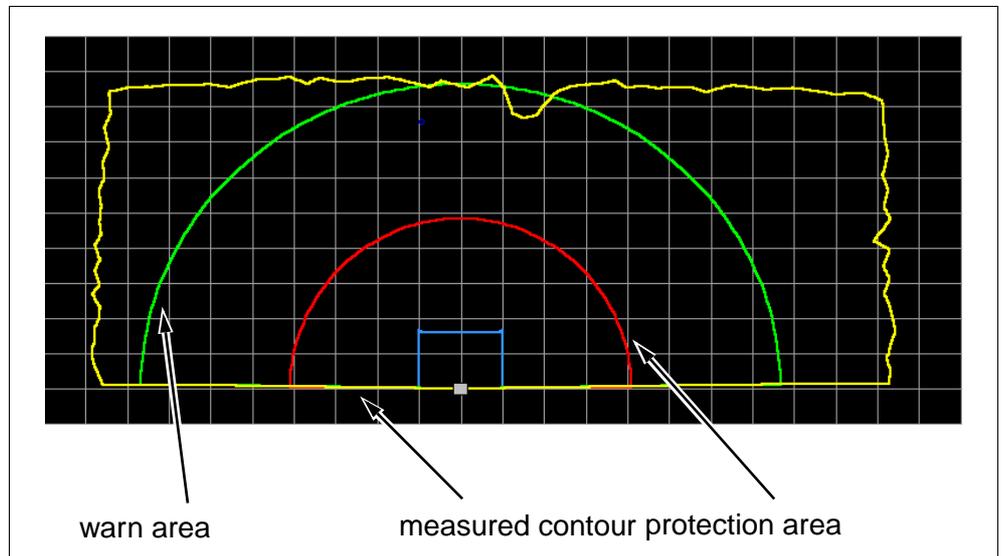
- Select the function "Change area" from the menu bar or the tool bar.

- The area curve now shows rectangular check points. Depending on the size of the area, the distance between the points may vary.


area with check points
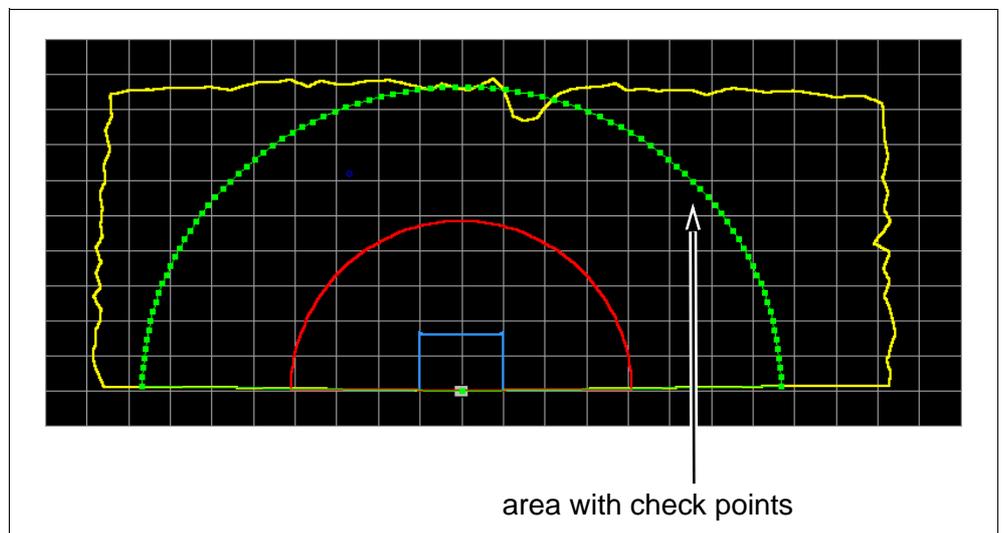
- Locate the points on the curve that cover the segment you wish to modify.

- Click on the first point and keep the mouse button pressed. A yellow line appears. Its end defines the new position of the point. You may modify this line until you release the mouse button.

The first point is to be shifted
to this position.
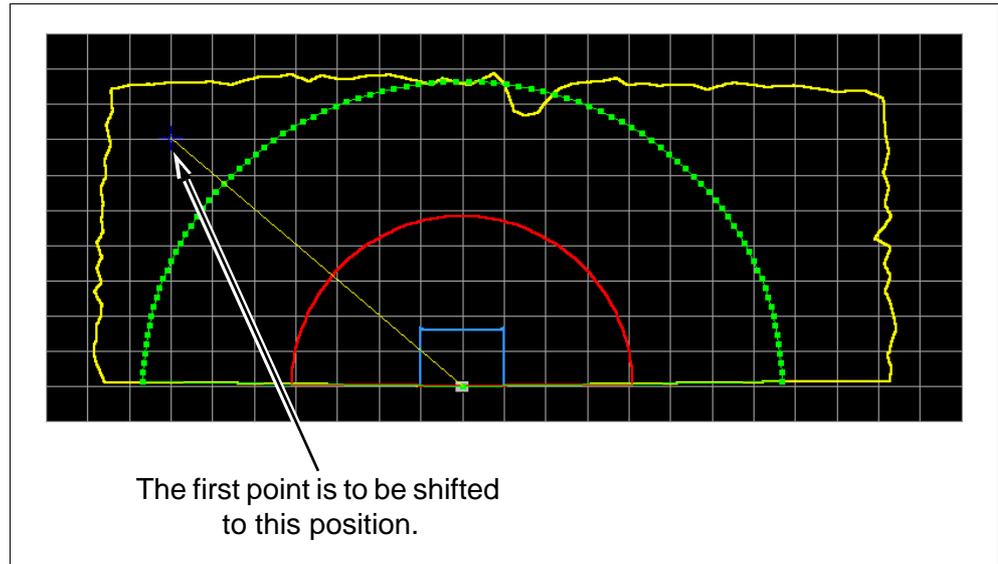
- Click on the last point and keep the mouse button pressed. A second line appears and is connected to the first. The end of the line describes the new position of that point.
 You may modify this line until you release the mouse button.

The last point is to be moved to
this position.

The intermediate points are
aligned along the connecting line.

- All check points inbetween the two points chosen are aligned along the conneting line generated. The area is changed accordingly.
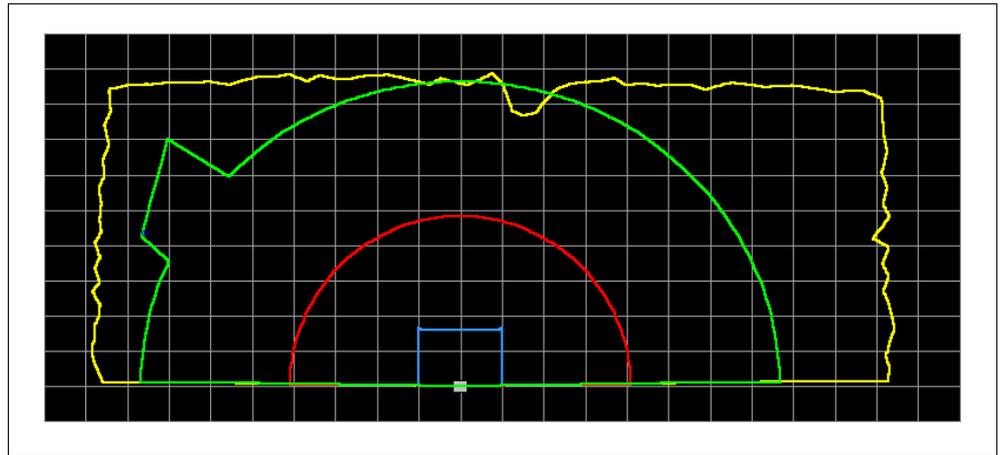
Cut areas   The function "Cut" allows you to cut an existing area on the left, on the right, and towards the front.

The following steps use an example to illustrate the procedure:

• working area (initial scenario):

measured contour   warn area   protection area
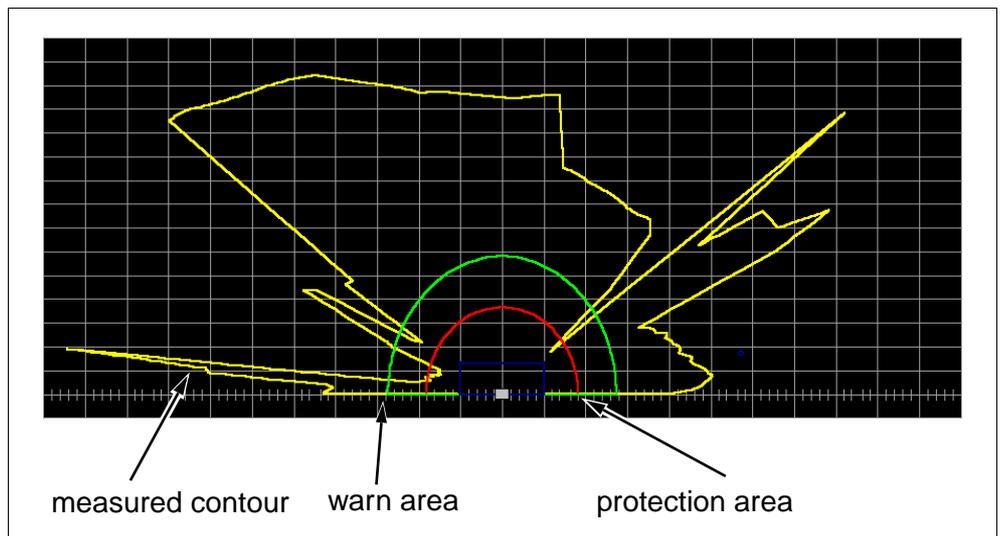
• Select the area you wish to cut via the tool bar or the menu bar (in the example, the warn area was chosen).

• Select the function "Cut" from the menu bar or the tool bar.

• In the following input mask, enter which values you would like to cut, and enter the required dimensions. In the example, the left edge is cut back to 300 mm.
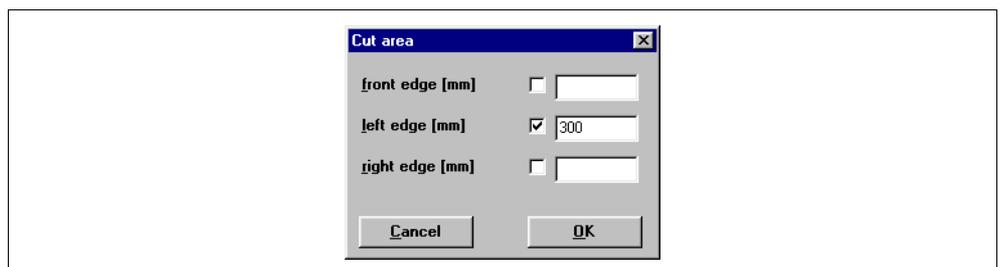
• Confirm the input with **OK**, and the area will be cut back to the dimensions specified.


cut warn area
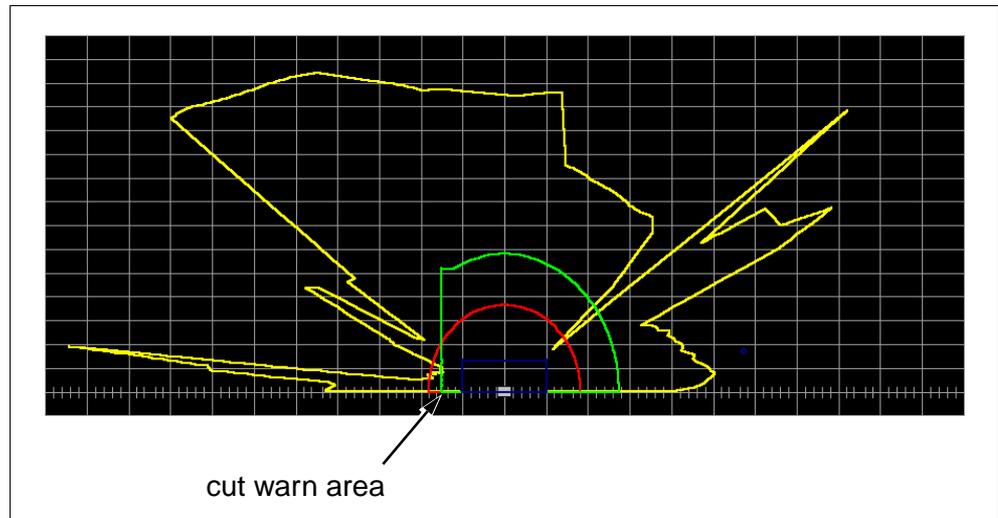
Fade out area segment   The "Polygon" gave you the opportunity to mask objects when the area was defined. The function "Fade out area segment" may now be used to remove segments from existing areas.
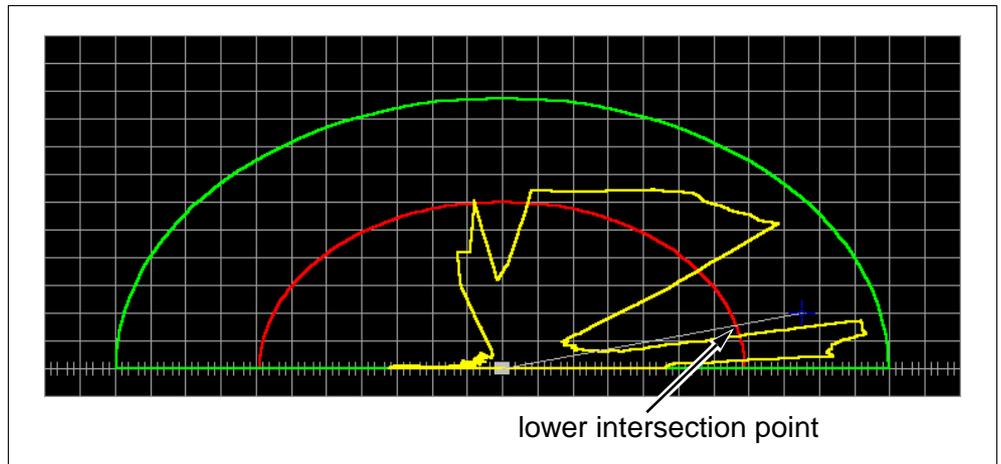
A segment cuts the area at two points.

The following steps illustrate the procedure for the fading out of area segments:

• A circular protection area serves as an example.
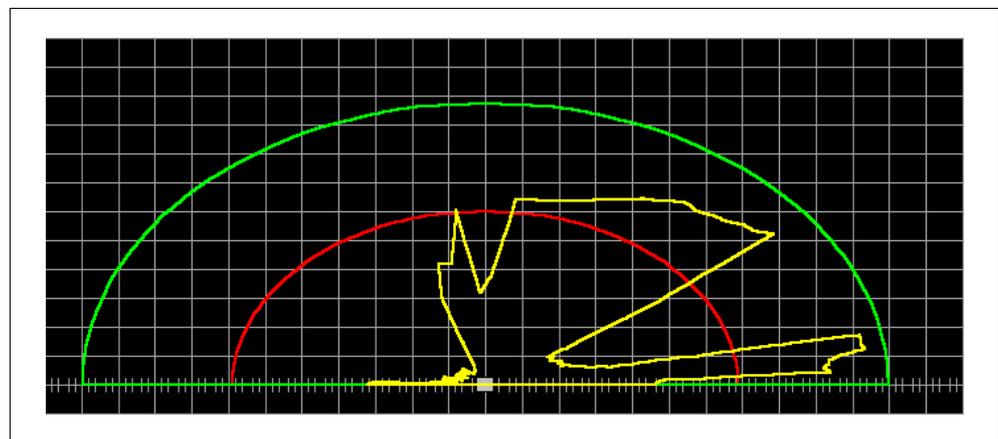
- To select the segment that is to be deactivated, use the optical position display to click on the lower intersection point.

lower intersection point

- Then click on the upper intersection point. The segment will be displayed in gray while the mouse button is pressed.

this segment will be removed from the area.
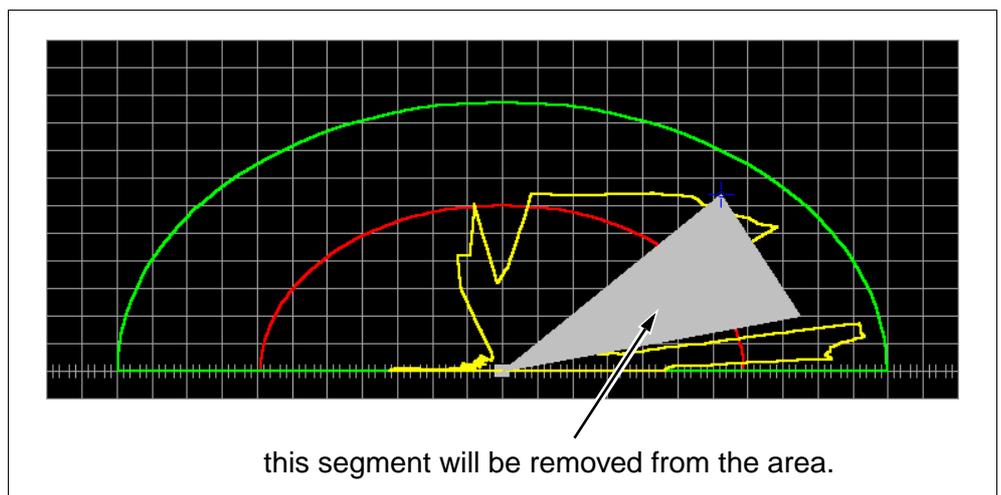
- When you release the mouse button, the segment selected will be taken out of the area.

protection area with segment removed
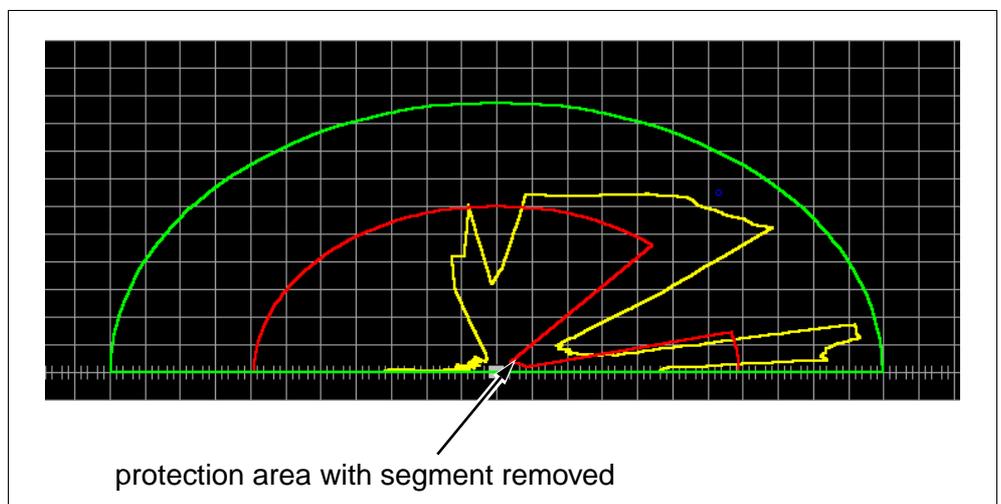
5.3 Saving and Loading Areas

To save the areas that you have changed to disk, select the command "Save area" from the "File" menu, or click on the button 💾 on the "RS3 configuration" tab.

In accordance with standard Windows procedure, you will be able to give a name to the file and choose a folder in which to save it.

Loading areas To load a previously saved area definition, select the command "Load area" from the "File" menu, or click on the button 📂 on the "RS3 configuration" tab. Select the desired file from the following dialog, then click on "Load".

The areas saved in this file are now read into the program, where they may be edited and uploaded to the RS3.

5.4 Uploading Areas

Initially, the modified areas are only stored in your computer's volatile memory.

⚠️ **Attention**

Always save the modified areas. This enables you to re-load the changed settings in case of transfer errors or program crashes.

To store the modified areas in the RS3, you must transfer them to the unit. The data transfer may be initiated either via the menu bar (**Areas → Transfer**) or via the tool bar of the "Areas" tab (symbol 🖼️).

The areas are now transferred to the RS3. However, before the protection area is stored in the RS3, the unit will send an echo (confirmation request) to confirm. The following dialog box will appear on the screen:
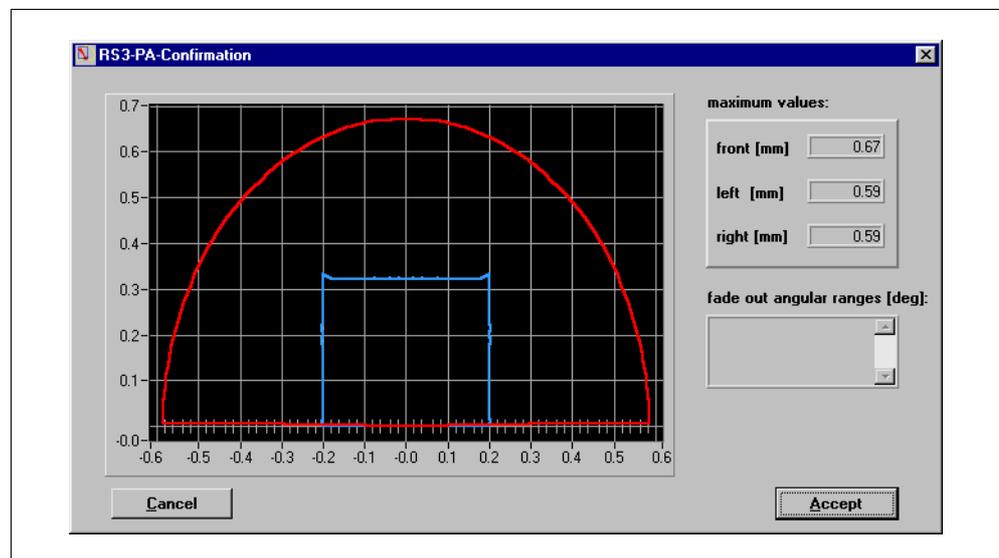
The window allows you to compare the values entered with the intended values. If there are values that differ from the intended ones, you may abort at this point and change the values in the program. If all values have been entered correctly, click on OK, and the areas will be stored in the RS3.
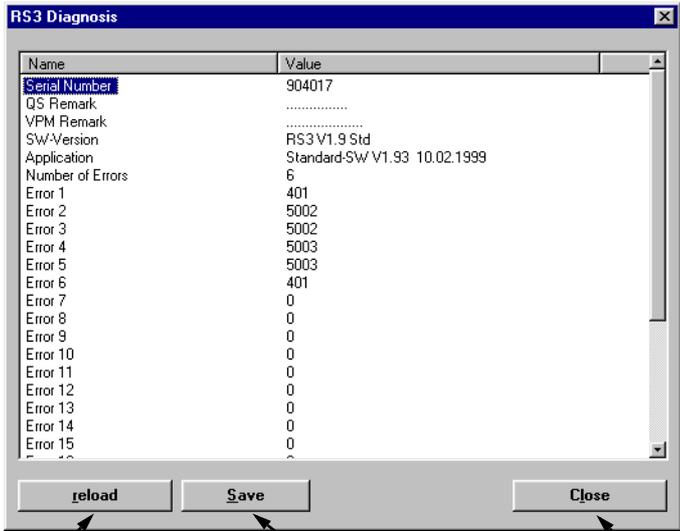
If transfer errors occur, check the PC error list (**Diagnosis → Display PC error list**) to find the type of error and try to eliminate the problem.

After solving the problem, try the upload again.

6 Error Diagnosis

6.1 RS3 Diagnosis

In the menu **Diagnosis** or on the "RS3 Diagnosis" tab, you can view the current settings, the number of errors that occurred, and the associated error codes. To display the diagnostic values, click on the icon on the tool bar, or on **Diagnosiss → Load Diagnosis Data** on the menu bar.
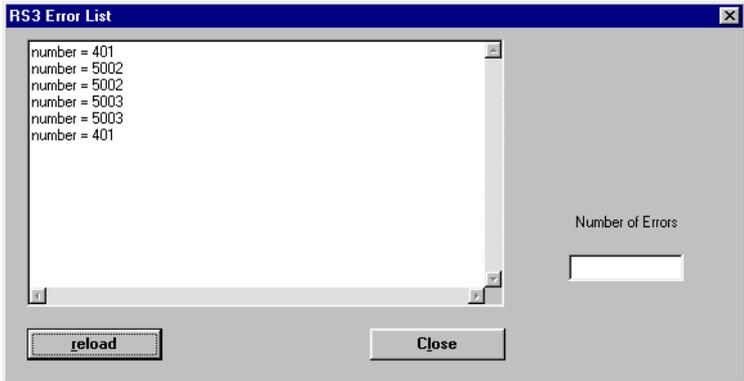

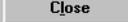reload diagnosis values from the RS3   save diagnosis values as a text file   close window

6.2 RS3 error list

All errors that occur in the RS3 during operation are stored in an error list in the unit. To display this list, click on the icon on the tool bar, or on **Diagnosis → RS error list** on the menu bar.

The status bar (see Section "Status Bar" on page14) shows the error message instead of the operation mode.

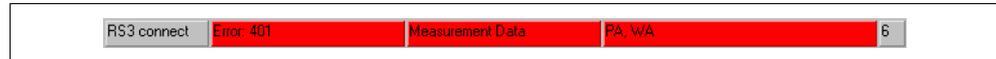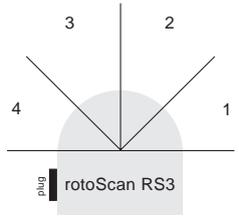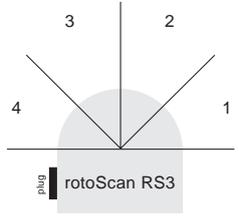Figure 6.1: Status bar with error message

The following table lists all errors and their possible remedies:

Error no.	Error description	Remedy
Internal errors		
401	motor revolutions too low	Check the RS3's operating voltage or disconnect the unit from the mains supply and turn it back on again afterwards.
402	motor revolutions too high	
421	did not achieve nominal revolutions	
Errors of the unit's initialization		
1528	operating voltage outside limits	Disconnect the RS3 from the mains supply and switch it back on afterwards.
1530 ... 1533	window sectors 1 - 4 dirty	Clean laser window
1535	RK reference value (value too large)	Contact LEUZE Customer Service
1536	RK reference value (value too small)	
Errors during measurement operation		
2518 ... 2525	operating voltage outside limits	Disconnect the RS3 from the mains supply and switch it back on afterwards.
2600 ... 2614	zero distance measured	Avoid exposure to strong light from other sources and mutual interference of several RS3's.
3310 ... 3313	window sectors 1 - 4 dirty	Clean laser window
3328 ... 3331	no detection in sectors 1 - 4	Check window sectors for manipulation by covering.
3333	unit temperature outside limits	Check the ambient temperature
Errors during interactive operation		
4007 / 4008	password incorrect	Enter a valid password

Error no.	Error description	Remedy
4009 ... 4099	transfer error	Check the wiring of the interfaces and the connection between the RS3 and the PC
4505	warn area too small	Check the warn area parameters
4506	warn area too large	
4507	distance too large	You have exceeded the maximum scan radius (15 m). Change the configuration
4508 ... 4599	warn area	Check the object safety area parameters
5002	areas too small	Check the safety area parameters
5003	areas too large	
5004 ... 5099	parameter check	Check RS3 parameters

If other error codes occur, or the problems cannot be solved, you should contact LEUZE Customer Service.

6.3 PC error list

An error list is kept on your PC. It individually list all problems with the RS3 configuration software.

If errors occur, contact LEUZE Customer Service.

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