

HELP ON CONFIGURATION

S3000/S300/S200



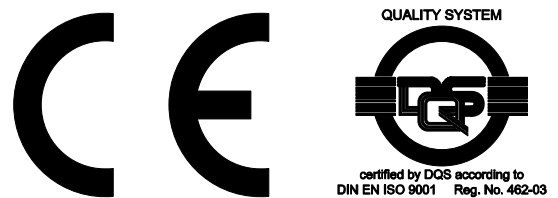
Configuration & Diagnostic Software

GB



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1 **Operating instructions**

You will find further information in the operating instructions for the safety laser scanner:

- S3000
- S300
- S200

2 Selection of the laser scanner variants

In the device selection wizard you can select the variants of the S3000 and S300 safety laser scanner (see also the basic description “Working with projects” in the CDS manual or in the CDS help).

S3000

Several sensor heads and I/O modules are available for the S3000 (see also the S3000 operating instructions).

The sensor heads differ in their maximum scanning range and the resulting possible size of the protective field.

The I/O modules define the range of functions in the S3000 and have different inputs.

- If you selected the device class S3000 in the previous dialog box, now choose the sensor head and the I/O module for the S3000 in the device selection wizard.

S300

Various S300 variants are available (see also the operating instructions for the S300) to cover the different applications.

- If you selected the device class S300 in the previous dialog box, now choose the S300 variant in the device selection wizard.

S200

There is only device variant available.

- If in the previous dialog box you selected the device class S200, in the device selection wizard click the **Finish** button.

3 Configuration of the laser scanner

Note Please read the basic description of the configuration using the CDS.

On a system that comprises two safety laser scanners, both scanners are configured in one configuration window. The configuration comprises:

- the configuration of the scanner system
(e.g. the resolution, the restart behaviour and the monitoring cases)
- the configuration of the two safety laser scanners
(e.g. the protective fields and warning fields)



WARNING

Check the configuration for each monitoring case and after every change!

Once you have successfully transferred the configuration, a machine or plant protected by the safety laser scanner must be checked and released by specialist personnel. If you configure several monitoring cases (see 3.8 “Monitoring cases” on page 14), then you must test the protective device for effectiveness for each of these monitoring cases individually.

3.1 Application name

Enter a name for your application. The name is saved in the devices after the configuration has been transferred. The name chosen may be, for example, the identifier for the vehicle, system or the machine. You can enter a name with a maximum of 16 characters.

If you assign unique application names, you may “reserve” the devices for certain duties. A machine maintenance person comparing exchanged devices with the configuration data saved in the CDS will be notified that the application name does not match. He may then exchange these devices for those with the correct application name.

3.1.1 Name of the scanner

Enter a name for each of the scanners in the system.

Recommendation Use meaningful names, e.g. “front” and “rear” for vehicle monitoring. Unique device names make the subsequent configuration steps easier (for example on allocating the control inputs or the OSSDs).

On a master/slave system with two scanners, the device names must always be different. You can enter names with a maximum of 16 characters.

3.1.2 User data

You can enter your name in the field **Name of the user**. This is then added to the configuration protocol and in the diagnostics report.

3.2 Application

In principle you can choose between stationary or mobile applications for a safety laser scanner.

- Select **Stationary** if the scanner is operated stationary on a machine or plant.
- Select **Mobile** if the scanner is operated mobile on a vehicle (e.g. AGV).

The configuration features subsequently available in the CDS depend on the selection made.

3.2.1 Resolution

Select the necessary resolution in millimetres for your application. The maximum protective field range depends on the resolution selected, this range is indicated in **Maximum protective field range** (see also the operating instructions of the related safety laser scanner).

The protective field range must be adequate ...

- in case of horizontal mounting, to ensure the necessary safety distance including the safety supplements is provided.
- to protect the entire access or hazardous area on vertical mounting.

The protective field range defines the maximum size of the protective field that you can edit in the field set editor.

Note In certain circumstances you may need to adapt existing protective fields after changing the resolution in the field set editor. This is the case if you have already drawn protective fields in the field editor (e.g. for an old application) and these protective fields are larger than the maximum protective field range for the resolution selected.



WARNING

In horizontal applications in which you use 70 mm resolution, ensure that a human leg can be detected!

Mount the scan planes ...

- for **stationary** applications with 70 mm resolution at least 300 mm above the floor! In case of scan planes higher than 300 mm, ensure that people cannot reach the hazardous area by crawling underneath the scan plane!
- for **mobile** applications at a maximum height of 200 mm!

3.2.2 Basic response time

The basic response time of the safety laser scanner is displayed in this field.

- On the S300 and S200 this is the fixed basic response time of the related device.
- On the S3000 you can choose between two protective field ranges. The basic response time of the scanner is also dependent on the selection. For the shorter protective field range offered, the scanner has a shorter basic response time than for the larger protective field range (see also the S3000 operating instructions).



WARNING

Use the total response time of the system to calculate the safety distance (see also the operating instructions of the related safety laser scanner, chapter "Mounting")!

The total response time depends on ...

- the basic response time.
- the multiple sampling set.
- the transmission speed of input signals via EFI.
- the transmission speed of the OSSD signals via EFI.

3.2.3 Maximum protective field range of the S3000

The maximum protective field range of the S3000 is primarily dependent on the resolution you have selected. You can then choose between two protective field ranges. However, this selection does not affect the basic response time of the scanner.

3.3 Control inputs

The Advanced and Professional variants of the safety laser scanner have control inputs with which it is possible to switch between monitoring cases.

- The Advanced variants have static control inputs, e.g. for tactile sensors.
- The Professional variants have static and dynamic control inputs, e.g. for incremental encoders on an AGV.

Note Always use the inputs on the master to switch between the monitoring cases in a master/slave system.

3.3.1 Control inputs for mobile applications

If you activate the **Use dynamic control inputs** option with a Professional or Expert safety laser scanner, then you can set the parameters for control inputs for incremental encoders.

In addition, two of the existing inputs are used in **Control inputs used** (A and B on the S300 or C and D on the S3000).

Note The option **Use dynamic control inputs** is only available if you have selected the **Mobile** option (during the definition of the application).

3.3.2 Control inputs used

In **Control inputs used** you must select the inputs you want to use for the static switching between the monitoring cases.

The control inputs available depend on the safety laser scanner variant and also on whether inputs are already used as dynamic control inputs.

Input C on the S300 Professional, Professional CMS or Expert

On the S300 Professional, Professional CMS and Expert you can also select the **Use RESET and RES_REQ as Input C** check box. The control input C is then formed from the RESET and RES_REQ connections.

Note If you configure the RESET and RES_REQ inputs as control inputs C1/C2, the “With restart interlock” function is no longer available.

Using the control input C, it is then possible to switch to a monitoring case that makes possible, for instance, turning on the spot. Complementary sampling is used for the input and the input overwrites the incremental encoder inputs.

3.3.3 Control inputs for master/slave operation



On the use of external control inputs, add 40 ms to the basic response time of the safety laser scanner!

The total response time of the safety laser scanner increases due to the transmission via EFI.

In a master/slave system the control signals for monitoring case switching must be on the inputs on the master. The slave is connected to the master via EFI and receives from the master the input information for monitoring case switching.

In the **Use from** field choose the device that is to act as the master and on which the control inputs are to be used.

Note On a system that comprises an S3000 and an S300, the S3000 **always** has the function of the master. For this reason its control inputs must be used.

3.3.4 Sampling for the static control inputs

If you are using static sampling, choose between **Complementary** or **1-of-n-sampling** depending on the control facilities available.

Fig. 1: Example for complementary connection layout

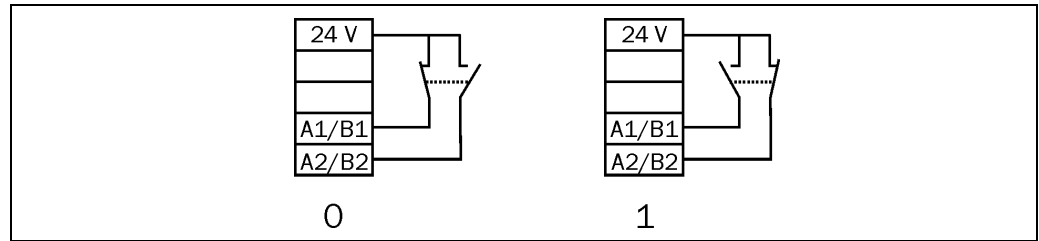
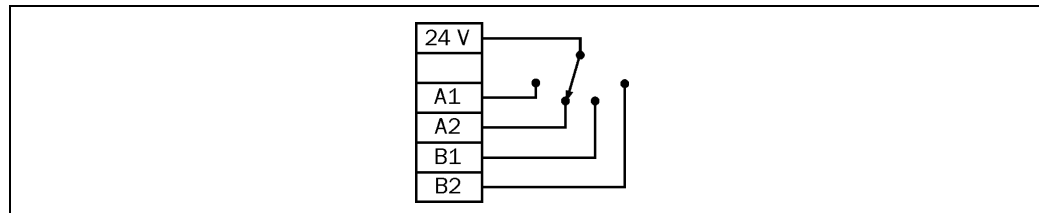


Fig. 2: Example for 1-of-n connection layout



3.3.5 Input delay for static control inputs

The control device that you want to use to switch the control inputs must be able to switch to the defined input condition within a given time. If this is not the case (e.g. due to bounce times on the switching contacts connected), in the **Input delay [ms]** field you can increase the input delay.

Note Also pay attention to the notes in the operating instructions of the related safety laser scanner, section “Time for monitoring case switching”.

3.3.6 Advancement for the switch timing

Under **Switching timing advance** you can see the time that results from the transfer time for control signals and OSSD signals over EFI and the input delay.

You must advance the timing of the monitoring case switching for the related scanner by the corresponding time.



WARNING

Switch to another monitoring case in good time!

The time the scanner needs to switch to a new monitoring case can be longer than its response time.

If you use external control inputs and/or OSSDs, or if you need an input delay for the control inputs, you must advance the timing for the switching (see also the operating instructions of the related safety laser scanner, chapter “Mounting”).

Note On a master/slave system with two scanners, the times are different for scanner 1 and 2, as the control signals only need to be transferred for one scanner, but under certain circumstances the OSSD signals must be transferred over EFI for both scanners. In this case the CDS displays the times in two fields with the related **Scanner names**.

3.3.7 Characteristic data for the incremental encoders

To determine the velocity and direction of travel of the vehicle, the **Pulses per cm travel** as output by the incremental encoders are required (as a rule you can determine the pulses per cm travel with the aid of the documentation on the incremental encoder from the diameter and transmission ratio of the drive gear, or you can determine the pulses per cm travel by measurement).

In the dialog box below, the minimum and maximum speed calculated from the entries is displayed.

Note To **safely** detect the movement of the vehicle, two independent incremental encoders must always be connected.

3.3.8 Allowed difference between the incremental encoders

For safety (e.g. on the failure of an encoder) the system compares the two pulse rates measured with each other. The values output by the incremental encoders are only allowed to vary by the tolerance entered in the **Allowed difference between the encoders** entry field. The maximum setting is 25%.

Note The **Allowed difference between the encoders** is allowed to be exceeded for max. 20 seconds, e.g. for driving around bends (you will find detailed information in the operating instructions for the related safety laser scanner in the section "Data sheet"). In this case the larger of the two velocity values is always used for the activation of the protective field. In this way the highest possible level of safety is ensured.

3.4 Application diagnostic output

The safety laser scanner has an application diagnostic output that can be configured. The following configuration possibilities are available:

- contamination
- error
- contamination or error
- inactive

Note On a master/slave system with two safety laser scanners, the outputs for both laser scanners can be configured independently.

3.5 OSSDs in master/slave operation

In a master/slave system you define which output signal switching device (OSSD) is switched to the OFF state on the presence of an object in the protective field.

The name or names for the possible devices are displayed. This can, e.g. be a second safety laser scanner, a switching amplifier (series UE100) or a bus node (series UE1000).

Select the check box for the device on which the OSSDs are to be switched to the OFF state if there is an object in the scanner's protective field.



WARNING

For external OSSDs add 20 ms to the basic response time of the safety laser scanner!

The total response time of the safety laser scanner increases due to the transmission via EFI.

3.5.1 External device monitoring

After every interruption to the protective field and prior to restarting the machine, the external device monitoring monitors the switching devices operated by the OSSDs (e.g. contactors). In this way the external device monitoring detects whether e.g. the (positively guided) contacts on the contactors connected are in the OFF position. The machine is only allowed to start if both contactors are in the OFF state, that is they are deactivated.

- Notes**
- If you configure the **External device monitoring active** function, this device must also be connected to the **EDM** input on the safety laser scanner.
 - If you do not configure the **External device monitoring active** function, the contactors must be monitored by the downstream machine controller and the **EDM** input must not be used.
 - In master/slave operation you can only activate the external device monitoring on the safety laser scanner if the internal OSSDs are used.

3.6 Restart



It is imperative that you configure the safety laser scanner with restart interlock if the protective field can be left to approach the hazardous point or if a person cannot be detected at every point in the hazard area for the safety laser scanner!

During the assessment, pay attention to whether the protective field can be left in the direction of the hazardous point, to areas that are unprotected due to the mounting and the unprotected near range of the safety laser scanner (see also the operating instructions of the related safety laser scanner).

You can restart the OSSDs of a safety laser scanner in three ways:

- without restart interlock

Only if an external restart interlock is realised on the machine controller
or

if the protective field **cannot** be left in the direction of the hazardous point and if people can be detected by the safety laser scanner **at every point in the hazardous area!**

The OSSDs are switched to the ON state if there is no object in the active protective field for the duration given.

- with restart interlock

The OSSDs are only switched to the ON state if the operator operates the control switch for restart or reset.

Note If you have configured the RESET and RES_REQ connections as control input C, (see section 3.3.2 “Control inputs used” on page 9), the “With restart interlock” option can no longer be configured.

- time delayed

Only if the protective field **cannot** be left in the direction of the hazardous point and if people can be detected by the safety laser scanner **at every point in the hazardous area!**

The OSSDs are switched to the ON state if there is no object in the active protective field for the duration given.

3.7 Creating field sets

Add one or more field sets for the safety laser scanner (see also the operating instructions of the related safety laser scanner). For the created field sets you define later the protective field and the warning field in the field set editor.

The field sets already defined are displayed in the table in the dialog box. Along with the name of the field set, the monitoring cases to which the field set is allocated are also displayed (the monitoring cases are used to switch between the field sets for a safety laser scanner).

In this dialog box, you can add, edit or delete field sets and change the name of a field set.

Note Once you have created all field sets available for a safety laser scanner, the **Add** button is no longer active.

3.7.1 Field set names

Enter a unique name for the field set. With the aid of the name, later you can allocate the field sets to the monitoring cases and define the protective field and warning field for the individual field sets. For this reason use meaningful names (e.g. "parking", "2 m/s" etc.).

You can only use a field set name once.

3.8 Monitoring cases

In operation it is possible to switch between monitoring cases for a safety laser scanner via static control inputs or using incremental encoders via dynamic control inputs.

The monitoring cases already defined are displayed in the table in the dialog box. You can:

- add monitoring cases
- edit monitoring cases
- delete monitoring cases

It is defined specifically for each monitoring case which field set is to be active with which multiple sampling.

Using different input conditions (control signals), you can define when, which monitoring case is to be active.

- Notes**
- You can only add monitoring cases if you have first configured that control inputs on the safety laser scanner are to be used.
 - In a master/slave system, the master defines the number of possible monitoring cases. If, e.g. an S3000 (master) is connected to an S300 (slave) over EFI, the number of S3000 monitoring cases is available in the complete system.
 - The CDS checks the plausibility of the monitoring cases. Cases for which the input values overlap or have the same input conditions are not allowed. These cases are shown in yellow. As long as one or more cases are implausible, you cannot leave the configuration step **Monitoring cases**.

Fig. 3: Implausible monitoring cases in the table

Single representation		Overview		Parameters for the defined monitoring cases					
Name	A	B	v [cm/s]	Following case	Scanner	Field set	OSSD	Resp.	
Slow forward	0	0	nv	Any	Front	Small	Front	120 ms	
Fast forward	1	0	nv	Any	Front	Large	Front	120 ms	
					Back	Other direction	Back	120 ms	
Slow backwards	0	1	nv	Any	Front	Other direction	Front	120 ms	
					Back	Small	Back	120 ms	
Fast backwards	1	0	nv	Any	Front	Other direction	Front	120 ms	
					Back	Large	Back	120 ms	

In the example shown, the input conditions for the cases **Fast forward** and **Fast backwards** are the same (1).

3.8.1 Monitoring case name

Enter the name for the monitoring case in the field or overwrite the existing name.

- Note** A monitoring case name cannot be used more than once. Use a meaningful name that, for instance, describes the situation in which the monitoring case is applicable (inching movement, parking, loading, welding, etc.).

3.8.2 Input conditions for static control inputs

With the aid of list boxes you can define which states the static control inputs must take for the allocated monitoring case to be activated.

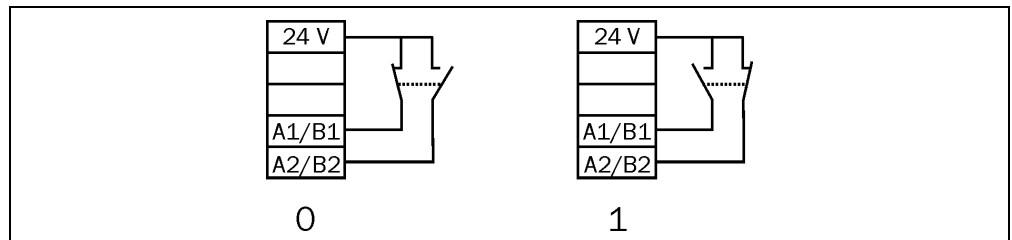
- Notes**
- The control inputs for which you can define conditions depend on which control inputs you have previously configured.
 - Whether you can use the **Complementary sampling** or the **1-of-n sampling**, depends on how you have configured the control inputs.
 - You are not allowed to configure any input conditions that are already used for another monitoring case.

If you have selected complementary sampling (see Control inputs):

In the related list boxes choose the logical state that the control input must adopt to activate the monitoring case:

- If you select **1** or **0**, the value selected must be present at the related control input to meet the input condition.

Fig. 4: Example for complementary connection layout



- If you choose **X**, the control input is not taken into account for this monitoring case. For this monitoring case it is then irrelevant as to which input condition is present at this control input. Only the other control inputs for which you have selected **1** or **0** are relevant.

Example

Tab. 1: Example for complementary sampling

A	B	Monitoring case
1	X	1
0	1	2
0	0	3
1	1	Implausible
1	0	Implausible

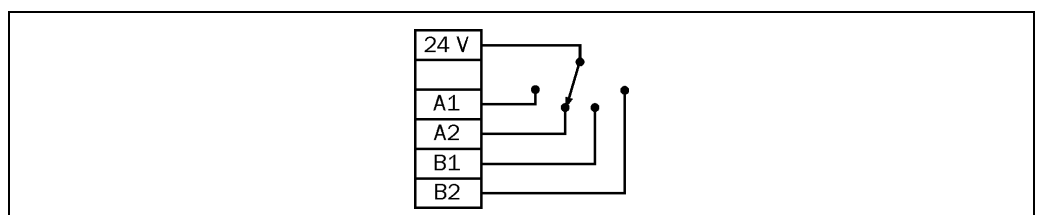
In the example the value 1 at control input A is defined for case 1. I.e. as soon as the value 1 is present at control input A, the device switches to monitoring case 1 irrespective of which values are present at control input B.

In the example the value 1 for control input A cannot be selected for any other monitoring case. This would lead to an implausible monitoring case.

If you have selected 1-of-n sampling (see Control inputs):

In the related list boxes, select the connection for the control input (A1, A2, B1, B2 etc.) at which a high signal must be present to activate the monitoring case.

Fig. 5: Example for 1-of-n connection layout



3.8.3 Input conditions for dynamic control inputs (incremental encoder inputs)

If you use the dynamic incremental inputs for monitoring case switching, you must select the **Use velocity range** check box.

- In the **from** and **to** fields enter the velocities at which the monitoring case is to be activated.

Note The maximum measurable velocities are -2000 cm/s to 2000 cm/s. Values in the expanded standstill range between -9 cm/s and 9 cm/s **cannot** be entered. During the definition of velocity-dependent monitoring cases ensure that the velocity ranges do not overlap and that there is no undefined range between the velocity ranges.

For defining monitored cases for moving backward, for this reason enter values from -2000 cm/s to -11 cm/s, for forward movement values from 11 cm/s to 2000 cm/s, for the standstill range values from -10 cm/s to 10 cm/s. If a monitoring case is to be active for both backward movement and forward movement, then the expanded standstill range between -10 cm/s and 10 cm/s must be bridged.

Example

Fig. 6: Example: velocity ranges

The screenshot shows three configuration panels, each with a checked 'Use velocity range' checkbox and two input fields for 'of' and 'to' values:

- Panel 1: 'of' -200 cm/s, 'to' -11 cm/s
- Panel 2: 'of' -10 cm/s, 'to' 10 cm/s
- Panel 3: 'of' 11 cm/s, 'to' 100 cm/s

A monitoring case is added for backward movement, forward movement and standstill range. For the backward movement a monitoring case from -200 cm/s to -11 cm/s is added, for the forward movement from 11 cm/s to 100 cm/s, for the standstill range a monitoring case from -10 cm/s to 10 cm/s is added.

3.8.4 Control input C on the S300 Professional, Professional CMS and Expert for mobile applications

If, in a mobile application, the inputs **A** and **B** are connected to incremental encoders, then the control input C can be used as an additional input for monitoring case switching.

Note On the S300 Expert, input C can also be selected for the application type *Stationary*. In this operating mode all control inputs operate with static signals.

This input C uses complementary sampling and overwrites the incremental encoder inputs.

Tab. 2: Action of the control input C

Input C			Effect
Connections		Logic	
C1	C2		
1	0	0	Monitoring cases using incremental encoders
0	1	1	The monitoring case allocated to the input C is activated.
0	0	Error	Error
1	1	Error	Error

3.8.5 Switching sequence

To check whether the monitoring cases are switched in the correct order during the production process or over the route covered, you can configure a sequence for the monitoring cases. Here you can define either an arbitrary sequence, a unique sequence, or two alternative sequences.

- Arbitrary sequence: It is allowed to switch from one monitoring case to any other defined monitoring case.
- Unique sequence: It is only allowed to switch from a monitoring case to another specifically defined monitoring case.
- Alternative sequence: It is allowed to switch from a monitoring case to one of two specifically defined monitoring cases.

Recommendation Use the monitoring of the monitoring case switching as an additional check on your control. For example, in this way deviations from a sequence in the production process on a system could be detected.

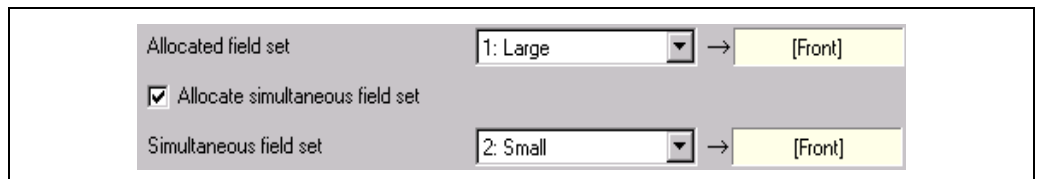
3.8.6 Allocating the field sets

You allocate a field set to each monitoring case. In the **Field set** list box you can select the field sets you have already created. If the monitoring case is switched on, then the configured protective field and the warning field for the related field set will be activated. Next to the **Field set** list box you can see the OSSDs on which the selected field set acts. In a master/slave system, the effect depends on the configuration of the output signal switching devices.

3.8.7 Simultaneous field set of the S3000

On the S3000 safety laser scanner you can allocate a so-called simultaneous field set. If you configure the S3000 with simultaneous field set, then the system monitors two field sets simultaneously.

Fig. 7: Simultaneous field set of the S3000

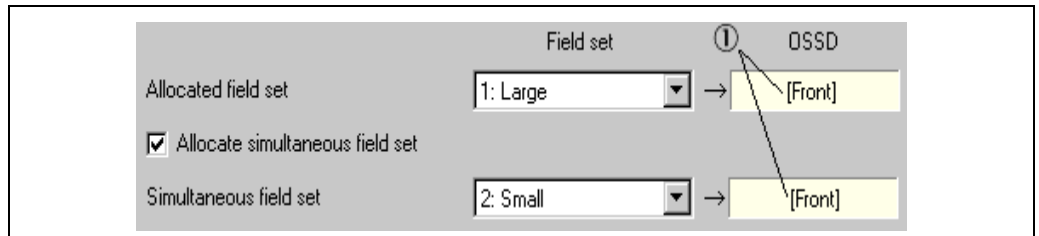


Effect of the field sets

Next to the list box for the field set or the simultaneous field set you can see the OSSDs on which the selected field set acts. The action is dependent on the configuration of the output signal switching devices.

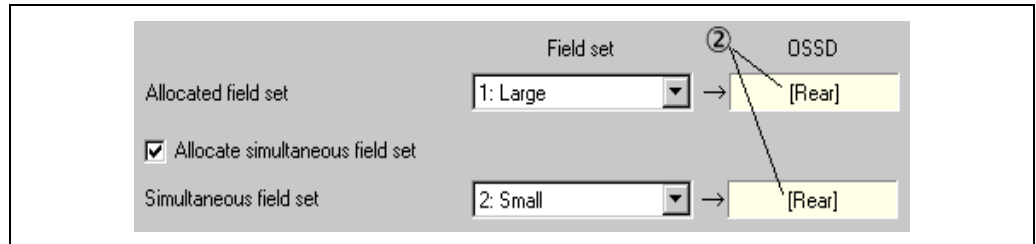
- If the interruption of the protective field only switches the internal OSSDs, both field sets act on these OSSDs (in the example on the **front** scanner (1)).

Fig. 8: Effect of the field sets internally



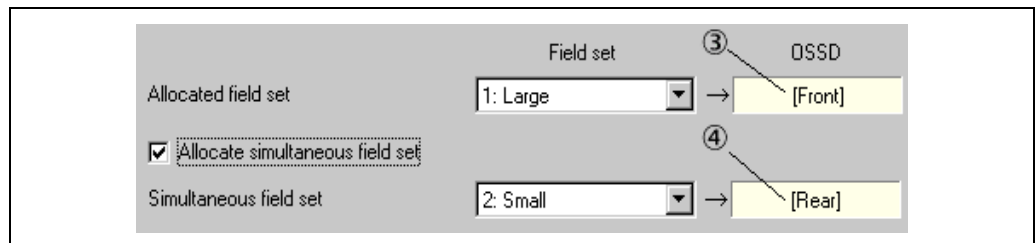
- If the interruption of the protective field only switches the external OSSDs on another device (e.g. the OSSDs on a second S3000 or a series UE100 device), both field sets act on the external OSSDs (in the example on the **rear** scanner (2)).

Fig. 9: Effect of the field sets externally



- If the interruption of the protective field switches both the internal and the external OSSDs, the field set acts on the internal OSSDs (in the example on the **front** scanner (3)), the simultaneous field set on the external OSSDs (in the example on the **rear** scanner (4)).

Fig. 10: Effect of the field sets internally and externally



3.8.8 Park mode

If, in mobile applications, vehicles are not moved for a time, the OSSDs and the laser on the safety laser scanner can be switched off by the park mode. In this way the power consumption of the device is reduced.

To switch to the park mode, configure a monitoring case and activate the mode using the **Park mode** check box.

Note It is not possible to allocate a field set to the monitoring case.

As an alternative to the park mode, you can also use the stand-by mode (see also the S300 operating instructions).

3.8.9 Multiple sampling

With multiple sampling selected, an object must be detected several times in the same beam before the safety laser scanner switches its OSSDs to the OFF state (see also the operating instructions for the related safety laser scanner). In this way you can reduce the probability that insects or particles result in the shutdown of the plant.

You can configure a specific multiple sampling for each monitoring case. In this way you can, for instance, adjust vehicle monitoring to suit different ambient conditions.

On the safety laser scanner, a multiple sampling of 2 is the minimum setting. You can set the multiple sampling to up to 16 with the aid of the CDS.



WARNING

For multiple sampling greater than 2, add the supplement to the basic response time!

Multiple sampling increases the response time (see also the operating instructions for the related safety laser scanner). Under **Resulting response time supplement** you can see the supplement that you must add to the basic response time.

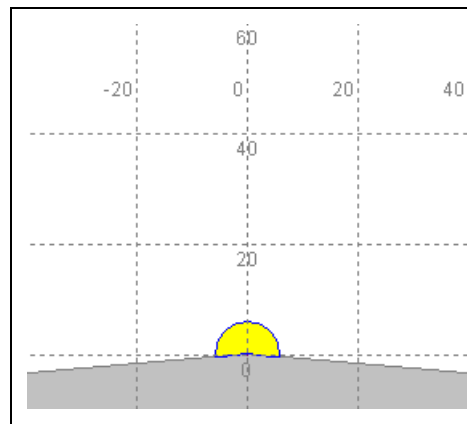
Tab. 3: Recommended multiple sampling for different applications

Recommended multiple sampling	Application
2 times	Stationary under clean ambient conditions
2 ... 4 times	Mobile
4 ... 8 times	Stationary under dusty ambient conditions

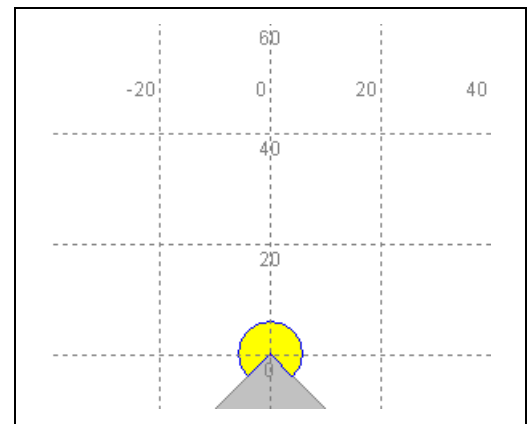
3.9 Edit field sets of the safety laser scanner

You can edit the field set(s) for a safety laser scanner in a **Field set editor**. Depending on the scanner used, the laser output aperture, the protective field and the warning field are displayed with a 190° angle or a 270° angle.

Fig. 11: Field set view is dependent on the scanner



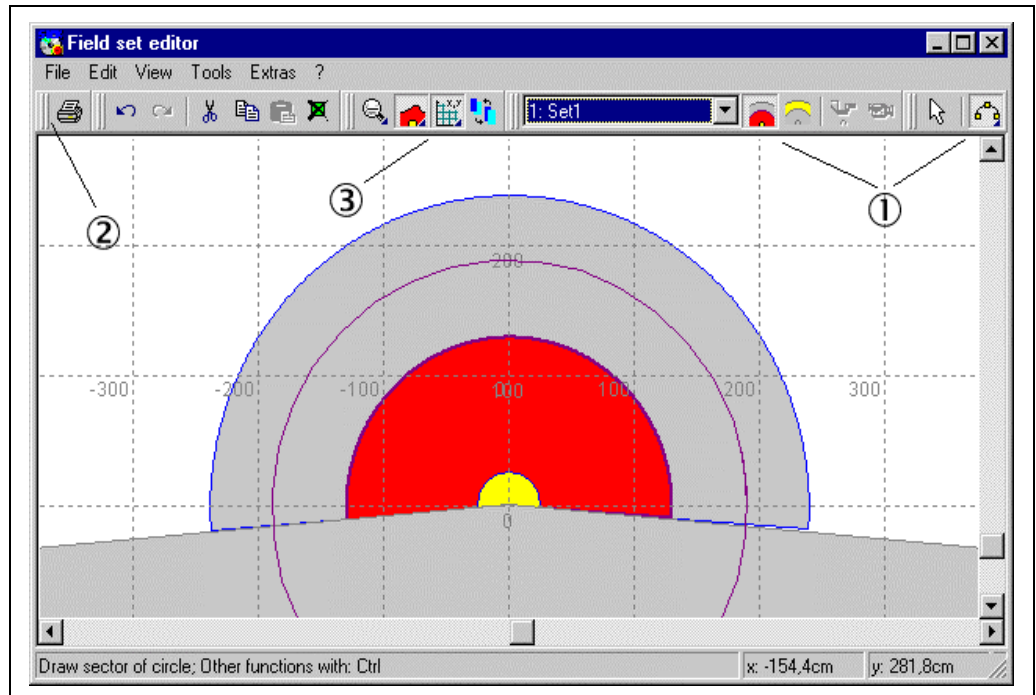
190° on the S3000



270° on the S300 and S200

In the **Field set editor** window you can edit the protective field and warning field for the created field sets with the aid of various Tools (1).

Fig. 12: Field set editor



The most important menu commands for editing the protective fields and warning fields are also available as buttons on the toolbars (2) in the window.

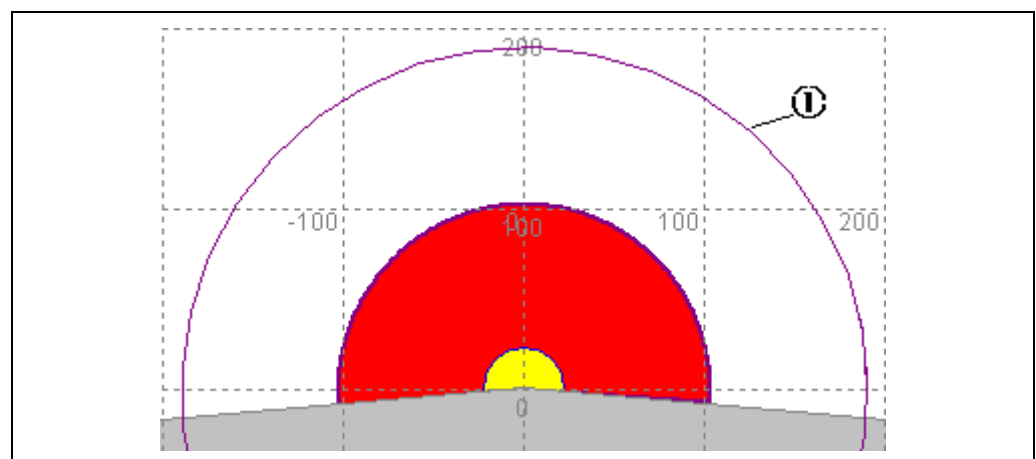
To adapt the window to suit your needs, you can set view (3).

You can also use the contour of the protective field as a reference and monitor the reference.

In the **Field set editor** window you can also display the contour of the surroundings as scanned by the safety laser scanner.

You can open the **Field set editor** window using the **Edit field sets...** command on the context menu for the related device symbol.

Fig. 13: Display of the maximum protective field range in the field set editor



Note The maximum protective field ranges depend on the resolution configured for the safety laser scanner. If you change the resolution later, it may not be possible to transfer protective fields already drawn to the devices. The maximum protective field range is displayed as a violet line (1) in the field set editor.

3.9.1 Symbols in the field set editor

You can hide or show all toolbars completely, or hide or show selected toolbars.

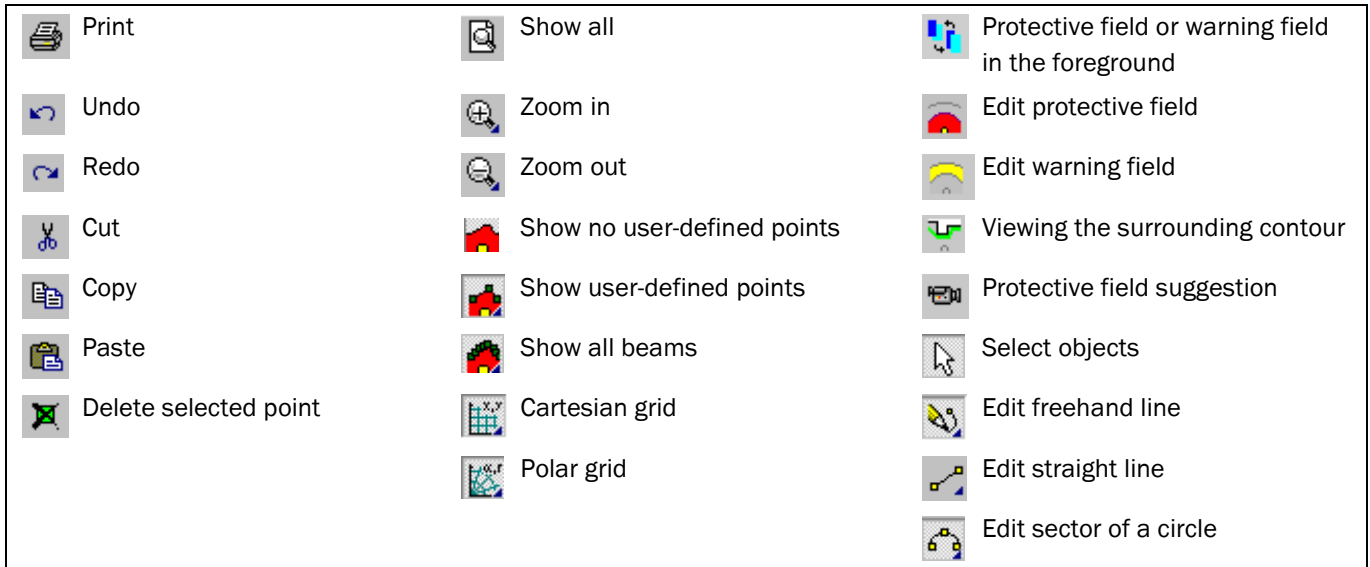


Fig. 14: Symbols in the field set editor

How to hide or show the toolbars:

- From the **View** menu, under **Toolbars**, select a toolbar. The selected toolbar is hidden or shown.

3.9.2 Set view

To be able to work optimally with the field set editor, you can change the screen layout.

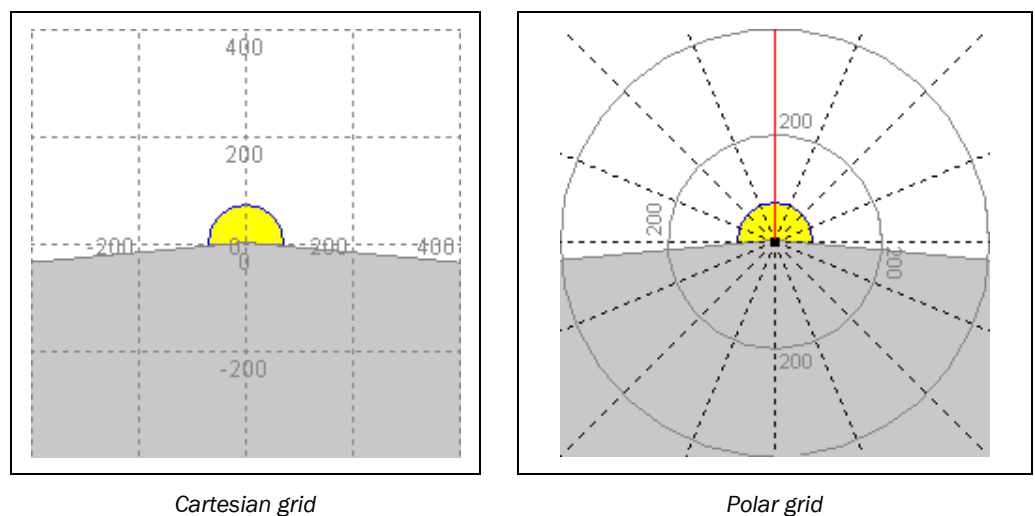
How to switch between cartesian and polar view:

- From the **View** menu select the **Cartesian** command. The grid lines are shown as a cartesian grid.

Or:

- From the **View** menu select the **Polar** command. The grid lines are shown as a polar grid.

Fig. 15: Field set display with cartesian grid or polar grid



How to adjust the beam view for the protective field and warning field:

- From the **View** menu select the **No points** command. Neither user-defined points nor beam end points of the safety laser scanner are shown for protective field and warning field.

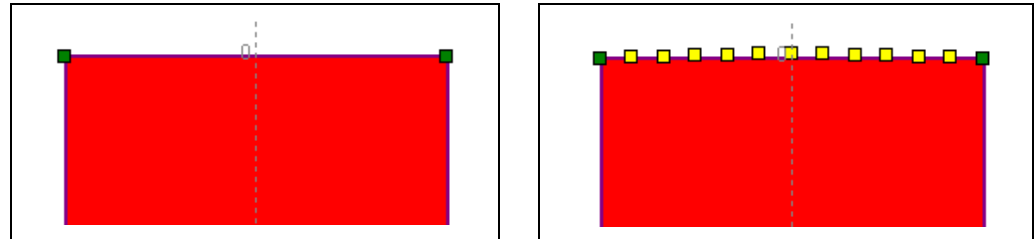
Or:

- From the **View** menu select the **User-defined points** command. Only the user-defined points are shown for protective field and warning field.

Or:

- From the **View** menu select the **All points** command. The user-defined points and all beam end points of the safety laser scanner are shown for protective field and warning field.

Fig. 16: Display of the field contour



Display of no points or only of user-defined points

Display of all points

How to change between protective field level and warning field level:

- From the **Edit** menu select the **Select monitoring field** command, **Protective field**. The protective field of the safety laser scanner is shown (if already drawn) and can be edited or re-drawn.

Or:

- From the **Edit** menu select the **Select monitoring field** command, **Warning field**. The warning field of the safety laser scanner is shown (if already drawn) and can be edited or re-drawn.

How to zoom in:

- Select the magnifying glass symbol with the plus sign.
- Click the area that you want to magnify. The view is enlarged.

Or:

- Select the magnifying glass tool with the plus sign and drag a selection rectangle to select the section that you want to zoom. The section is enlarged to fill the window.

Note To change quickly to the **Zoom out** function, press and hold the **Ctrl** key. The magnifying glass tool is changed.

How to zoom out:

- Select the magnifying glass symbol with the minus sign.
- Click the area that you want to scale down. The view is reduced.

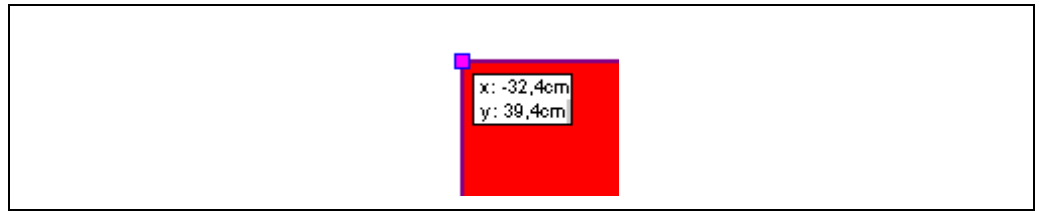
Note To change quickly to the **Zoom in** function, press and hold the **Ctrl** key. The magnifying glass tool is changed.

How to show the co-ordinates for the user-defined points:

- From the **View** menu select the **Show coordinates** command.
- From the **View** menu select the **User-defined points** command or the **All points** command.
- Mark one or more points. The co-ordinates for the point marked/points marked are displayed.

S3000/S300/S200

Fig. 17: Co-ordinates of the user-defined points

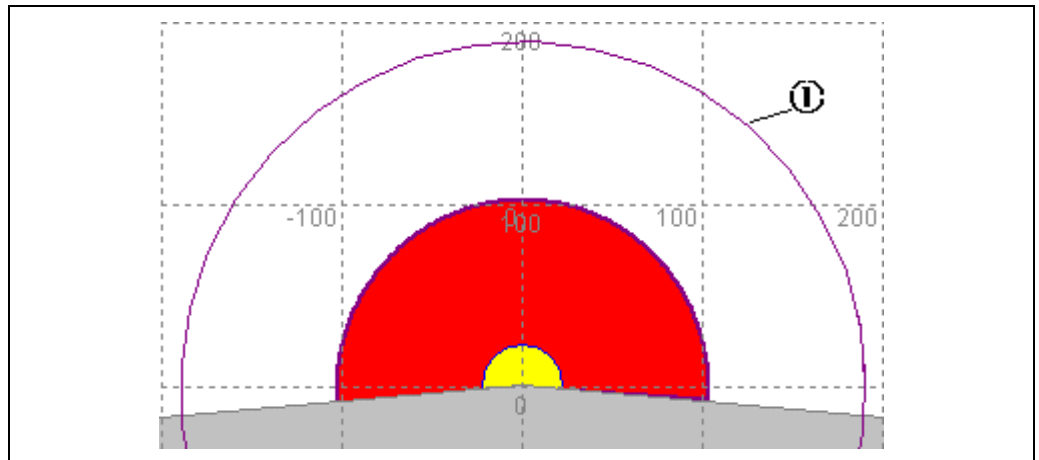


3.9.3 Editing the protective fields and warning fields

You can edit a protective field or a warning field with the aid of **Freehand lines**, **Straight lines** or with **Sectors of a circle**.

Note The maximum protective field range, which is dependent on the resolution, is indicated as a violet line (1) in the field set editor.

Fig. 18: Display of the maximum protective field range in the field set editor



Note Take into consideration that only objects with the resolution set can be safely detected. If you draw narrow protective field segments, this aspect is no longer assured.

Exporting or copying protective fields and warning fields

You can export individual protective fields and warning fields and import them into other field sets or other safety laser scanners.

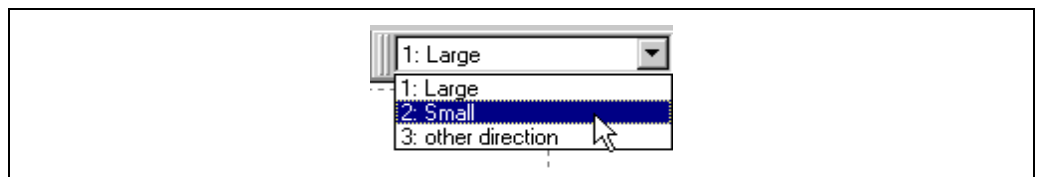
- To export or import the protective field, switch to the protective field level using the toolbar or using the menu, and export or import the field using the **File** menu.
- To export or import the warning field, switch to the warning field level using the toolbar or using the menu, and export or import the field using the **File** menu.

You can copy and paste the points marked on a protective field or warning field. In this way you can, for example, copy a protective field and paste it in another field set.

How to select the required field set:

- Select the required field set on the toolbar.

Fig. 19: Choose field set to be edited



Or:

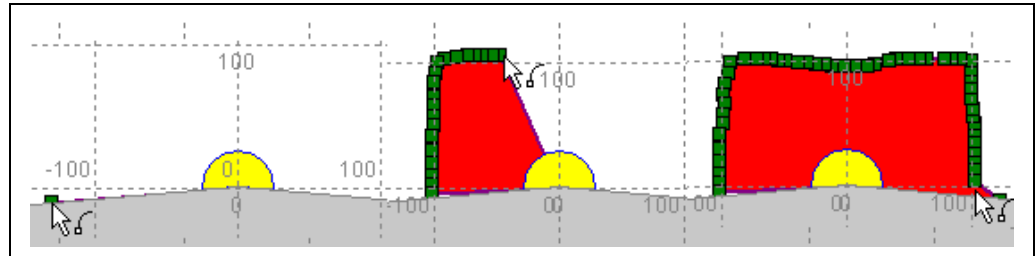
- From the **Edit** menu select the **Select field set** command, [Name of the field set]. You can now edit the field set.

Note Depending on the settings in the options, the protective fields and warning fields for the other field sets are displayed as dotted lines.

How to edit the protective field and warning field using the Freehand line tool:

- In the **Field set editor** window, on the **Tools** menu select the **Freehand line** command or select the related symbol on the toolbar.
- Click any point on the desktop and drag the mouse pointer over the desktop. In this way the protective field or warning field is created point by point on the screen.

Fig. 20: How to edit the fields using the **Freehand line** tool



Or:

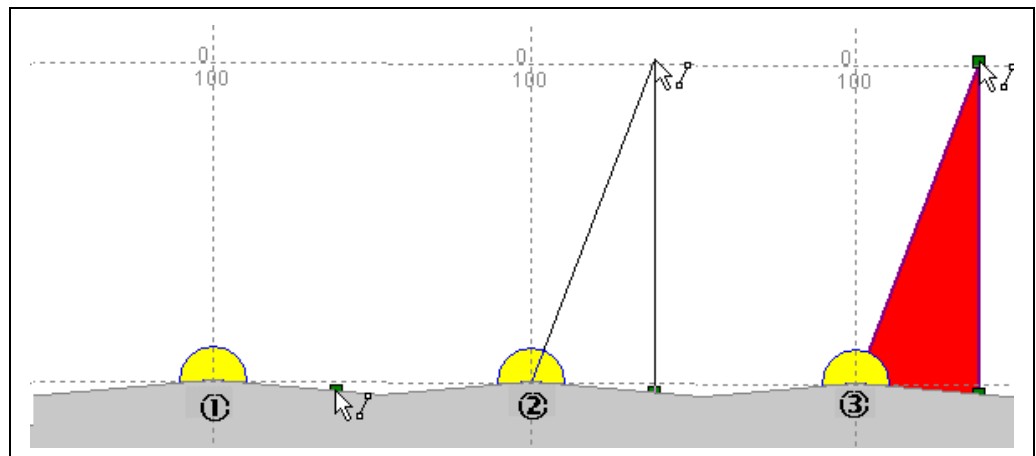
- Click various points on the surface in succession. The points are automatically joined to form a protective field or warning field.

Note Using the **[Ctrl]** key you can restrict the possible user-defined points to the horizontals or verticals.

How to edit the protective field and warning field using the Straight line tool:

- In the **Field set editor** window, from the **Tools** menu select the **Straight line** command or select the related symbol on the toolbar.

Fig. 21: How to edit the fields using the **Straight line** tool



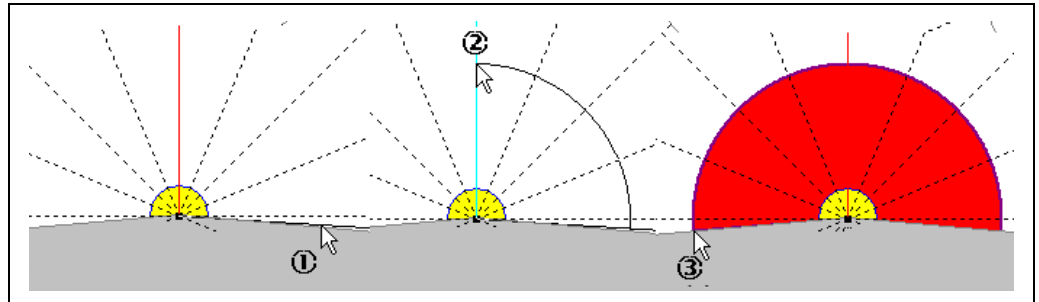
- Click the first (right) point of the protective field or warning field required (1).
- Then drag the protective field or warning field to the next corner point (2).
- Then position the next corner point by clicking with the mouse. The protective field or warning field is automatically filled accordingly (3).
- Then drag the protective field or warning field to the next corner point.
- Continue positioning corner points until the protective field or warning field has the required shape and size.

Note Using the **[Ctrl]** key you can restrict the possible user-defined points to the horizontals or verticals.

How to edit the protective field and warning field using the Sector of a circle tool:

- In the **Field set editor** window, from the **Tools** menu select the **Sector of a circle** command or select the related symbol on the toolbar.
- Click the bottom right point of the required protective field or warning field (1).

Fig. 22: How to edit the fields using the **Sector of a circle** tool



- Then drag the protective field or warning field anticlockwise (2).
- Release the mouse button. The protective field or warning field is shown coloured (3).

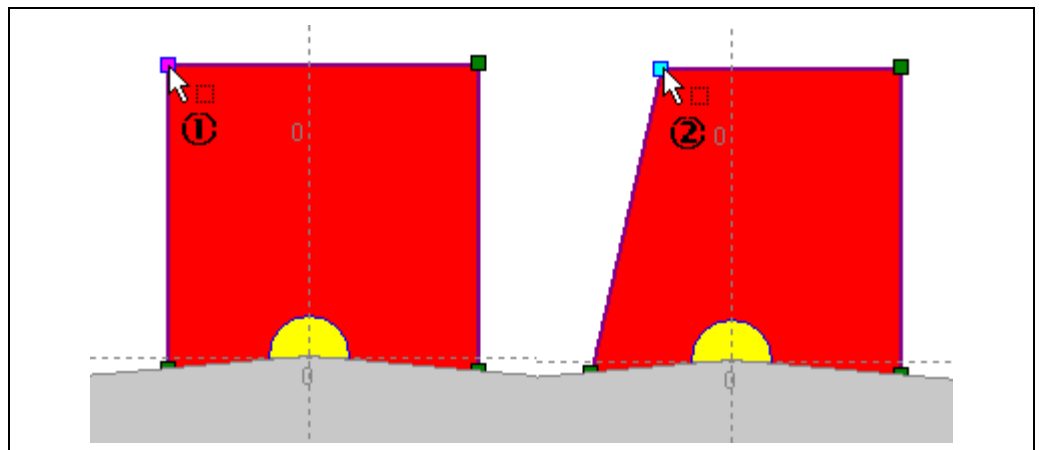
Or:

- Keep the **Ctrl** key pressed.
- Click the bottom left point of the required protective field or warning field.
- Then drag the protective field or warning field clockwise.
- Release the mouse button. The protective field or warning field is shown coloured.

How to move user-defined points for a protective field or warning field:

- In the **Field set editor** window, on the **Tools** menu select the **Select** command or click the related symbol on the toolbar.
- From the **View** menu select the **User-defined points** command. The user-defined points for the protective field or warning field are shown as small squares.

Fig. 23: Move user-defined points



- Click one of these squares. The user-defined point changes colour (1).
- Now drag it to the required position using the mouse (2).

Note When a point is moved you can see the co-ordinates of the mouse pointer in the status bar. Use this information to move the point to the required position.

Move several user-defined points simultaneously:

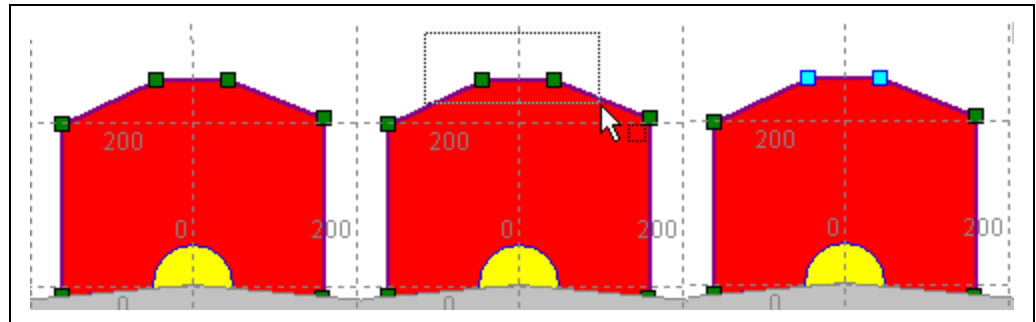
- Drag a selection rectangle around the user-defined points that you want to move (1). All user-defined points in the selection rectangle change colour (2).

Or:

- Click the first user-defined point. The colour changes.

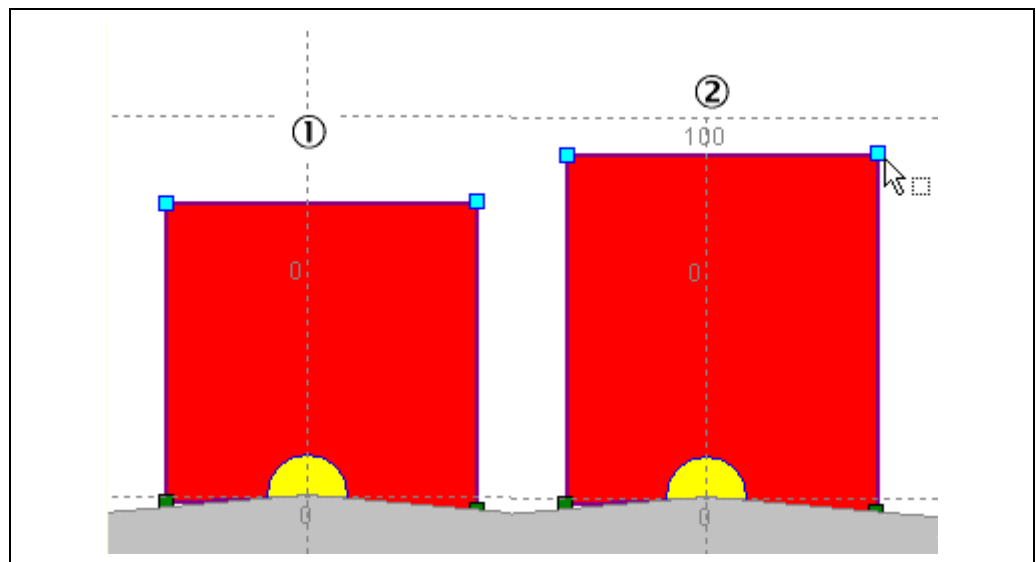
- Keep the Shift key pressed.
- Click the next user-defined point. This also changes colour.

Fig. 24: Move several user-defined points simultaneously (1)



- Mark as many user-defined points as necessary with the shift key pressed.
- Then drag the protective field or warning field to the required position by dragging one of the marked user-defined points.

Fig. 25: Move several user-defined points simultaneously (2)



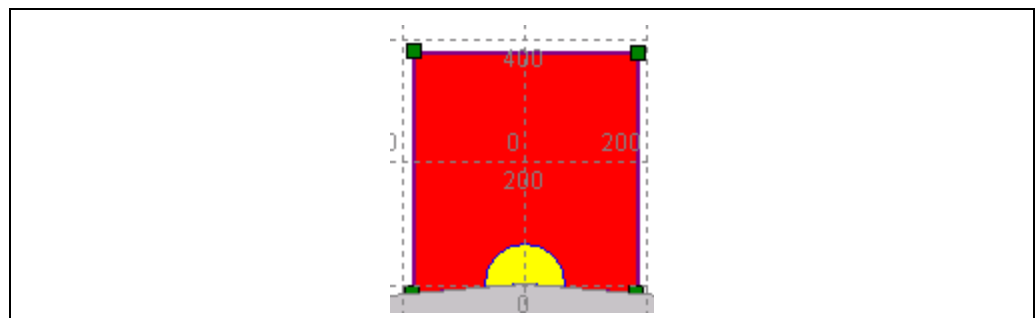
Only move user-defined points radially:

- Keep the **Alt** key pressed. You can only move the user-defined points radially towards or away from the laser scanner.

How to delete user-defined points for a protective field or warning field:

- In the **Field set editor** window, on the **Tools** menu select the **Select** command or click the related symbol on the toolbar.
- From the **View** menu select the **User-defined points** command. The user-defined points for the protective field or warning field are shown as small squares.

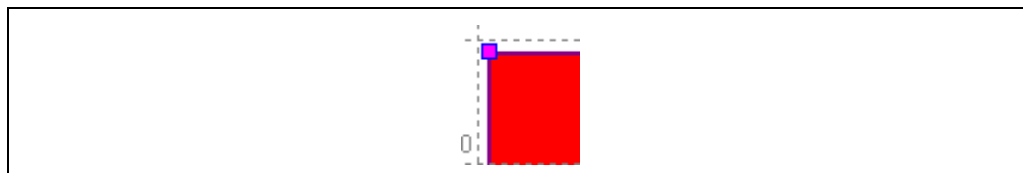
Fig. 26: Delete user-defined points (1)



- Click one of these squares. The user-defined point changes colour.

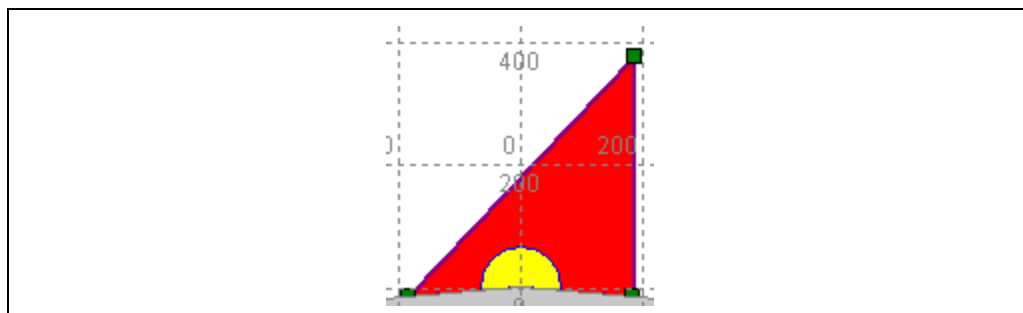
S3000/S300/S200

Fig. 27: Delete user-defined points (2)



- From the **Edit** menu select the **Delete** command or click the corresponding symbol on the toolbar. The user-defined point is deleted, the protective field or warning field takes on a corresponding shape.

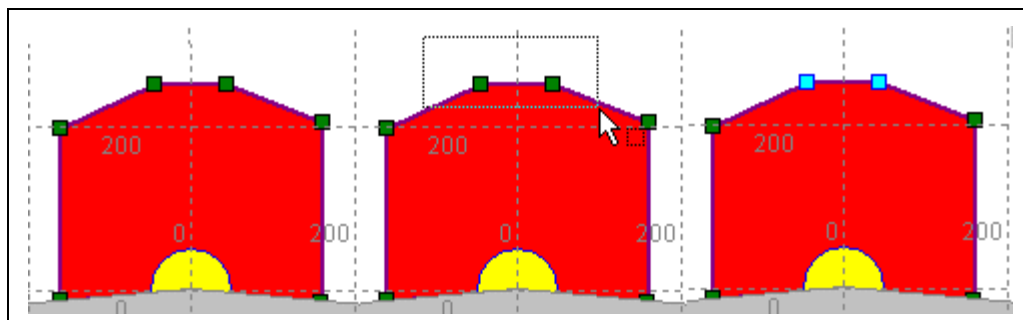
Fig. 28: Delete user-defined points (3)



Delete several user-defined points simultaneously:

- Drag a selection rectangle around the user-defined points that you want to delete. All user-defined points in the selection rectangle change colour.

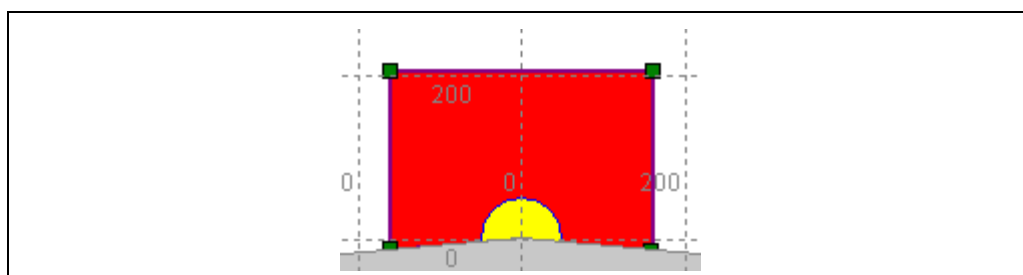
Fig. 29: Delete several user-defined points simultaneously (1)



Or:

- Click the first user-defined point. The colour changes.
- Keep the Shift key pressed.
- Click the next user-defined point. This also changes colour.
- Mark as many user-defined points as necessary with the shift key pressed.
- From the **Edit** menu select the **Delete** command or click the corresponding symbol on the toolbar. The user-defined points are deleted, the protective field or warning field takes on a corresponding shape.

Fig. 30: Delete several user-defined points simultaneously (2)



How to undo an action:

- From the **Edit** menu select the **Undo** command or click the corresponding symbol on the toolbar. The action performed last is undone.

How to redo an action undone:

- From the **Edit** menu select the **Redo** command or click the corresponding symbol on the toolbar. The action undone last is redone.

3.9.4 Protective field or warning field suggestion

The CDS can suggest a protective field or warning field. The safety laser scanner scans the visible room contour several times. From the data obtained the CDS determines the contour of the related field (see also the operating instructions of the related safety laser scanner).

Note The measurement tolerances of the safety laser scanner are automatically subtracted from the protective field suggested. As a result the protective field is slightly smaller than the surface covered.



WARNING

Check the protective field suggested!

The protective field suggested is not a replacement for the calculation of the safety distance. Calculate the safety distance based on the chapter “Mounting” and check the protective fields, prior to commissioning the application, using the instructions in the chapter “Commissioning” and using the “Checklist” in the operating instructions of the related safety laser scanner.

You can edit the fields suggested in two ways:

- Move the individual points of the field using the mouse until the field is of the required shape and size.
- Walk along the field boundary required and during this process hold up a so-called target board (for example a piece of cardboard at least 10 × 10 cm) at the boundary required for the protective field. During this process you can see how the protective field suggested in the CDS changes.

How to have a protective field suggested:

- Switch to the protective field level in the field set editor using the toolbar.



- On the toolbar click the button shown below.



A warning will be displayed by the CDS that the actual protective field will be overwritten.

- Click the **Yes** button. The room contour is scanned and displayed.
- If necessary, you can edit the protective field suggested using the drawing tools in the field set editor.

How to have a warning field suggested:

- Switch to the warning field level in the field set editor using the toolbar.



- On the toolbar click the button shown below.



A warning will be displayed by the CDS that the actual warning field will be overwritten.

- Click the **Yes** button. The room contour is scanned and displayed.
- If necessary, you can edit the warning field suggested using the drawing tools in the field set editor.

3.9.5 Viewing the surrounding contour

You can display the contour of the surroundings in the field set editor. In this way you can change the protective field and warning field to suit. You can also detect obstacles that prevent detection (for example pillars) or that would result in the shutdown of the OSSDs (hanging cables, etc.).

You can also continually update the display of the contour of the surroundings. In this way you can see on the screen how the contour of the surroundings changes when you move obstacles, for example.

Note Depending on the power of your PC or notebook, some CDS functions will become slower or will be impaired by the continual updating of the surrounding contour.

How to display the surrounding contour:

- On the toolbar in the field set editor click the button shown below.



The surrounding contour is scanned and displayed as a blue line in the field set editor.

Or:

- Keep the **Ctrl** key pressed and on the toolbar in the field set editor click the button shown below.

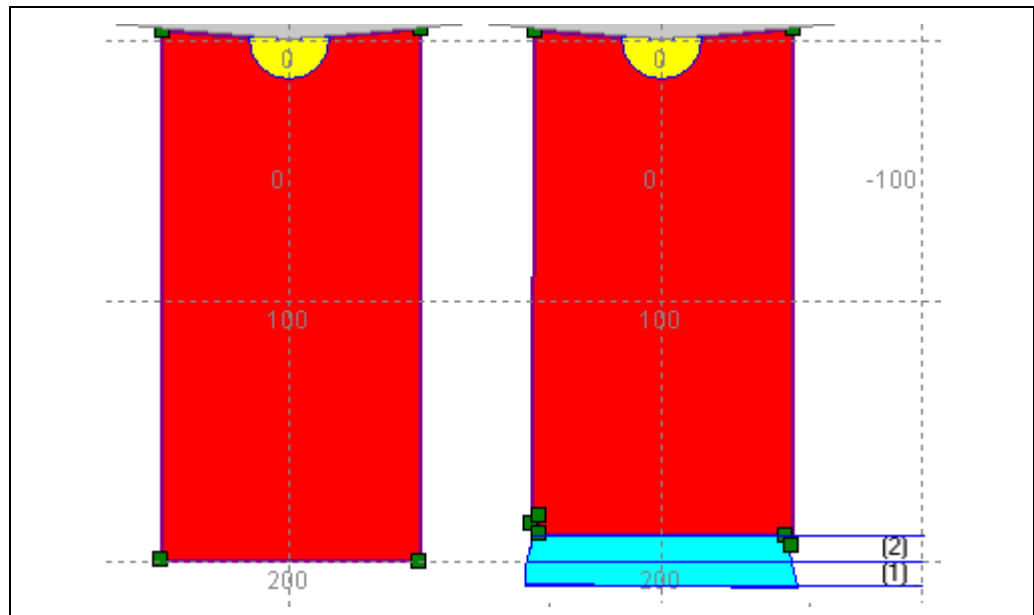


The surrounding contour is scanned, displayed as a blue line in the field set editor and continually updated.

3.9.6 Using the contour as a reference

With the function **Contour as reference**, a contour segment is also applied to the monitored area. This contour segment is added in the field set editor and its depth adjusted (positive (2) and negative (1) tolerance band).

Fig. 31: Tolerance band for a contour segment



Within the tolerance band, the contour of an object (e.g. the floor) must cover the entire width of the segment, i.e. an object must always be present (the contour is used as a reference).

The OSSDs of the safety laser scanner change to the OFF state if ...

- there is an object in the protective field.
- the room contour is no longer fully within the tolerance band, e.g. due a change in the position of the safety laser scanner (protection against tampering).

You can set the size of the tolerance band in the field set editor options.

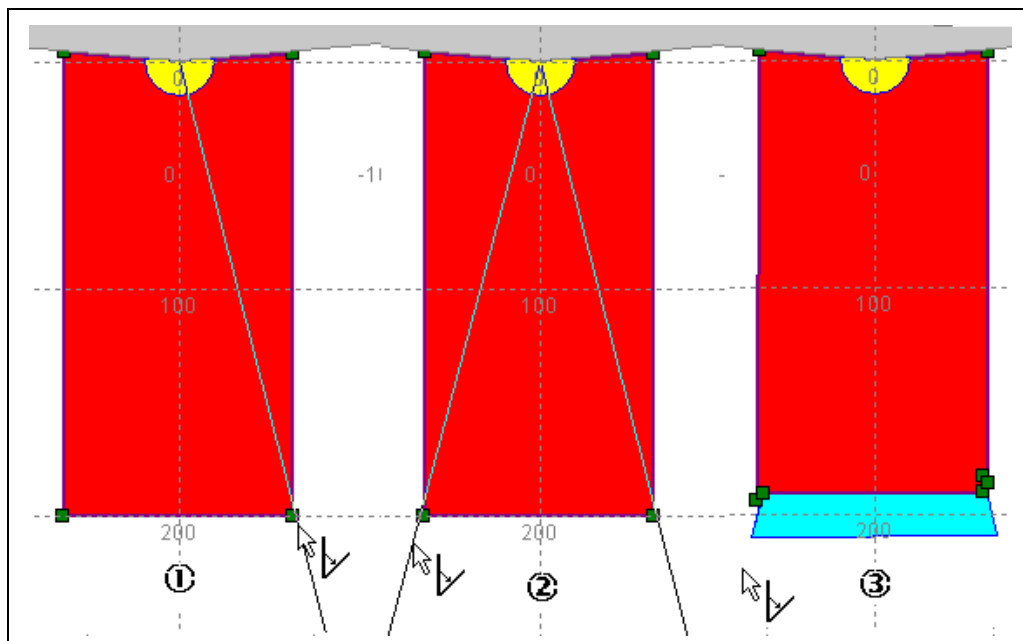
The depth of the negative tolerance band can be set such that it protrudes into the protective field or starts directly at the boundary of the protective field.

- Notes**
- It is not possible to edit a warning field where there is a contour segment. Any existing warning field will be deleted by adding the contour segment in this area.
 - As many contour segments as required can be added.

How to create a contour segment:

- You can only create a contour segment if you have already prepared a protective field. Thus first create the protective field for your application.
- From the **Tools** menu select the **Create contour** command. An angle symbol appears next to the mouse pointer.

Fig. 32: Adding a contour segment

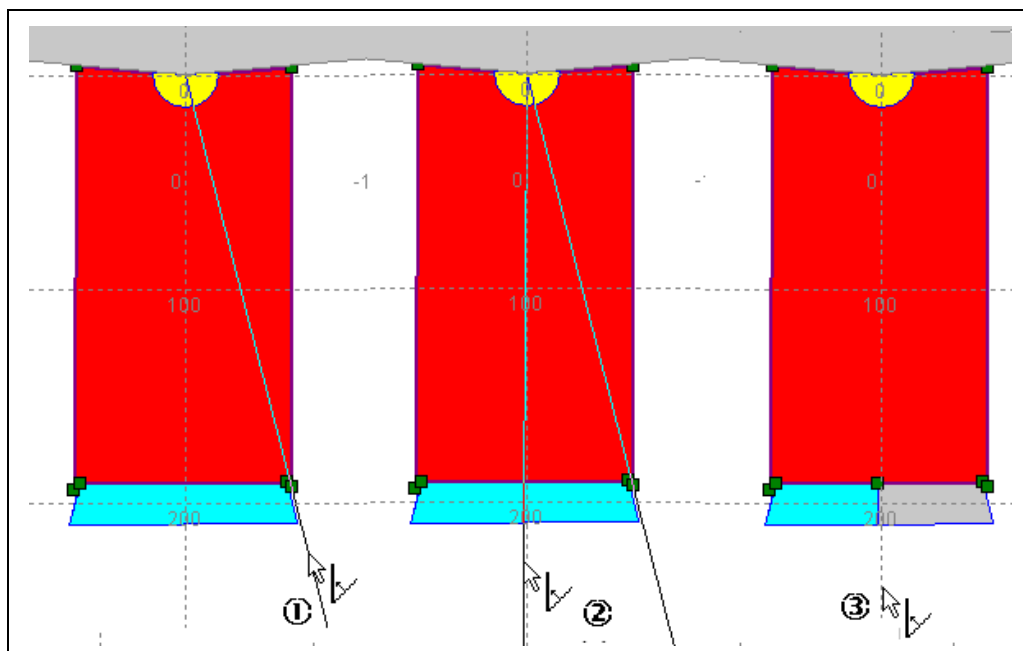


- Click the outermost point on the right of the contour segment (1).
- Then drag the mouse pointer to the outermost point on the left of the segment (2).
- Release the mouse button (3). The contour segment is created with a positive and negative tolerance band (as set in the options).

How to reduce a contour segment:

- Go to the **Tools** menu and select the **Reduce contour** command. An angle symbol appears next to the mouse pointer.

Fig. 33: Reducing a contour segment



- Click the point from which you want to reduce the contour segment (1).
- Then drag the mouse pointer to the point to which you want to reduce the contour segment (2).
- Release the mouse button (3). The contour segment is reduced appropriately. A warning field is now in the place where there was previously a contour segment.

How to edit a contour segment:

Negative tolerance band

- Switch to the protective field level in the field set editor using the toolbar.



- Select one of the tools to edit the protective field (freehand line, straight line or sector of a circle).

In the area of the contour segment you can now change the protective field and with it the negative tolerance band.

However, you cannot increase the size of the protective field beyond the contour segment. For this purpose you must first reduce the contour segment again.

Positive tolerance band

- Switch to the warning field level in the field set editor using the toolbar.



- Select one of the tools to edit the protective field (freehand line, straight line or sector of a circle) and change the positive tolerance band with the tool.

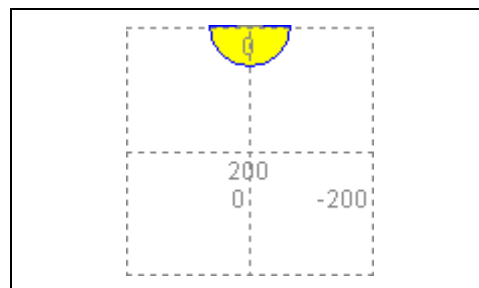
During this process you can only reduce the contour field to the original protective field boundary.

3.10 Options for editing the field set

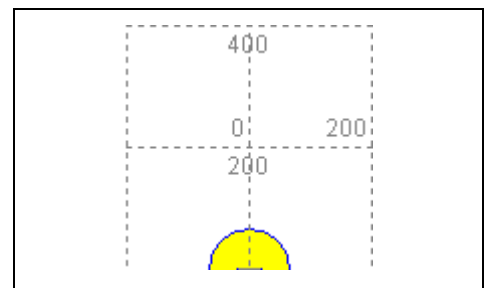
3.10.1 Pre-setting of the view

In this dialog box you can set the direction in which the laser scanner's scanning range is to be aligned in the **Field set editor** window: **Up** (standard), **Down**, **Left** or **Right**.

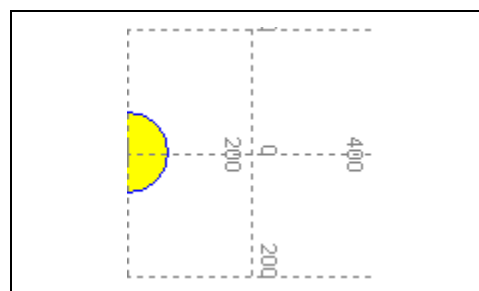
Fig. 34: Alignment of the scanning range in the field set editor



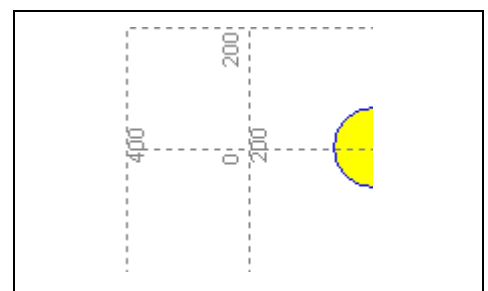
Pointing down



Pointing up



Pointing right

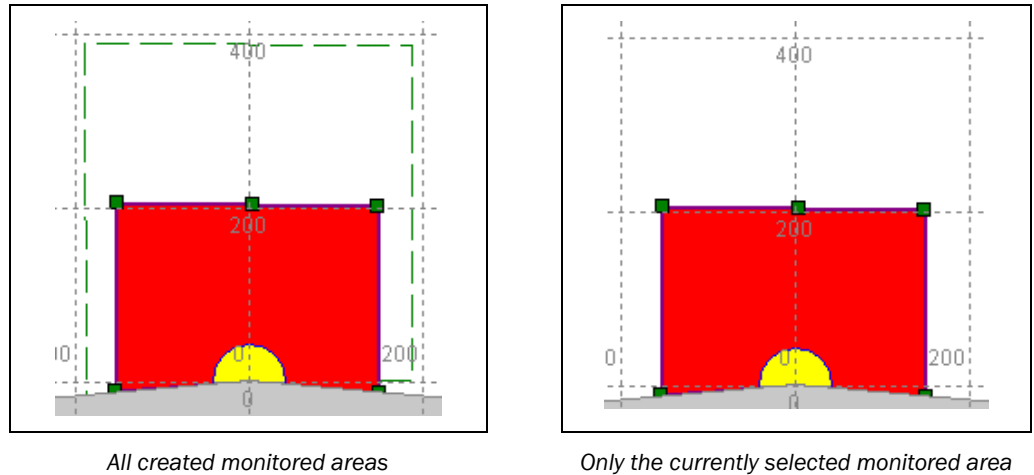


Pointing left

Under **Representation of the monitoring areas** choose whether all field sets are to be shown in the **Field set editor** window or only the one currently selected:

- all created
Along with the field set currently selected, the protective fields and warning fields for all other field sets created are displayed as dotted lines.
- only the currently selected
Only the protective field and the warning field for the field set currently selected are displayed.

Fig. 35: Representation of the monitored areas in the field set editor

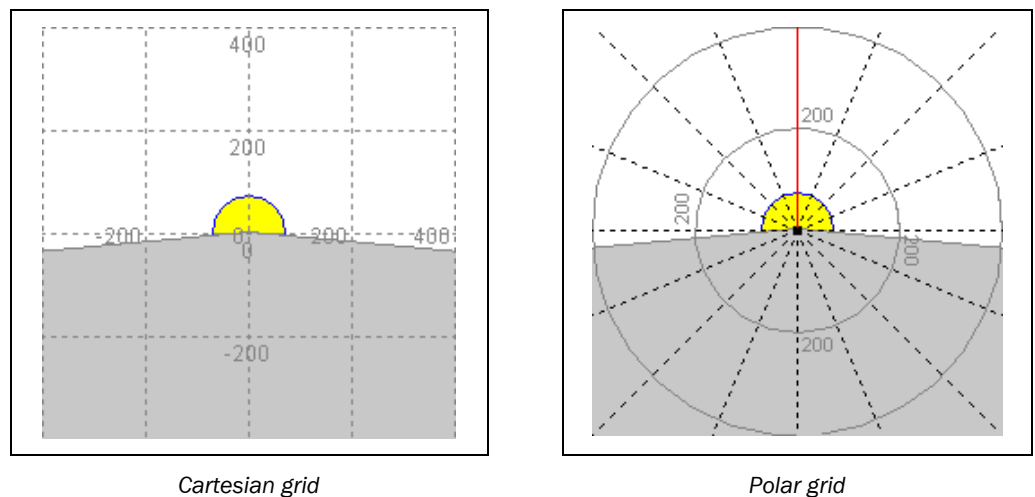


3.10.2 Pre-setting of the grid

In this dialog box you enter the basic setting for the grid lines. When the **Field set editor** window is opened, the grid is shown in the preset form.

You can choose between a cartesian grid and a polar grid. A cartesian grid is suitable for rectangular field sets or polygon-shaped field sets, a polar grid is suitable for circular field sets.

Fig. 36: Basic setting for the grid view



3.10.3 Colour settings

In this dialog box you can enter the **Colour of the grid**.

Laser scanner, protective field, warning field and background have fixed colour definitions that cannot be changed.

3.10.4 Pre-setting for the protective field

You can set the field editor such that on opening a new field set, a protective field is already defined.

First choose whether the default is to be **No protective field**, a **Rectangle** or a **Sector of a circle**.

- If you have selected **Rectangle**, on the **Rectangle** tab enter the **Height**, the **Width** and the **Distance** to the laser scanner.
- If you have selected **Sector of a circle**, on the **Sector of a circle** tab enter the **Radius**.

Note You can only enter values within the size of the protective field on the scanner used and its variants (see also the operating instructions of the related safety laser scanner).

Fig. 37: Choosing a pre-setting for the protective field

Protective field

Rectangle Sector of a circle

Height cm

Width cm

Distance cm

Default for new protective fields:

No protective field
 Rectangle
 Sector of a circle

Protective field

Rectangle Sector of a circle

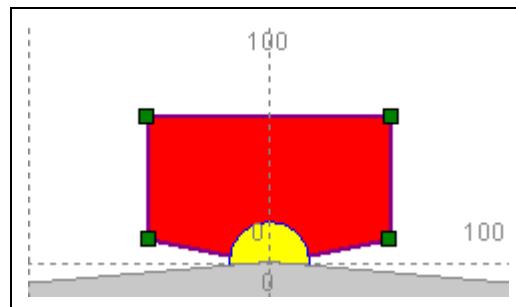
Radius cm

Default for new protective fields:

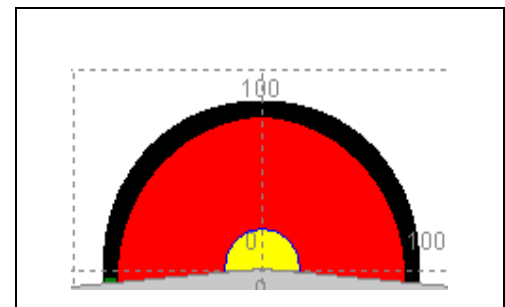
No protective field
 Rectangle
 Sector of a circle

Rectangle

Sector of a circle



Resulting protective field



Resulting protective field

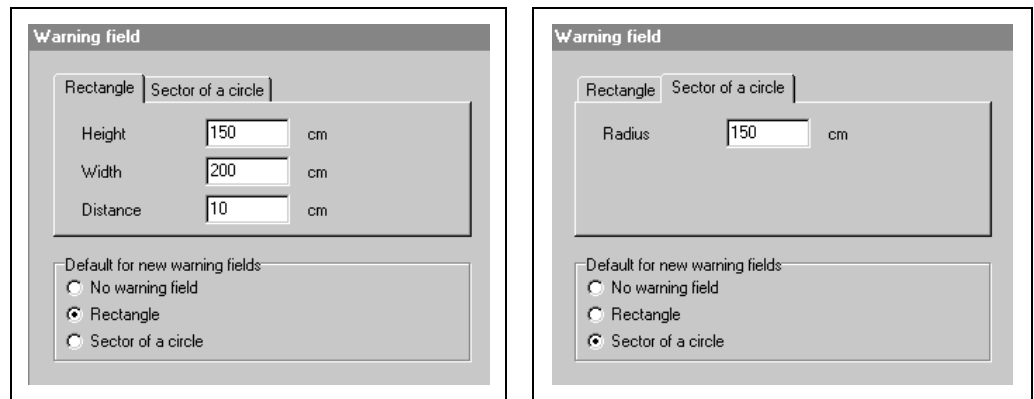
3.10.5 Pre-setting for the warning field

First choose whether the default is to be **No warning field**, a **Rectangle** or a **Sector of a circle**.

- If you have selected **Rectangle**, on the **Rectangle** tab enter the **Height**, the **Width** and the **Distance** to the laser scanner.
- If you have selected **Sector of a circle**, on the **Sector of a circle** tab enter the **Radius**.

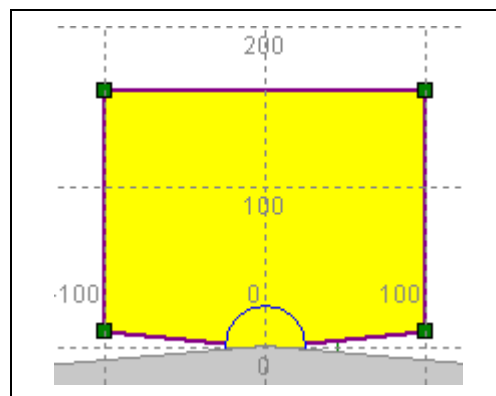
Note You can only enter values within the size of the warning field on the scanner used and its variants (see also the operating instructions of the related safety laser scanner).

Fig. 38: Choosing a pre-setting for the warning field

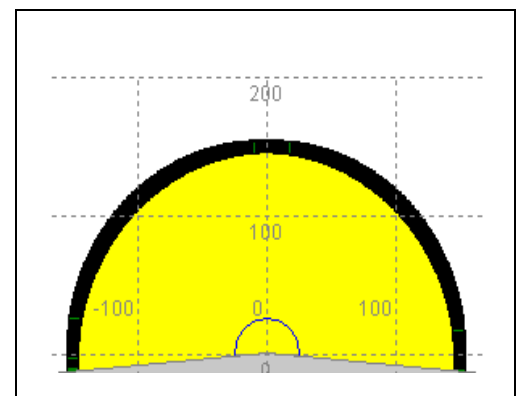


Rectangle

Sector of a circle



Resulting warning field



Resulting warning field

3.10.6 Pre-setting for the contour segments

Define a positive and a negative tolerance band for the contour segments that you add using the field set editor. You can only enter values between 10 cm and the maximum protective field range.

- Notes**
- The values entered relate to the boundary of the protective field:
 - +15 cm/-15 cm = The tolerance band protrudes 15 cm beyond the protective field and 15 cm into the protective field.
 - +15 cm/-0 cm = The tolerance band starts at the boundary of the protective field and protrudes 15 cm beyond the protective field.
 - The tolerance bands must not be set to less than +10 cm/-0 cm.

4 Service

4.1 Optics cover/front screen calibration

The level of contamination is measured continuously during the operation of the safety laser scanner. For this purpose the optics cover/front screen calibration must first be performed; this then serves as a reference for the contamination measurement (status = not contaminated).

The calibration is only allowed to be performed with a new optics cover or front screen! The new optics cover or front screen must be free of contamination at the time of the calibration. The optics cover calibration should be performed at room temperature (10-30 °C)!



Only calibrate immediately after replacement with a brand-new, clean optics cover or front screen!

If you perform the calibration with an optics cover or front screen that has already been used or that is already contaminated, the laser scanner detection features will be degraded.

How to perform a front screen calibration:

- On the context menu for the **S3000/S300/S200** device symbol choose the command **Service, Optics cover calibration** or **Front screen calibration**. A warning is displayed; this warning informs you that you are only allowed to calibrate immediately after replacement with a brand-new, clean optics cover or front screen.
- Only click the **OK** button if you have replaced the optics cover or front screen with a brand-new, clean optics cover or front screen! The message **Calibration has been performed** appears.

4.2 Restart of the safety laser scanner

Via the CDS you can restart the scanner. In this way the power-up process is simulated with the aid of the software. For example, re-start the scanner if the safety laser scanner is in the lockout operational status.

Note During restart the OSSDs will be switched to the OFF state.

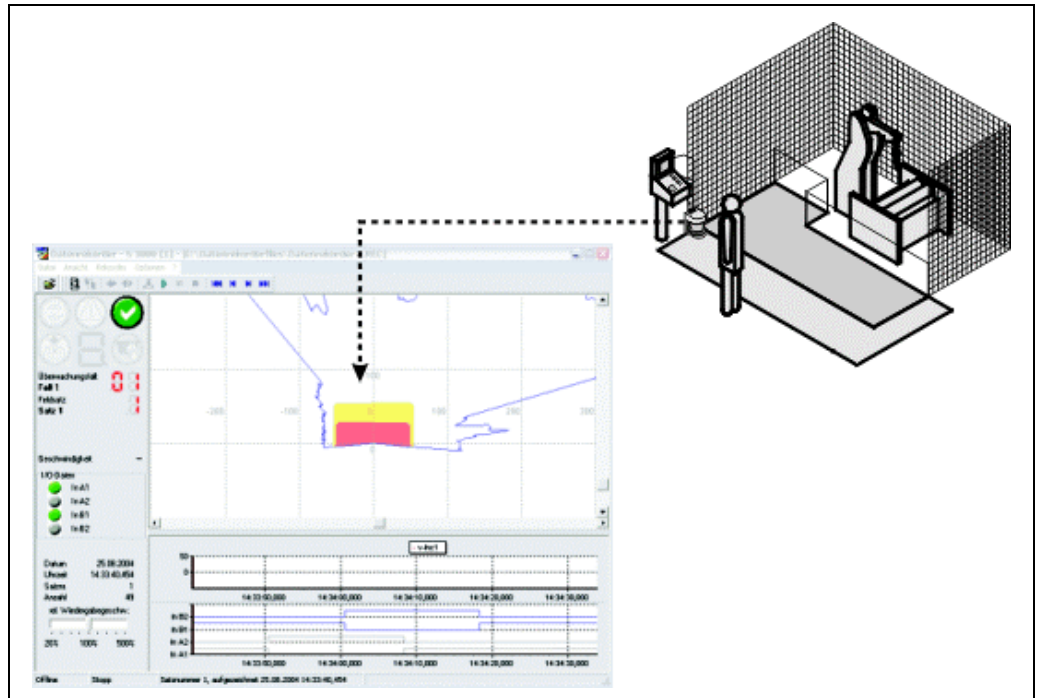
How to restart the safety laser scanner:

- From the context menu for the device symbol select the command **Service, Restart scanner**. The safety laser scanner performs the power up sequence (see also the operating instructions of the related safety laser scanner, chapter “Commissioning”).

5 Data recorder

The data recorder enables you to display and record various operating data for the safety laser scanner while online. With the aid of the data recorder you can, e.g. display the scanner's measured scan line and infringements of the protective field or warning field, and observe the states of the control inputs (see also section 5.1 "User interface elements" on page 38).

Fig. 39: Data recorder online on an S3000 application




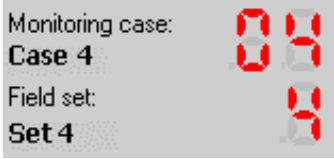
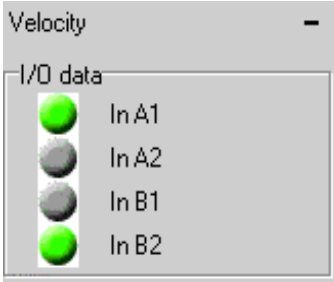
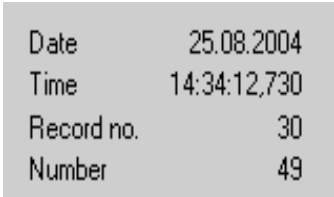
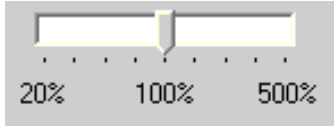
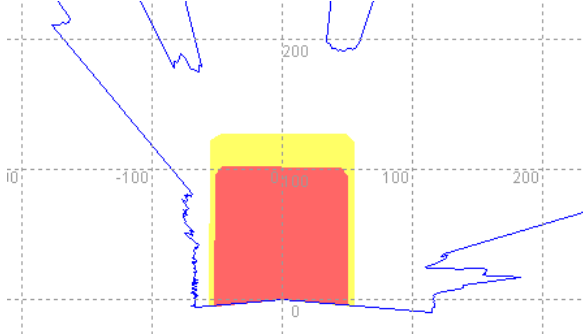
The data displayed can be recorded and saved in a file. It is often possible to localise and identify errors during operation by recording operating data over a longer period in some circumstances.

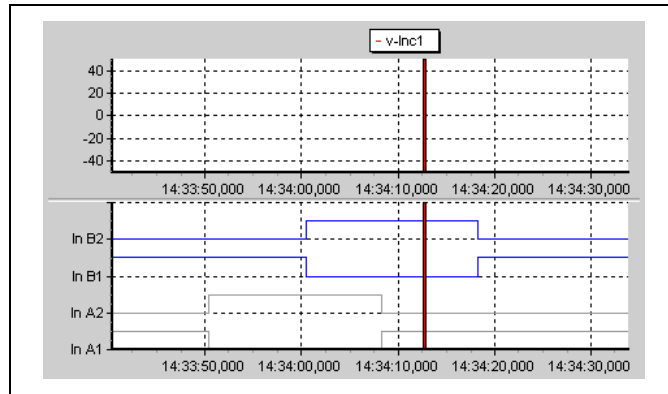
You can start or stop the recording automatically using configurable trigger conditions. For example, the data recorder can be set-up such that it only records data on a protective field infringement in a specific monitoring case. With the aid of the trigger conditions you can localise and systematically track down errors in an application.

5.1 User interface elements

The user interface for the data recorder comprises the following elements:

Tab. 4: Elements on the user interface

	<p>Display of the LEDs and the 7-segment display</p>
	<p>Activated monitoring case with the field set assigned to it (with the S3000 a field set that may be allocated simultaneously)</p>
	<p>Velocity that is present at the dynamic control inputs Status of the control inputs</p>
	<p>Date and time of a recording Number for the current data record and number of data records</p>
	<p>Slider for replay speed</p>
	<p>Monitored area with: protective field = red warning field = yellow retrieved room contour = blue</p>



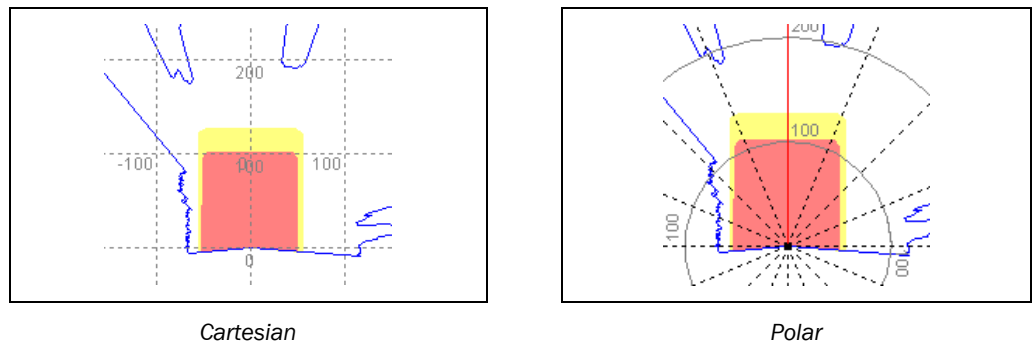
I/O traces with the velocities present at the incremental encoders or the levels present at the control inputs

5.1.1 Changing the user interface

You can modify the user interface for the data recorder to suit your needs:

- show or hide status indications and toolbar
- show or hide monitoring areas and I/O traces
- rotate the view of monitoring area by 90° or 180°
- cartesian or polar display of the grid lines for the monitored area

Fig. 40: Cartesian or polar view



- Note** ➤ Use the selections on the **View** menu to change the settings to suit the current session.
- On the **Options** menu, use the **Settings** dialog box to save these settings, i.e. for all future settings.

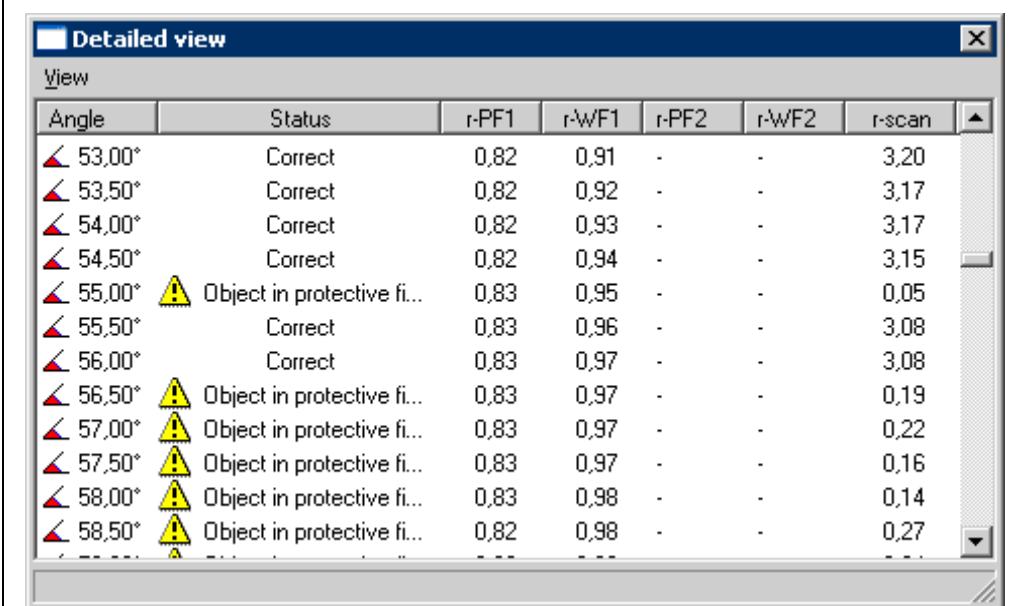
In the **Settings** dialog box you can also save changes to other aspects of the way the user interface is displayed:

- colour settings
- show or hide I/O data in the I/O data and I/O traces areas
- display of graphic elements, e.g. protective field or room contour

5.1.2 Detailed view

All the angular steps on the safety laser scanner are displayed individually in the data recorder detail view. In particular, you can see at which angular steps there is/was an object in the protective field.

Fig. 41: Individual angular steps in the detail view



Angle	Status	r-PF1	r-WF1	r-PF2	r-WF2	r-scan
53,00°	Correct	0,82	0,91	-	-	3,20
53,50°	Correct	0,82	0,92	-	-	3,17
54,00°	Correct	0,82	0,93	-	-	3,17
54,50°	Correct	0,82	0,94	-	-	3,15
55,00°	Object in protective fi...	0,83	0,95	-	-	0,05
55,50°	Correct	0,83	0,96	-	-	3,08
56,00°	Correct	0,83	0,97	-	-	3,08
56,50°	Object in protective fi...	0,83	0,97	-	-	0,19
57,00°	Object in protective fi...	0,83	0,97	-	-	0,22
57,50°	Object in protective fi...	0,83	0,97	-	-	0,16
58,00°	Object in protective fi...	0,83	0,98	-	-	0,14
58,50°	Object in protective fi...	0,82	0,98	-	-	0,27

The following data are displayed for each angular step:

- column **Status**: correct, object in protective or warning field
- column **r-PF1**: configured protective field radius
- column **r-WF1**: configured warning field radius
- column **r-PF2**: configured radius of any simultaneously present protective field (only possible on the S3000)
- column **r-WF2**: configured radius of any simultaneously present warning field (only possible on the S3000)
- column **r-scan**: radius of the scanned room contour

Note You can restrict the view of the beams on the **View** menu in the **Detailed view** window with the aid of the **Display only faulty beams** command. Only the scanner beams that are interrupted by an object in the protective field or warning field are displayed.

5.2 Usage of the data recorder

Fig. 42: Toolbar for operating the data recorder



The data recorder is operated using a toolbar. The symbols are similar to the usual symbols on a video recorder or tape recorder and also have so-called tooltips for identification.

You can also run all functions using the **Recorder** menu.

5.2.1 Display and record data

For it to be possible for the data recorder to display and also record data, you must first connect the CDS and then the data recorder to the safety laser scanner.

- In the toolbar of the data recorder, click on the **Connect** button. The actual operating mode is indicated on the safety laser scanner.

Recording data

- In the toolbar of the data recorder, click on the **Start recording** button. A dialog box is opened in which you can enter the name and folder for the file where you want to save the data.

Note You must also start the recording and add a file if you use trigger conditions, i.e. the actual recording only starts later.

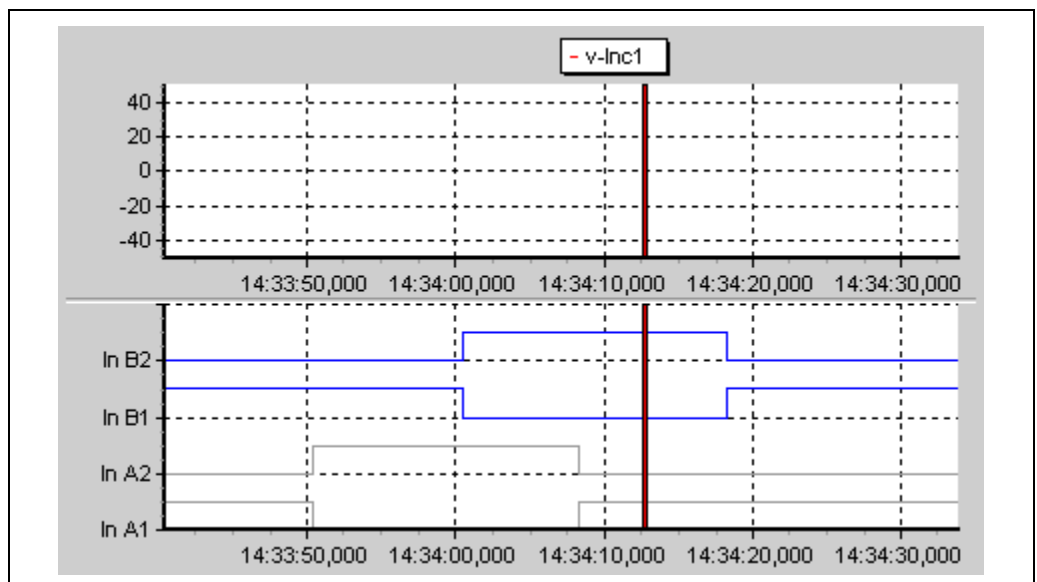
5.2.2 Playing back saved files

- Open a recorded file (file extension .REC).

Note The project opened in the CDS must match the project used during recording.

You can the start, stop or end replay using the buttons on the toolbar. In addition, you can also move forward or back in steps or to the start or the end of the recording.

Fig. 43: Navigation within the recording with the aid of the I/O traces

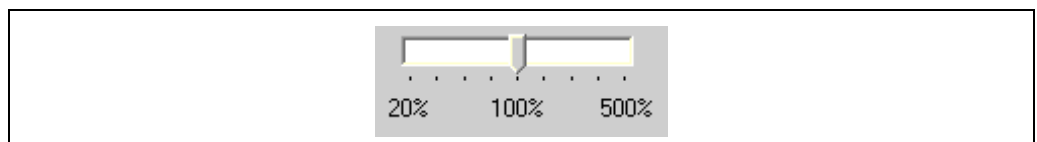


In addition, you can move forward or back directly in the recording by clicking the I/O traces displayed.

Changing replay speed

The **Rel. replay speed** slider can be used to regulate the replay speed.

Fig. 44: Slider for regulating the replay speed

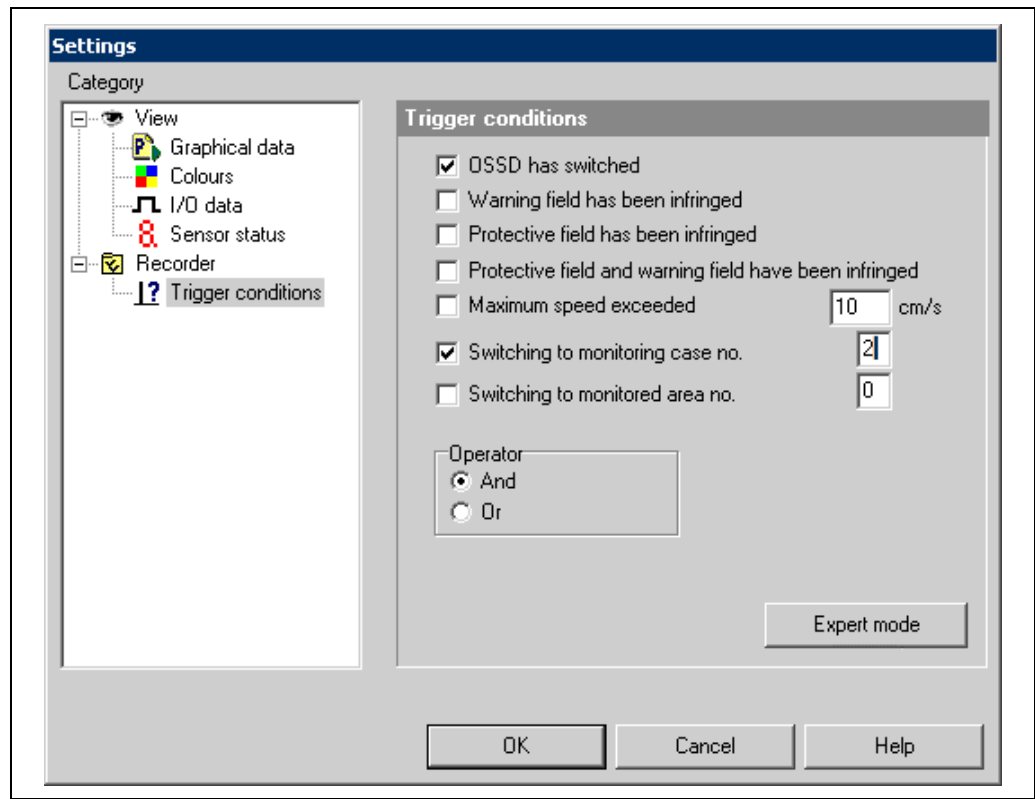


- Move the slider to the left to slow down the replay speed.
- Move the slider to the right to increase the replay speed.

5.2.3 Setting the trigger conditions (simple mode)

With the aid of the trigger conditions (**Options** menu, **Settings**) you can define when the data recorder is to record application data.

Fig. 45: Dialog box for setting the trigger conditions



In the “simple mode” you activate one or more conditions and select **AND** or **OR** as the operator between the conditions.

Example 1

You link the conditions **OSSD has switched** and **Switching to monitoring case no. 2** with **AND**. The data recorder records data as soon as both conditions are met. If the scanner switches the OSSD back on or if the scanner is switched to a different monitoring case using the control inputs, the recording is interrupted.

Example 2

You link the conditions **Warning field has been infringed** and **Switching to monitored area no. 3** with **OR**. The data recorder records data as soon as at least one of the two conditions is met. Recording is only interrupted if neither of the two conditions continues to be applicable.

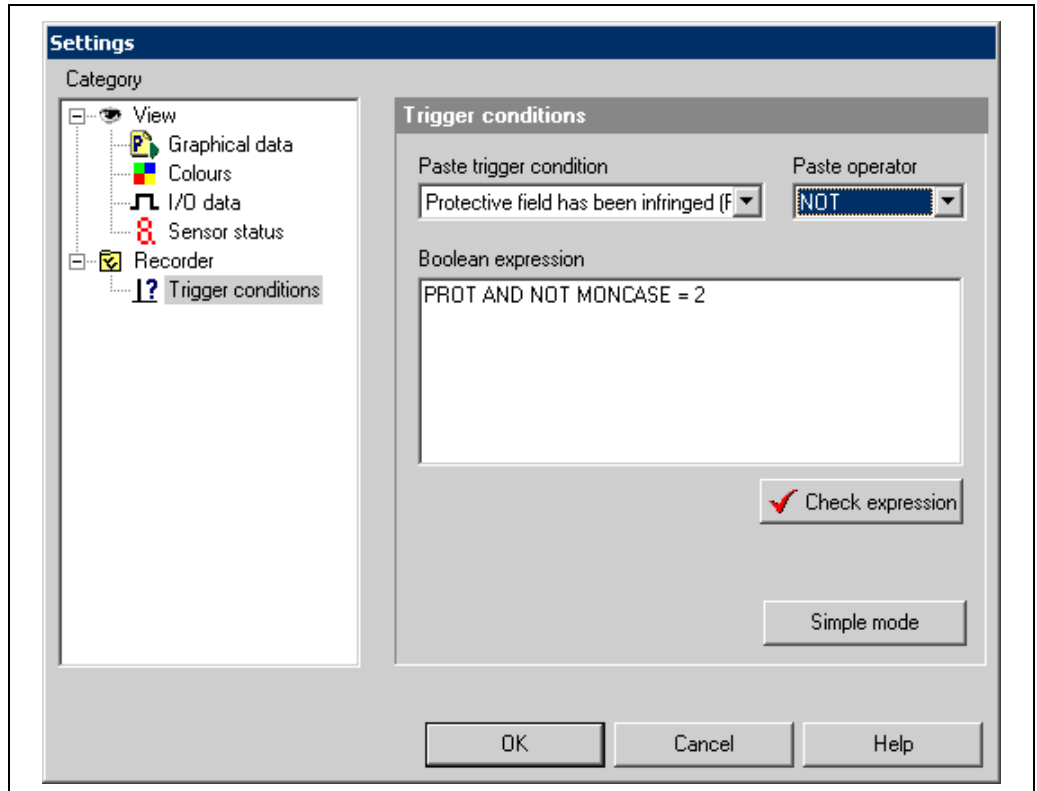
5.2.4 Setting the trigger conditions (expert mode)

With the aid of the trigger conditions, you can define when the data recorder is to record application data.

- In the dialog box **Settings** in the **Trigger conditions** area, click on the **Expert mode** button in order to switch into expert mode.

In the **Boolean expression** field you can either enter conditions directly or assemble them using the **Insert trigger condition** and **Paste operator** list boxes.

Fig. 46: Dialog box for setting the trigger conditions in expert mode



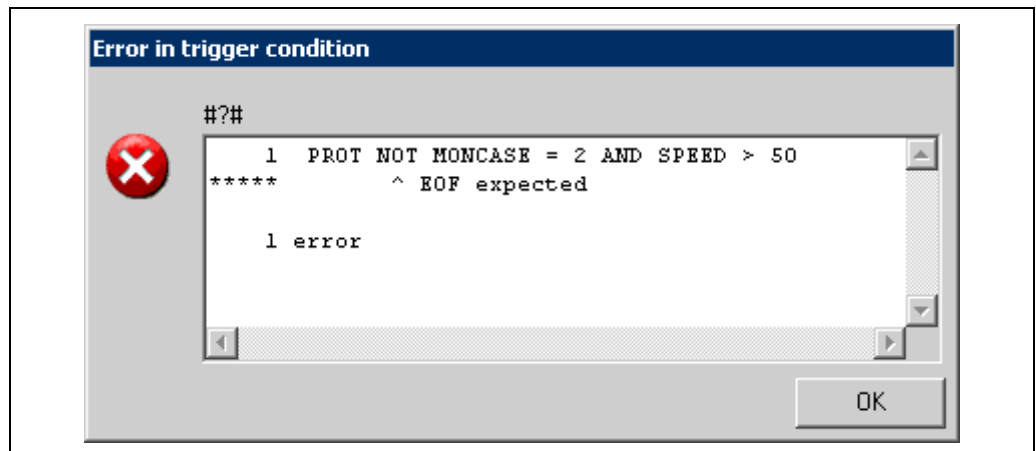
Example:

You define as a condition **PROT AND NOT MONCASE = 2**. The data recorder records data as soon as there is an object in the protective field, but the scanner is **not** in monitoring case 2.

Checking the trigger conditions

You can have the trigger conditions entered checked for plausibility. Click on the **Check expression** button. The data recorder checks whether the conditions entered are plausible (e.g. whether the monitoring cases entered are configured).

Fig. 47: Indication of errors in the trigger conditions



How to define a Boolean expression in the expert mode:

- If you want to exclude (invert) the trigger condition to be entered, then choose “NOT” in the **Paste operator** list box.
The operator is inserted in the **Boolean expression** field at the cursor position.
- In the **Insert trigger condition** list box choose the required trigger condition.
The trigger condition is entered in the **Boolean expression** field at the cursor position.
- If you want to add further trigger conditions, then choose the required operator, e.g. “AND” in the **Paste operator** list box.
- Repeat the previous steps until you have defined the required expression.

- Notes**
- You can assemble the Boolean expression either with the aid of the list boxes or enter it manually. The entries are not case sensitive.
 - A single condition inserted with the aid of the **Insert trigger condition** list box is always a correct Boolean expression that yields the value *True* or *False* on the evaluation of the logical value.
 - Note that the data recorder handles Boolean operators with the usual priority during the evaluation of the trigger condition.
 - You can group the complete trigger condition by using round brackets and as a result change the priority of the evaluation. Nested brackets are allowed.

6 Notes and warnings

6.1 No operating instructions available for the safety laser scanner

Possible cause	Rectification of the error
No operating instructions in the Portable Document Format (PDF) were found on your PC.	<ul style="list-style-type: none"> ➤ Repeat the installation of the CDS. Or: <ul style="list-style-type: none"> ➤ Open the operating instructions directly from the installation CD-ROM.
Acrobat® Reader™ has not yet been installed on your PC. To display the operating instructions, Acrobat® Reader™ must be installed on your PC.	<ul style="list-style-type: none"> ➤ Install Acrobat® Reader™ from the CDS installation CD-ROM. Or: <ul style="list-style-type: none"> ➤ Open the operating instructions directly from the installation CD-ROM.

How to install Acrobat® Reader™ from the installation CD-ROM:

- Place the installation CD-ROM in your CD-ROM drive. After a few seconds the SICK installation wizard starts automatically.
If Windows does not start the installation wizard automatically:
 - Click **Run...** in the **Start** menu.
 - Enter the following command line in the **Open** field:
[Drive letter for your CD-ROM drive]:\setup.exe
 - Click on **OK**.
- In the **Configuration & Diagnostic Software** dialog box choose **Acrobat Reader** in the **Install software** list box.
- Using the left mouse button click **OK**. The installation program for Acrobat® Reader™ is loaded from CD-ROM.
- Follow the instructions in the Acrobat installation wizard.

Once the installation is complete, you will be able to open the operating instructions directly from the CDS online help.

How to open the operating instructions directly from the installation CD-ROM:

- Place the installation CD-ROM in your CD-ROM drive. After a few seconds the SICK installation wizard starts automatically.
If Windows does not start the installation wizard automatically:
 - Click **Run...** in the **Start** menu.
 - Enter the following command line in the **Open** field:
[Drive letter for your CD-ROM drive]:\setup.exe
 - Click on **OK**.
- In the **Configuration & Diagnostic Software** dialog box, select the required document from the **Read documentation** list box.
- Using the left mouse button click **OK**. Acrobat® Reader™ is loaded from the CD-ROM and the required document is displayed on the screen. Neither Acrobat® Reader™ nor the operating instructions are installed on your PC during this process.

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