

LMPxxx-S01 Laser Measurement Package



Reliable Boom Anti-Collision Kit for Port Cranes



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1 Introduction

This Port Package has been designed/put together to help our customers in the design, installation and setup of this anti-collision device.

This package contains the necessary components and instructions to do a complete installation. Some additional material will be required, such as cables, mechanical components, etc to complete the installation.

Additional accessories can also be purchased separately to complement your system or to suit a specific application or environment.

Please note that the scanners are pre-configured. However, we cannot exclude that the configuration of the scanners must still be accommodated to the specific boom equipment. Therefore, the customer is only responsible if the default parameters do not suit the specific boom equipment. The default settings are designed taking into account the average boom length; therefore, SICK gives instructions on how to modify these parameters to suit our customer's equipment at customer's request.


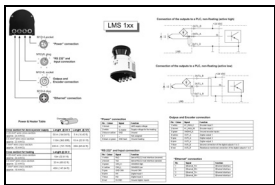
2 Package Description LMP100

2.1 Scope of Delivery

| Product | Qty | PN |
|--|----------|----------------|
| LMP100 Package, consists of: | 1 | 1046577 |
| LMS111-10100S01 | 2 | 1047516 |
| I/O Cable, M12x8, 20m | 2 | 6036157 |
| Power supply cable, M12x5, 4 open ended, 20m | 2 | 6036161 |
| Weatherhood 190° | 2 | 2046459 |
| Bracket | 2 | 2046025 |
| Quick Release bracket | 2 | 2046989 |
| Port Settings + Manual CD | 2 | 2050817 |
| Special Port Manual | 2 | 8013309 |
| Connection Diagram Print out | 2 | 8013275 |

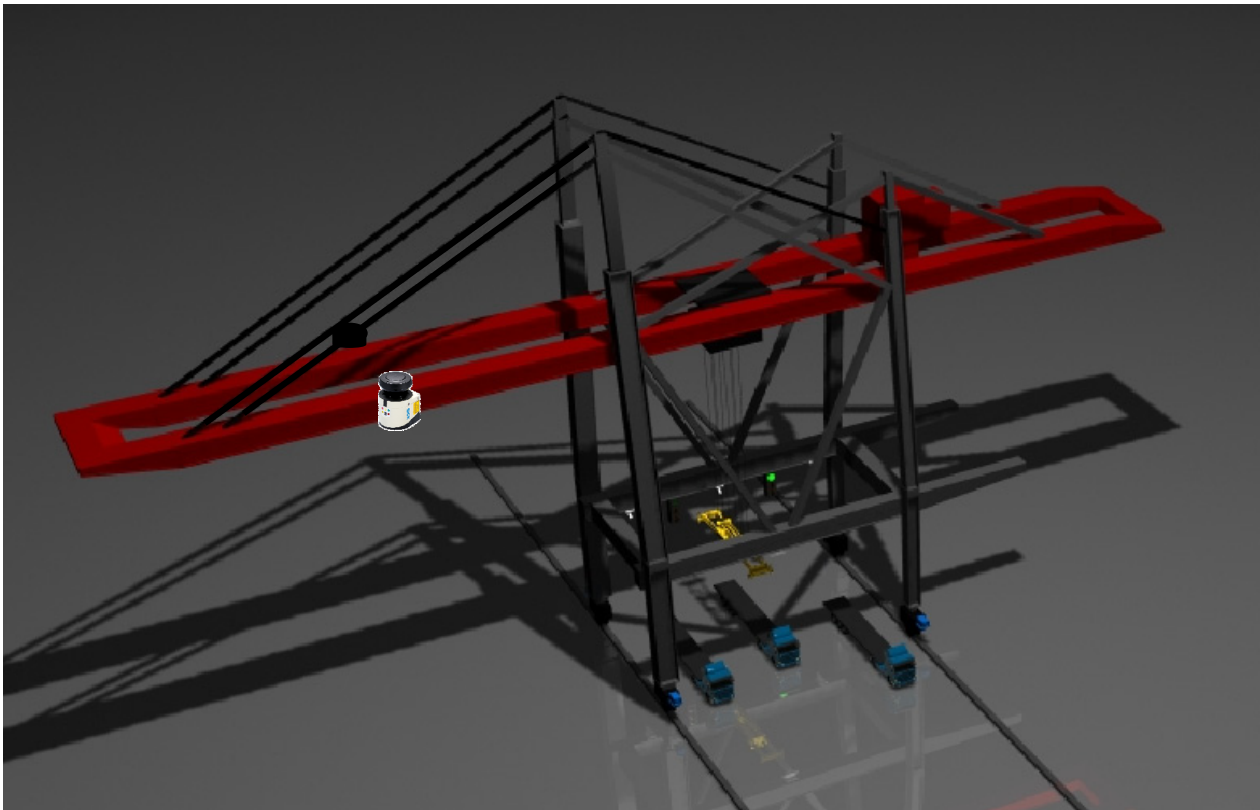
Spare parts can be ordered from SICK using the above Part Numbers.

| | |
|---|--|
| <p>Front view</p> <p>LMS 111-101000S01 Laser Measurement Scanner 270° PN: 1047516</p> <p>Weather hood PN: 2046459</p> <p>For horizontal mounting 190°.</p> | <p style="text-align: center;">LMS111</p>   |
| <p>Bottom view</p> <p>LMS111-101000S01</p> |  |

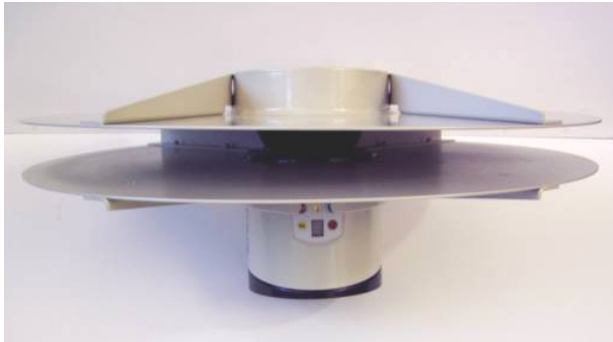
| | |
|---|--|
| <p>Bracket PN: 2046025</p> <p>Assembled with</p> <p>Quick Release Bracket PN: 2046989</p> |  |
| <p>Port Package CD PN: 2050817</p> <p>Connection Diagram PN: 8013275</p> |  |

3 Mechanical Installation

The LMS1x1 pre-configuration has been designed so the scanners are installed approximately in the middle of the boom, as indicated below.



The scanner comes equipped with a dedicated weather hood and quick release bracket. This weather hood will prevent rain and dirt coming in contact with the laser screen.



During the selection of the location of the scanner, please bear in mind that access to the scanner will be necessary when performing cleaning of the lens.

4 Electrical installation

For information on the electrical installation, specifications and tolerances, please refer to the LMS manual in the scanner CD.

To facilitate the installation, in the packaging of the LMS there is included a print out of the connectivity for the scanner together with additional information about cable lengths, etc.

Please select the page for your scanner package. You can also find this page on the Port Package CD.

Power & Heater Table

| Cross section for device power supply | Length @ 24 V | Length @ 12V |
|--|-------------------|-----------------|
| 0.25 mm ² wire cross-section (approx. 24 AWG) | 50 m (164.04 ft) | 5 m (16.40 ft) |
| 0.5 mm ² wire cross-section (approx. 22 AWG) | 110m (360.89ft) | 10 m (32.81 ft) |
| 1 mm ² wire cross-section (approx. 18 AWG) | 220 m (721.78 ft) | 20m (65.62 ft) |

| Cross section for heating | Length @ 24 V |
|--|-----------------|
| 0.25 mm ² wire cross-section (approx. 24 AWG) | 10m (32.81 ft) |
| 0.5 mm ² wire cross-section (approx. 22 AWG) | 20 m (65.62 ft) |
| 1 mm ² wire cross-section (approx. 18 AWG) | 45m (147.64 ft) |

LMS 1xx

Connection of the outputs to a PLC, non-floating (active high)

Connection of the outputs to a PLC, non-floating (active low)

"Power" connection

| Pin / Colour | Signal | Function |
|------------------|-----------------------|--------------------------------|
| 1/brown | V ₊ | LMS supply voltage |
| 2/white | V _h heater | Supply voltage for the heating |
| 3/blue or yellow | GND | Ground |
| 4 / - | - | Not assigned |
| 5/black or green | GND heat. | Ground heating |

Output and Encoder connection

| Pin / Colour | Signal | Function |
|--------------|------------|---|
| 1/white | AT_INCA_0 | Encoder input 1 |
| 2/brown | AT_INCA_90 | Encoder input 2 |
| 3/green | GND/HC_A | Ground encoder inputs |
| 4/yellow | OUT_L_A | Digital output 1 |
| 5/grey | OUT_L_B | Digital output 2 |
| 6/pink | OUT_L_C | Digital output 3 |
| 7/blue | OUT_L_B | Second connection of the digital outputs 1 to 3 |
| 8/red | OUT_L_R | Resistance monitored connection of the digital outputs 1 to 3 |

"RS 232" and Input connection

| Pin / Colour | Signal | Function |
|--------------|---------|--|
| 1/white | RxD | Serial RS232 host interface (receiver) |
| 2/brown | TxD | Serial RS232 host interface (sender) |
| 3/green | GNVH | ONVRS-high |
| 4/yellow | GNVL | ONVRS-Low |
| 5/grey | GND GVN | Ground GVN |
| 6/pink | IN1 | Digital input 1 |
| 7/blue | IN2 | Digital input 2 |
| 8/red | IN GND | Ground digital inputs |

"Ethernet" connection

| Pin | Signal | Function |
|-----|--------------|--------------------|
| 1 | Ethernet_D0+ | Ethernet interface |
| 2 | Ethernet_D0- | Ethernet interface |
| 3 | Ethernet_D2+ | Ethernet interface |
| 4 | Ethernet_D2- | Ethernet interface |

5 Pre-configuration Software Settings

The scanner has been pre-configured from factory and these settings are applicable in most boom anti-collision applications. The default settings can be re-loaded onto the scanner via the SOPAS software. Please refer to SOPAS Online Help for 'Load application defaults in device'.

Small variations of these settings may be necessary to adapt to the customer's specific equipment and/or requirements.

An explanation of changes of the different settings are indicated by the arrow sign ⇒. To visualise all the setting, the SOPAS software must be installed and running.

SICK has the right to accommodate the default settings to its best possible abilities. If the default settings do not completely suit the application, SICK will not be responsible for the failure of the default settings.

The LMS111 has 2 sets of 3 fields each built-in:

- Field Set 1 is designed with shorter distances, usually for stationary operations or for slow moving cranes.
- Field Set 2 is designed with longer distances. Longer distances are necessary if the crane is moving at faster speed than normal, as longer breaking distance will be required.

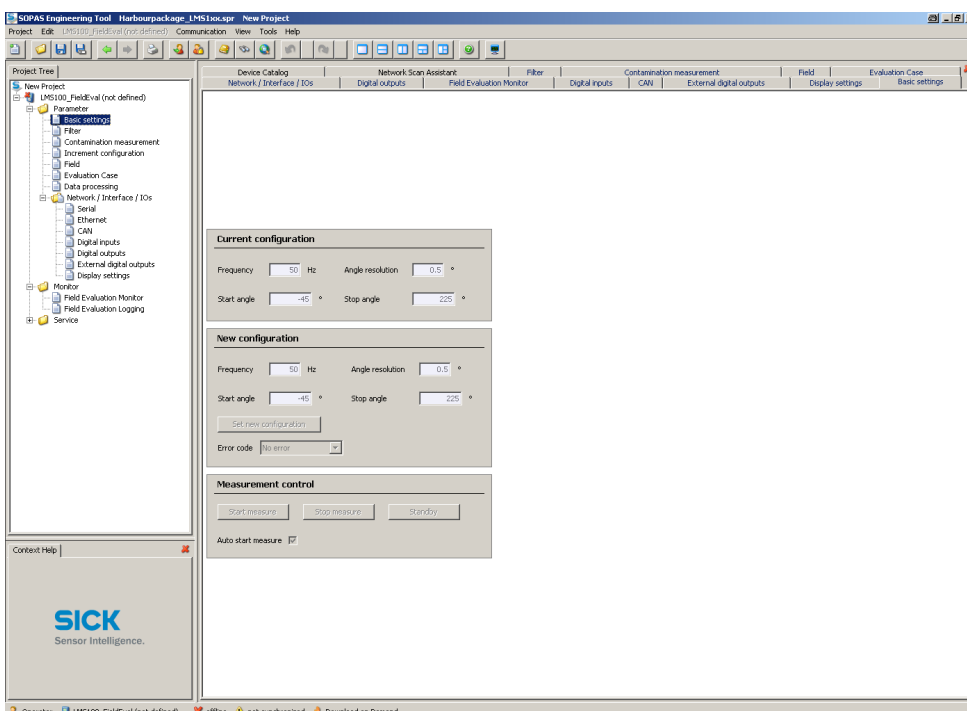
The switching between the two fields is done via an input to the scanner. See electrical diagram for pin layout.

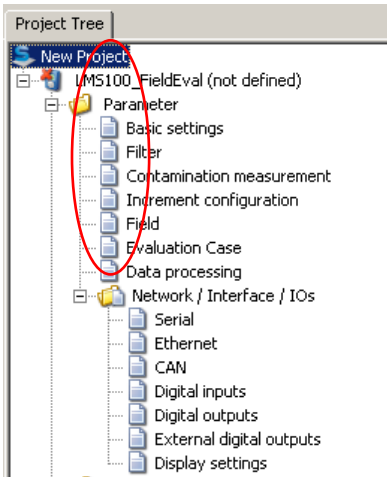
The scanner has additional settings which has been set to have the best performance under port environments.

The settings and fields can be visualised using the SOPAS software contained in the CD.

Install the software and execute it. Go through the Wizard and establish communication with the scanner. For further information, please refer to the SOPAS manual.

The following window should be displayed:



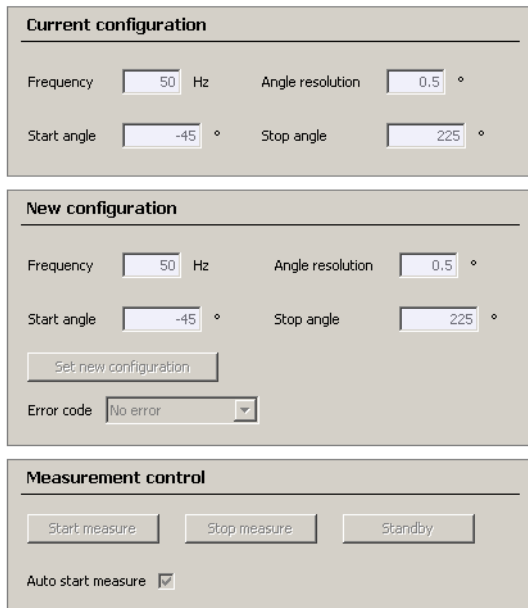


The different preset parameters can be seen by selecting the different options on the left hand side tree.

5.1 Parameter's Description

The different parameters are now described as follows:

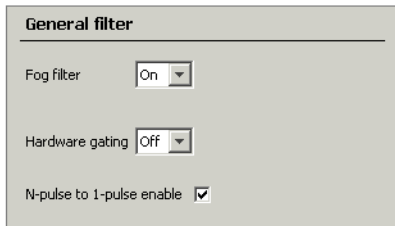
5.1.1 Basic Settings



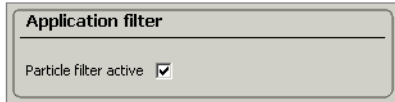
The scanner is set with an angular resolution of 0.5°.

⇒ The angular resolution could be changed to 0.25° for detection of smaller objects, however it will reduce the scanning speed from 50 Hz to 25 Hz.

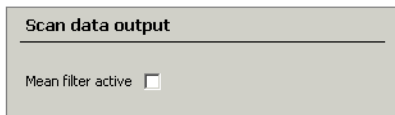
5.1.2 Filter



The LMS has activated the fog filter and dazzling control. These two filters are combined together.



The LMS111 has a new double pulse technology which allows the scanner to ignore raindrops and any transparent object in front of the scanner. See LMS111 Operating Instructions Manual for further information.

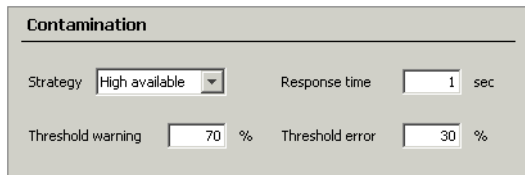


The double pulse technology has been switched on (*N-pulse to 1-pulse enable*)

The *Particle Filter* can be used in dusty surroundings or in case of rain or snow to filter out interference due to particles of dust, rain drops, snow flakes etc.

The filter compares each measured value with the measured value at the same angle in the previous scan and the measured values for the neighbouring angles in the previous scan

5.1.3 Contamination Measurement

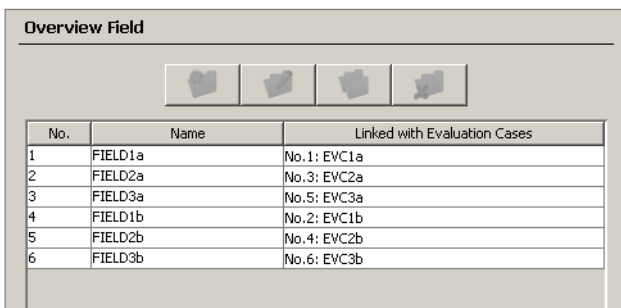


The LMS is equipped with multiple pollution sensors to detect contamination or dirt on the screen. The current setting, High Availability, allows the scanner to operate with only 1 pollution sensor available. The threshold level for the warning signal has been set to 70% and the error to 30%.

The scanner will set the output contamination after 1 s (*Response Time*).

- ⇒ Changing the Strategy will make the scanner more sensitive to pollution.
- ⇒ Decreasing the threshold levels too low could have serious implications on the availability of the scanner to see the target. Increasing the levels will make the scanner more sensitive to pollution.

5.1.4 Fields



The different fields are define in this section

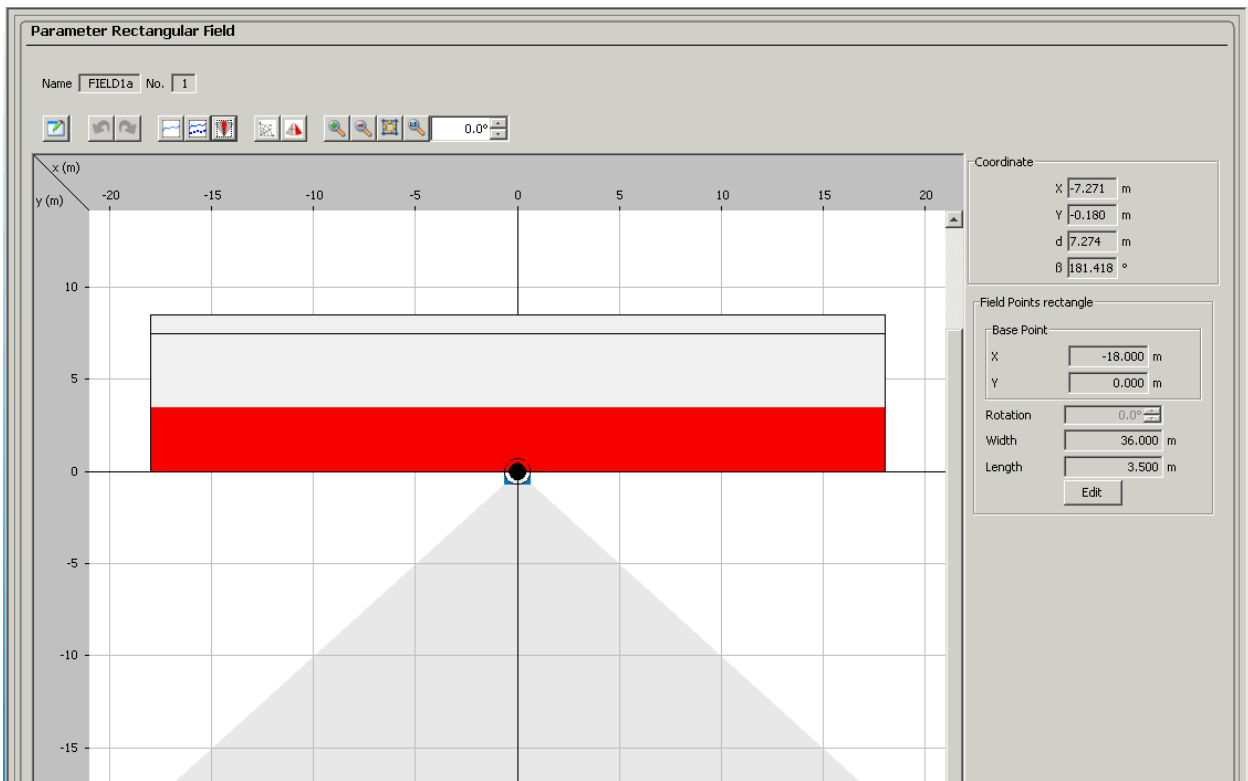
The dimensions of the fields are as follows:

| Set A | Width | Length |
|---------|-------|--------|
| Field 1 | 32 m | 3.5 m |
| Field 2 | 24 m | 7 m |

| Set B | Width | Length |
|---------|-------|--------|
| Field 1 | 32 m | 7.5 m |
| Field 2 | 24 m | 12 m |

These fields can be easily modified. Please refer to the SOPAS Online Help.

When clicking on the *Edit* button the field selected will be shown:



5.1.5 Evaluation Case

Each field can have its own evaluation case.

In this field shown on the left image, when Input 1 is selected this field will become active.

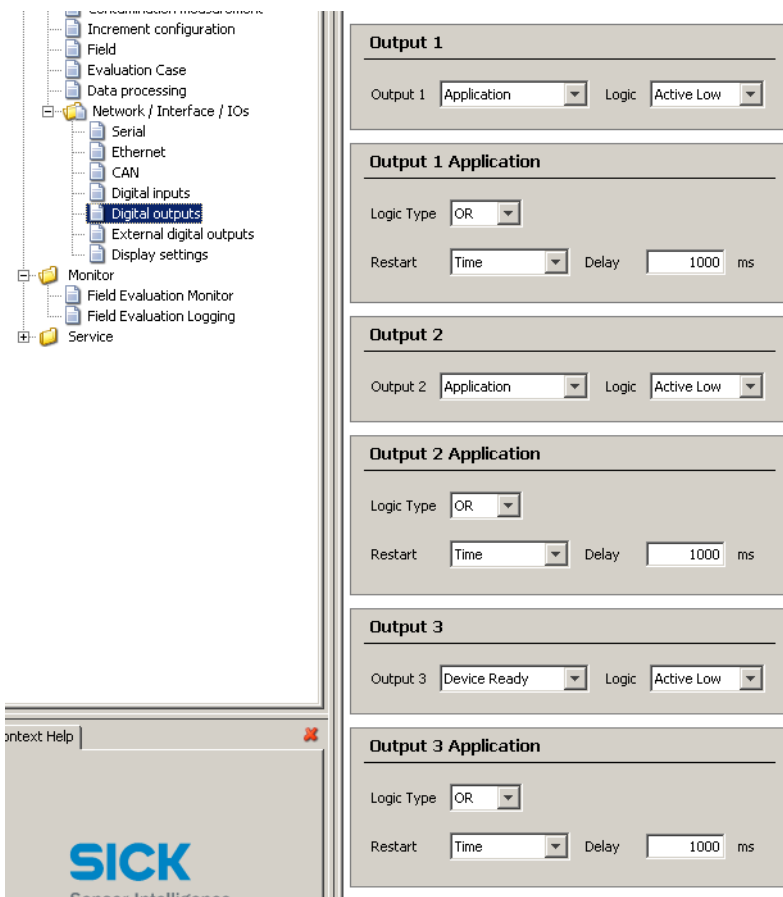


The output for this field has been selected in Output 1.

The response time of the scanner has been set to 500 ms. This will allow the scanner to minimise on false alarms due to fast moving objects in front of the scanner.

The blanking size is set to 50 mm, therefore any object smaller than 50 mm at close range will be ignored.

5.1.6 Outputs



The scanner has been preset with 2 fields on either side of the boom. Each Field is directly connected to each Output on the scanner (Field 1 -> Output 1, Field 2 -> Output 2).

Output 3 is used for Device Ready. This output signals the status of the scanner.

The LMS is equipped with pollution sensors to detect contamination on the screen. These sensors are configured according to the *Contamination Strategy* setting described in Section 4.2.3.

Should the scanner reach a high level of contamination the Output C will be triggered.

This will indicate that the screen needs cleaning. Please refer to the Maintenance section of the Operation Manual.

IMPORTANT NOTE:

Output C must always be connected to the stop or signalling system in the vehicle. Output C is the only output signal verifying the status of the scanner.

6 Maintenance

The LMS is maintenance-free apart from the maintenance measures described in the scanner’s manual. No maintenance is necessary to ensure the retention of laser class 1.

To obtain the full performance of the LMS, the cover on the scanner must be regularly checked for contamination and should be included as part of the maintenance routine. This applies particularly in harsh operation environments (dust, powder, finger marks, etc).

Please refer to the Maintenance Chapter in the Operation Instructions manual included in the scanner’s CD.

7 Accessories

For a full list of accessories and cables, please refer to the Operating Instructions manual of the LMS111.

- **Programming Cable (PN: 6036158)**

Connection cable Ethernet M12 x 4 / RJ-45, for connecting the Ethernet interface on the LMS with the Ethernet interface on the PC, 20 m.

- **LS 70B (PN: 6020756)**

LS-70B scan finder (alignment aid) for manual/continuous operation, with LED display and acoustic indicator, power supply 9 V block battery (supplied).



8 Other anti-collision Packages

SICK has designed 3 Boom Anti-Collision Packages according to the boom length and type.

1. **LMP100-01 (Seeing in this manual)**

This package includes 2 of the small and compact LMS111 Scanners with a maximum range of 20 m and 270° angle view. All accessories included.

2. **LMS200-01**

This package includes 2 of the mid-range LMS211 Scanners with a maximum range of 80 m and 180° angle view. All accessories included.

3. **LMPLRS-01**


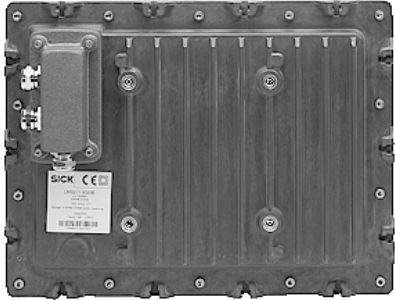
This package includes 1 of the long range LD-LRS Scanner with a maximum range of 250 m and 300° angle view.

9 Package Description LMP200

9.1 Scope of Delivery

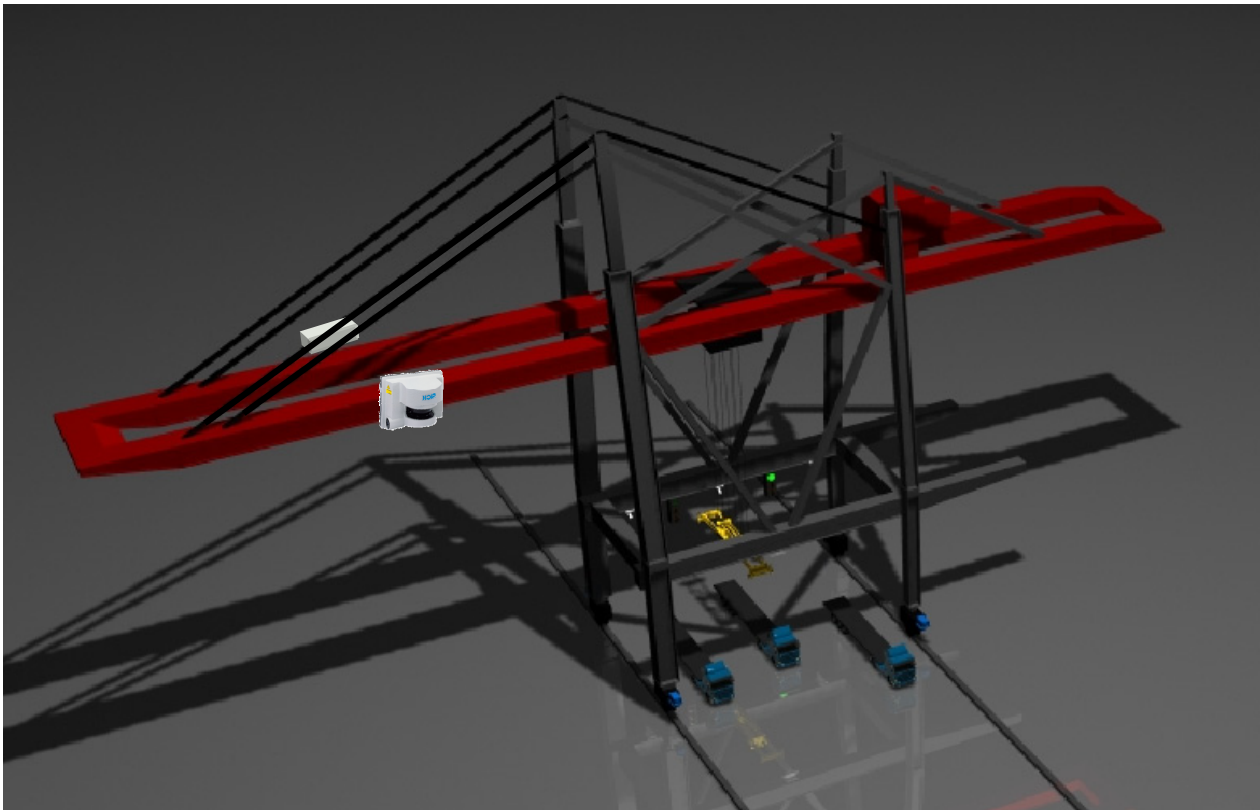
| Product | Qty | PN |
|-------------------------------------|----------|----------------|
| LMP200 Package, consists of: | 1 | 1046578 |
| LMS221-S28 | 2 | 1047515 |
| Weather hood | 2 | 4039833 |
| Bracket | 2 | 2018303 |
| Carry Handle | 2 | 2050816 |
| Port Settings + Manual CD | 2 | 2050817 |
| Special Port Manual | 2 | 8013309 |
| Connection Diagram Print out | 2 | 8013275 |

Spare parts can be ordered from SICK using the above Part Numbers.

| | |
|--|---|
| <p>Front view</p> <p>LMS 221-S28 Laser Measurement Scanner 180° PN: 1047515</p> <p>Weatherhood For horizontal mounting. PN: 4039833</p> | <p style="text-align: right;">LMS221</p>  |
| <p>Rear view</p> <p>LMS221-S28</p> |  |

10 Mechanical Installation

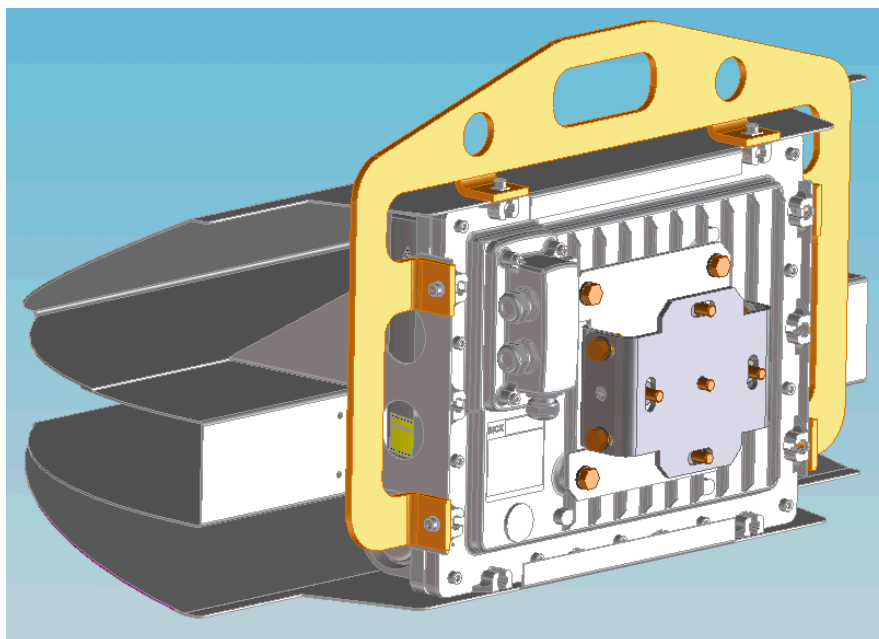
The LMS2x1 pre-configuration has been designed so the scanners are installed approximately in the middle of the boom, as indicated below.



The recommended position to mount the scanner is upside down, as shown in the picture below.



The scanner comes equipped with a dedicated carry handle for easy transport and for securing during installation to prevent falls. A lanyard should be used during the installation and it should be permanently secured to the scanner and a fixed point in the crane.



During the selection of the location of the scanner, please bear in mind that access to the scanner will be necessary when performing cleaning of the front lens.

For further information regarding Maintenance, please refer to the Maintenance Instructions Manual included in the Port Package CD.

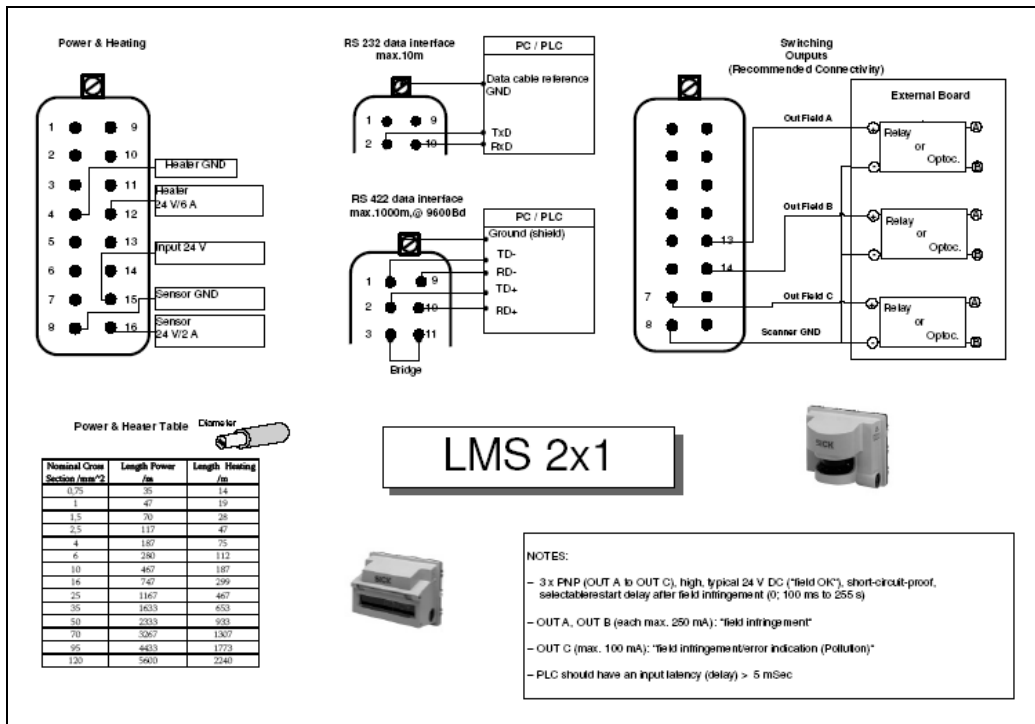
11 Electrical installation

For information on the electrical installation, specifications and tolerances, please refer to the LMS manual in the scanner's CD.

To facilitate the installation, in the packaging of the LMS there is included a print out of the connectivity for the scanner together with additional information about cable lengths, etc.

Please select the page for your scanner package.

You can also find this page on the Port Package CD.



12 Pre-configuration Software Settings

The scanner has been pre-configured from factory and these settings are applicable in most boom anti-collision applications.

Small variations of these settings may be necessary to adapt to the customer's specific equipment and/or requirements. A backup copy of the configuration file can be found in the Port Package CD.

The modifications of the parameters, either increasing or decreasing their values, have been explained under each parameter chapter.

An explanation of changes of the different settings are indicated by the arrow sign ⇒.

The word **NOTE** will be used to advise the customer on possible warnings or dangers when changing some of the parameters.

To visualise all the setting, the LMSIBS software must be installed and running.

SICK has the right to accommodate the default settings to its best possible abilities. If the default settings do not completely suit the application, SICK will not be responsible for the failure of the default settings.

12.1 Field Settings

The LMS200 has 2 sets of 3 fields each built-in:

- Field Set 1 is designed with shorter distances, usually for stationary operations or for slow moving cranes.
- Field Set 2 is designed with longer distances. Longer distances are necessary if the crane is moving at faster speed than normal, as longer breaking distance will be required.



The switching between the two fields is done via an input to the scanner (Pin 15). See electrical diagram for pin layout.

The dimensions of the fields are as follows:

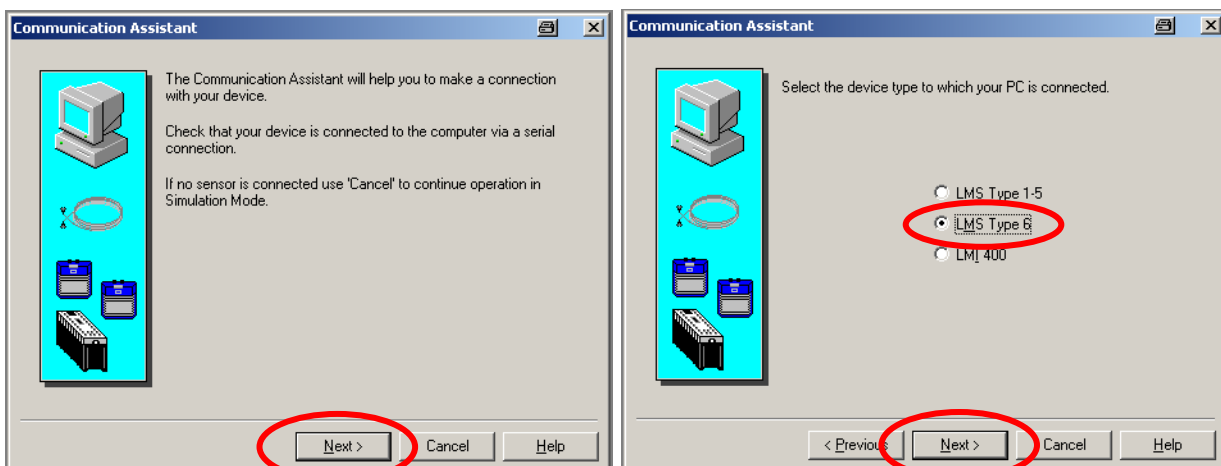
| Set 1 | Width | Length |
|---------|-------|--------|
| Field 1 | 50 m | 3.5 m |
| Field 2 | 50 m | 7.5 m |
| Field 3 | 50 m | 11 m |

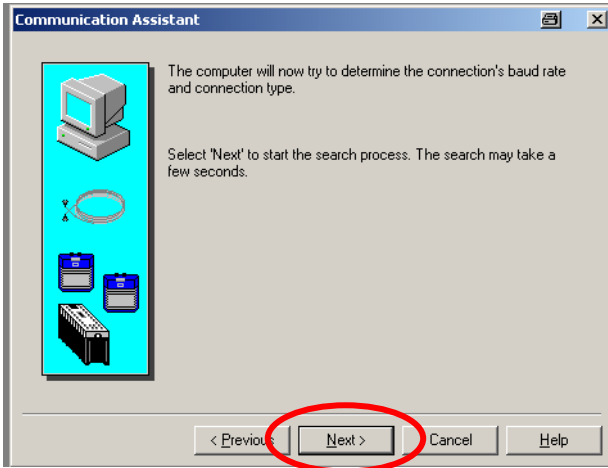
| Set 2 | Width | Length |
|---------|-------|--------|
| Field 1 | 50 m | 7 m |
| Field 2 | 50 m | 12 m |
| Field 3 | 50 m | 16 m |

The scanner has additional settings which has been set to have the best performance under port environments.

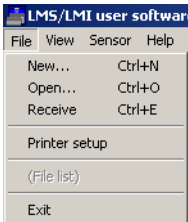
The settings and fields can be visualised using the LMSIBS software contained in the CD.

Install the software and execute it. The following windows will appear:

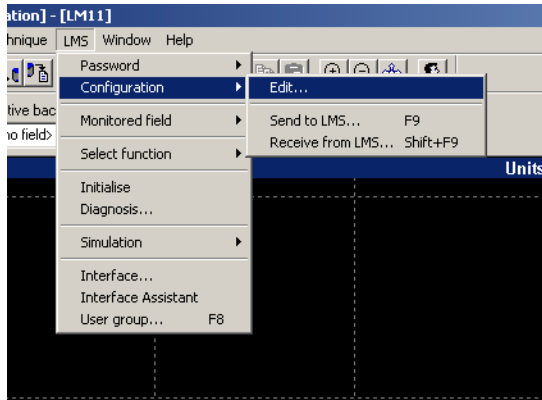




The software will start searching through the different ports until it finds the unit.



Then select *File -> Receive*, or just press *Ctrl+E*, and the configuration from the scanner will be downloaded onto the LMSIBS.



The different preset parameters can be found under *LMS -> Configuration -> Edit*.

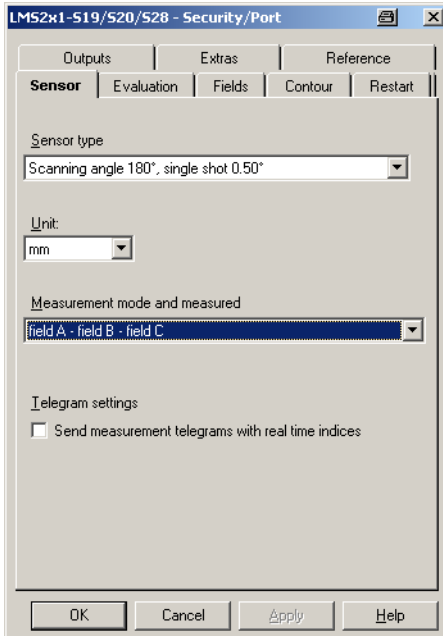
A window with different tabs will appear



12.2 Parameter's Description

The different parameters in their tabs are now described as follows:

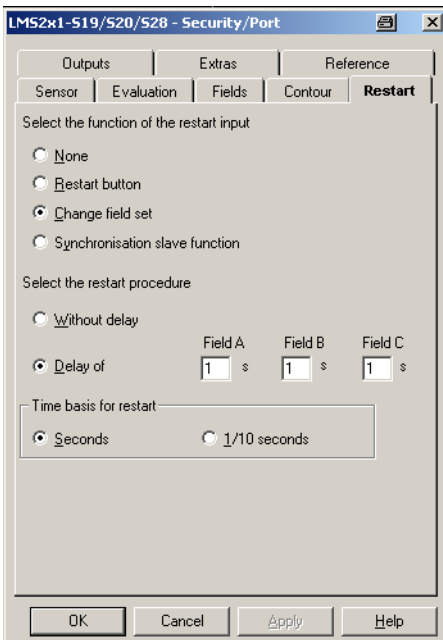
12.2.1 Sensor



The LMS has been set to 180° scanning angle and 0.5° angle resolution.

- ⇒ The angular resolution could be changed to 1° for faster performance however it will affect the measurement of small objects due to the wider distance between laser shots.

12.2.2 Restart



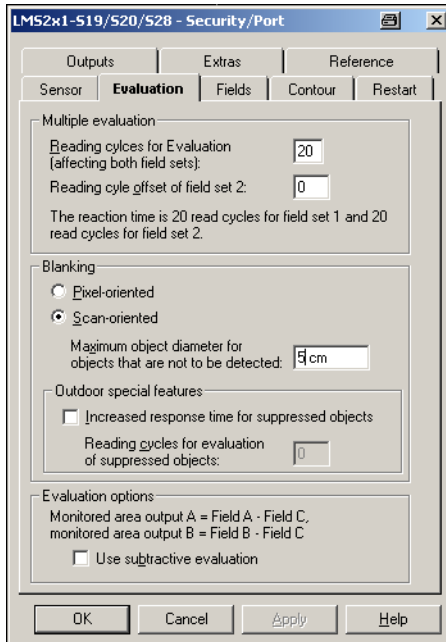
The LMS is equipped with an input (pin 15 in the connection plug). Through this input the LMS can switch between the 2 Field Sets.

The fields have been set with a 1 s delay. After any of the fields has been cleared the output of the LMS will remain low for 1 s to allow the object to move away from the LMS.

- ⇒ This setting can be changed to 0 if no delay is required, or increased for a longer delay.

12.2.3 Evaluation

These following settings are important and critical. If set wrong it can affect the response of the LMS to trigger on rain, dust and small flying objects. It may also slow down the response to trigger against anti-collision objects.



The 'Reading cycles for Evaluation' in the Multiple Evaluation window has been set to 20. This means that the LMS will do 20 scans before triggering. If the object is in the same position during the 20 scans then the LMS will trigger the output in the appropriate affected field.

One evaluation scan is 13 ms x 20 times = 260 ms

This setting is designed to give the LMS immunity against rain, small random objects (i.e. bugs, flies, airborne particles, etc).

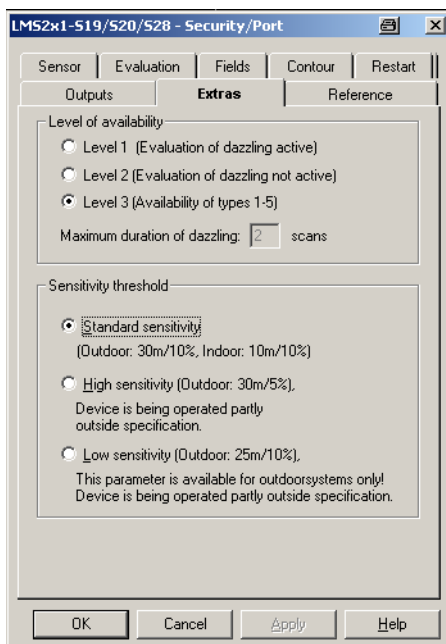
- ⇒ Increasing this setting will slow down the LMS to respond to objects to be detected in the fields. If the objects are relatively fast moving they may not be detected due to the high number of cycles required to be performed by the LMS before triggering the outputs.
- ⇒ Decreasing this value the scanner will become more responsive to faster objects, however it will be more sensitive to heavy rain, big airborne objects, etc.

NOTE:

The customer should trial different settings according to their environment if the pre-set values are not suitable.

The 'Blanking' has been set to blank or discriminate objects smaller than the set value (5 cm). This setting also gives the LMS immunity against small objects close to the scanner.

12.2.4 Extras

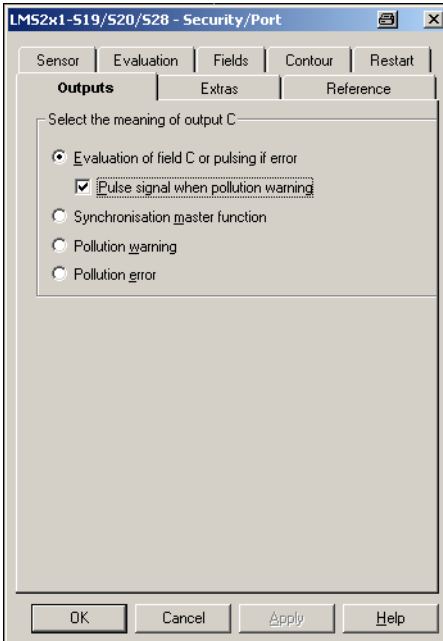


This setting controls the dazzling or blinding of the scanner. The scanner is designed to alert when it has been dazzled as required in security application. However, in this case, it is not required.

- ⇒ Modifying this setting to any other Level of availability will affect the performance of the scanner during sunrises and sunsets as the sun light is strong enough to dazzle the scanner.

Due to the position of the scanner on the boom crane, with a clear view of the horizon, the dazzling or blinding of the scanner is very common.

12.2.5 Outputs



The scanner has been preset with 3 fields. Each Field is directly connected to each Output on the scanner (Field A -> Output A, Field B -> Output B, Field C -> Output C).

Output C also gives information about the pollution (dirt) status of the scanner's window.

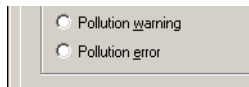
If the pollution sensors in the LMS are triggered then the Output C will blink 50% on / 50 % off with 1Hz frequency.

This blinking will indicate a warning and the scanner's window must be cleaned. The scanner will continue operating as normal.

If failing to clean the window and the pollution levels increases, the scanner will go into a *Pollution Error* and will shut down its outputs until further cleaning.

Instructions on how to clean the window can be found in the Maintenance Section of this manual (Section 7).

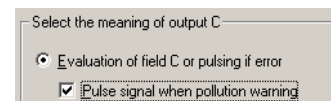
⇒ If the customer does not need 3 fields and only wishes to operate with 1 or 2 fields, the Output C can be changed to alert of Pollution status, Warning or Error.



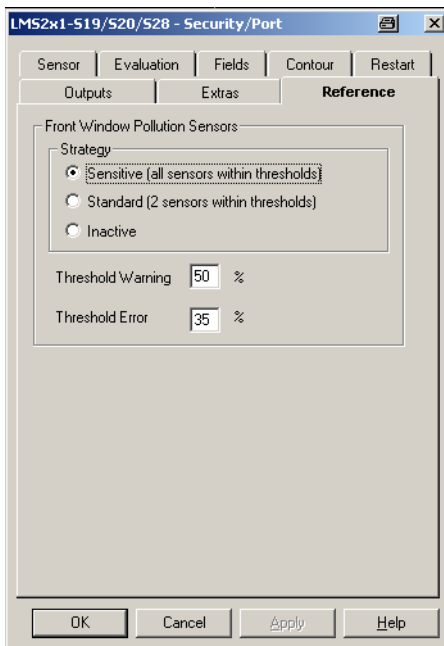
If any of these two options is selected then Output C will give a constant signal (no blinking) if pollution is triggered.

NOTE: If there is a Field C in the scanner and one of the above parameters is selected, the output of the field will be overwritten by the pollution signal and the scanner will not trigger the output in case of infringement.

If the Field C is not required and the customer would like to have a blinking output for the Pollution Warning, then Field C must be deleted and the default parameters can be used.



12.2.6 Reference



pollution level.

NOTE:

Both *Standard* and *Inactive* settings will minimise the performance of the scanner to detect objects due to excessive dirt on the scanner's screen.

Both *Threshold Warning* and *Threshold Error* have been set to the standard values. With the clean clear window the level reached by the pollution sensors is 100%. When this value decreases due to pollution and it reaches Warning and Error levels according to the set values then the Output C will be set.

- ⇒ If the environment is very dusty and the scanner gets an homogeneous layer of dust without big clusters then the values can be reduced to 40 % for the Warning and 25 % for the Error Thresholds.

NOTE:

If the Threshold levels are decreased too much it make the pollution levels trigger at very high levels of dust on the screen and it make influence the scanner ability to detect an object.

The LMS has built-in a series of sensors (4) to monitor the pollution (dirt) on the scanner's lens.

Once these sensors detect a certain level of pollution it will trigger a warning or error through Output C.

The number of sensors to trigger (Strategy) together with their threshold levels can be adjusted.

The default values have been set to use all 4 pollution sensors, that is a *Sensitive* Strategy. As soon as one of the 4 sensors is triggered, the pollution output will be set according to the Output setting (see Section 4.2.5).

- ⇒ The parameter could be changed to *Standard* (2 sensors). In this setting the scanner is able to operate normally with up to two pollution sensors triggered. When the third sensor is triggered then the scanner will set the Output C according to Output setting (Section 4.2.5).
- ⇒ If the *Inactive* parameter has been selected, the scanner will discard any information from the pollution sensors, hence it will not trigger Output C on any kind

13 Technical Specifications

Please refer to the LMS Technical Manual included in the LMS CD for Technical Specifications.

14 Maintenance

These instructions refer to the series LMS2x1 device family.

Except for the upkeep measures described here, the LMS2x1 operates maintenance-free. Its self-monitoring functions allow long and trouble free operation.

The LMS2x1 writes functional and device errors in its error log as coded errors (Info, Warning & Error). These can be read out from the error log and interpreted with the help of the Diagnostic Tool of the LMSIBS configuration software or in form of telegram (see Telegram Listing file).

In case of a current error, the switching Output C generates a coded pulse signal according to the settings in 4.2.5 section.

14.1 Cleaning the front screen

The LMS2x1 requires a clean front screen in order to maintain full measurement performance. Regular checking of the front screen for pollution is therefore recommended, particularly in harsh operating environments or outdoors (dust, dampness, etc).

The LMS2x1 autonomously checks the level of front screen pollution with the help of measurement channels (sensors) and, if necessary, reacts as explained in Section 4.2.5.

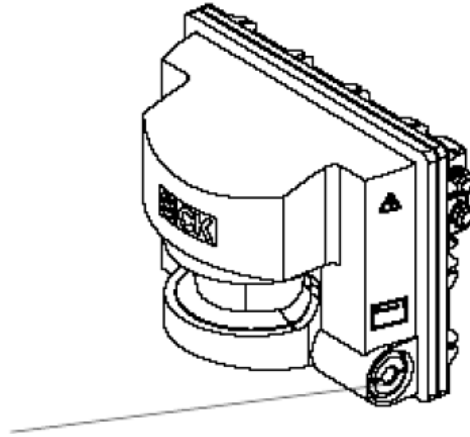
The LMS221 measures the level of pollution of its plastic front screen via 4 channels, using transmitters aimed through the front screen to one receiver located opposite them. As shown below, the red arrows show the measurement positions.



- Clean the entire black plastic front screen with lots of water, a conventional glass detergent can also be used afterwards in case of more severe pollution.
- Use a soft, clean and lint-free cloth. Avoid using rough papers as they scratch the surface seal.

14.2 The drying agent cartridge

The LMS2x1 has a drying agent cartridge that is screwed in airtight on the right side of the device and binds the dampness that may occur inside the device.



Drying agent cartridge No. 5306179

The drying agent cartridge is equipped with a dampness indicator behind the round window, for 40% humidity. The indicator is blue when the cartridge is new; a grey coloration shows depletion and thus the need for replacement.

14.2.1 Indication for cartridge replacement

Blue: new drying agent cartridge

Light violet: replace cartridge soon

Diffuse yellow: overloaded cartridge



Depending on the application and installation position of the device, we recommend replacing the cartridges at scheduled intervals.

- Replace cartridges every six to twelve months in the case of applications without any special climatic influence.
- Carry out a more frequent replacement of cartridges for applications in environments with high air humidity.

14.2.2 Replacing the drying agent cartridge

The cartridge should **only** be replaced in dry surroundings, so that no dampness or dust can get into the device! Do not change the cartridge when the device is exposed (unprotected) in rain, fog or snow.

If possible, and highly recommended, the cartridge should be replaced in an enclosed space or room.

The protective packaging of the new drying agent cartridge can be used to help release the used cartridge, as shown below:



Make sure that replacement of the drying agent cartridge takes place quickly.

1. Switch off power supply for the LMS2x1.
2. Prepare the new cartridge in the clear packaging (tube) but do NOT remove the new cartridge yet!
3. Unscrew the used cartridge with the help of the ridge at the bottom of the clear packaging, and remove it from the opening.
4. Remove the new cartridge from the clear packaging, insert it in the opening and gently screw it in with the help of the ridge on the bottom of the clear packaging (see above figure). Make sure that the cartridge sits properly (rubber seal).
5. Screw the cartridge tight with a torque screwdriver with a torque of 1.5 ± 0.2 Nm.
6. Switch the power supply for the LMS2x1 back on again.

15 Accessories

▪ Programming Cable (PN: 2019561)

Service cable, pre-set to RS 232 (switchable to RS 422 using a bridge in the LMS plug module), consists of:

- 1 x LMS connector (16-pin socket) with data cable (RS 232/422) and 9-pin D Sub socket, shielded, length 5 m
- 1 x cable for power supply with LMS connector (16-pin plug), 2 x 0.93 mm², shielded, length 5 m.

The service cable is used for being interconnected between an existing connection from the LMS211/ LMS221 connector (plug) to the customer-specific wired socket.



▪ LS 70B (PN: 6020756)

LS-70B scan finder (alignment aid) for manual/continuous operation, with LED display and acoustic indicator, power supply 9 V block battery (supplied).



16 Other anti-collision Packages

SICK has designed 3 Boom Anti-Collision Packages according to the boom length and type.

1. LMP100-01

This package includes 2 of the small and compact LMS111 Scanners with a maximum range of 20 m and 270° angle view. All accessories included.

2. LMS200-01 (Seeing in this manual)

This package includes 2 of the mid-range LMS211 Scanners with a maximum range of 80 m and 180° angle view. All accessories included.

3. LMPLRS-01

This package includes 1 of the long range LD-LRS Scanner with a maximum range of 250 m and 300° angle view.


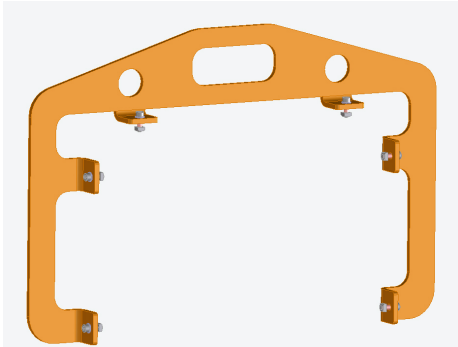
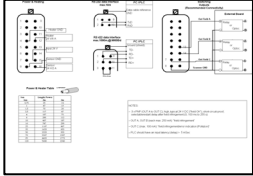
17 Package Description LMP-LRS

17.1 Scope of Delivery

| Product | Qty | PN |
|--------------------------------------|----------|----------------|
| LMP-LRS Package, consists of: | 1 | 1046579 |
| LD-LRS3100-S01 | 1 | 1047619 |
| Bracket | 1 | 2018303 |
| Carry Handle | 1 | 2050816 |
| Port Settings + Manual CD | 1 | 2050817 |
| Special Port Manual | 1 | 8013309 |
| Connection Diagram Print out | 1 | 8013275 |

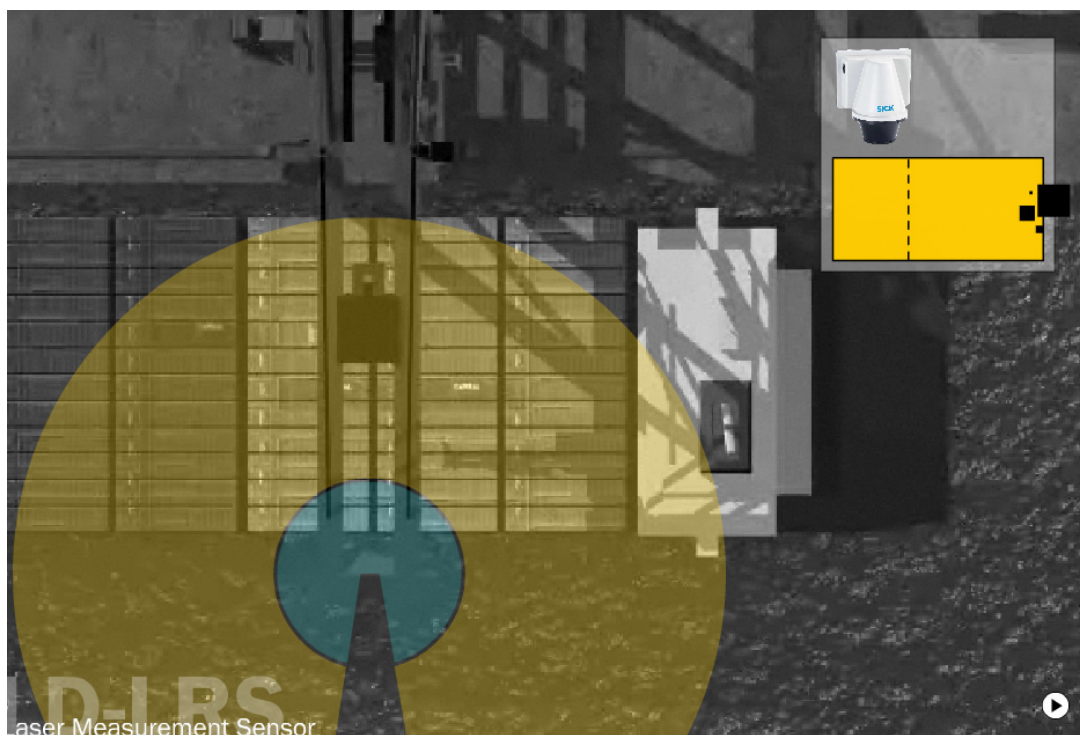
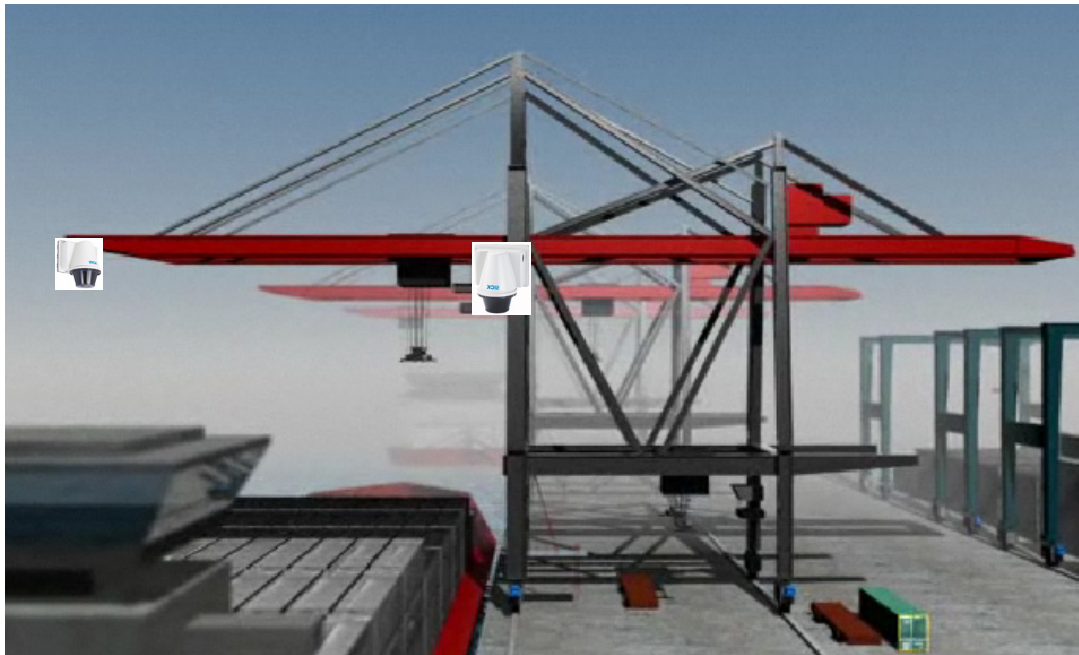
Spare parts can be ordered from SICK using the above Part Numbers.

| | |
|---|--|
| <p>Front view</p> <p>LD-LRS3100-S01 Laser Measurement Scanner 300°</p> <p>PN: 1047619</p> | <p style="text-align: center;">LD-LRS</p>  |
| <p>Rear view</p> <p>LD-LRS3100-S01</p> |  |

| | |
|---|--|
| <p>Bracket</p> <p>PN: 2018303</p> <p>Carry Handle</p> <p>PN: 2050816</p> |   |
| <p>Port Package CD</p> <p>PN: 2050817</p> <p>Connection Diagram</p> <p>PN: 8013275</p> |  |

18 Mechanical Installation.

The LD-LRS pre-configuration has been designed for the scanners to be installed at the beginning or the end of the boom, in both mono and twin-block booms, as indicated below.



The recommended position to mount the scanner is upside down, as shown in the picture below.



This position helps maintaining the scanner's screen clean and protected.

The scanner comes equipped with a dedicated carry handle for easy transport and for securing during installation to prevent falls. A lanyard should be used during the installation and it should be permanently secured to the scanner and a fixed point in the crane.

During the selection of the location of the scanner, please bear in mind that access to the scanner will be necessary when performing cleaning of the front lens.

Please refer to the Maintenance Section of this manual.

19 Electrical installation

For information on the electrical installation, specifications and tolerances, please refer to the LMS manual in the scanner CD.

To facilitate the installation, in the packaging of the LMS there is included a print out of the connectivity for the scanner together with additional information about cable lengths, etc.

Please select the page for your scanner package. You can also find this page on the Port Package CD.

20 Pre-configuration Software Settings

The scanner has been pre-configured from factory and these settings are applicable in most boom anti-collision applications.

However, modifications of the dimensions, length or width, are possible to adapt to the customer's specific equipment and/or requirements. A backup copy of the configuration file can be found in the Port Package CD.

The settings can be easily modified using the SOPAS software.

Please refer to the SOPAS manual included in the scanner and to the online Help functions within the software.

An explanation of changes of the different settings are indicated by the arrow sign ⇒.

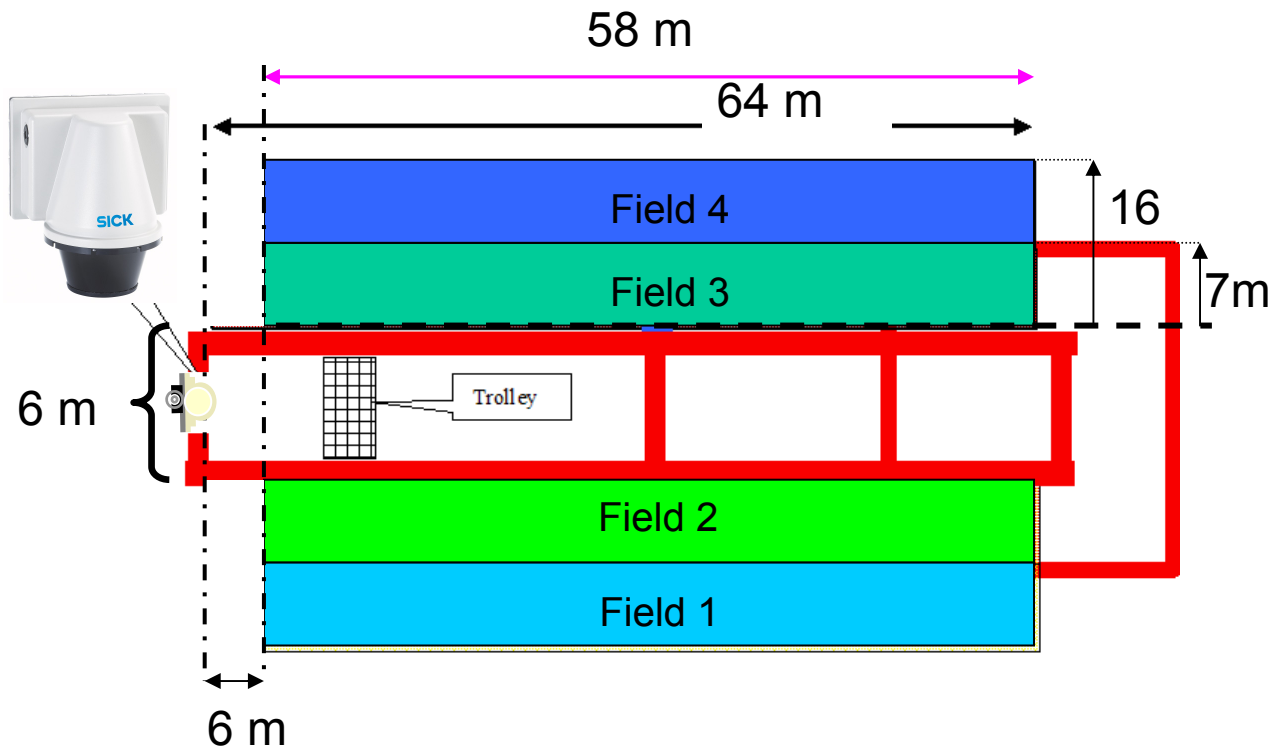
To visualise all the setting, the SOPAS software must be installed and running.

SICK has the right to accommodate the default settings to its best possible abilities. If the default settings do not completely suit the application, SICK will not be responsible for the failure of the default settings.

20.1 Field Settings

The LD-LRS has a total of 4 fields separated in 2 fields on each side of the boom, as shown in the diagram below:

- Field 1 & 2 : Field 1 is designed for slow down and Field 2 for Stop of the crane.
- Field 3 & 4 : Field 3 is designed for slow down and Field 4 for Stop of the crane.



The dimensions of the fields are as follows:

| | Width | Length |
|-------------|-------|--------|
| Field 2 & 3 | 7 m | 64 m |
| Field 1 & 4 | 16 m | 64 m |

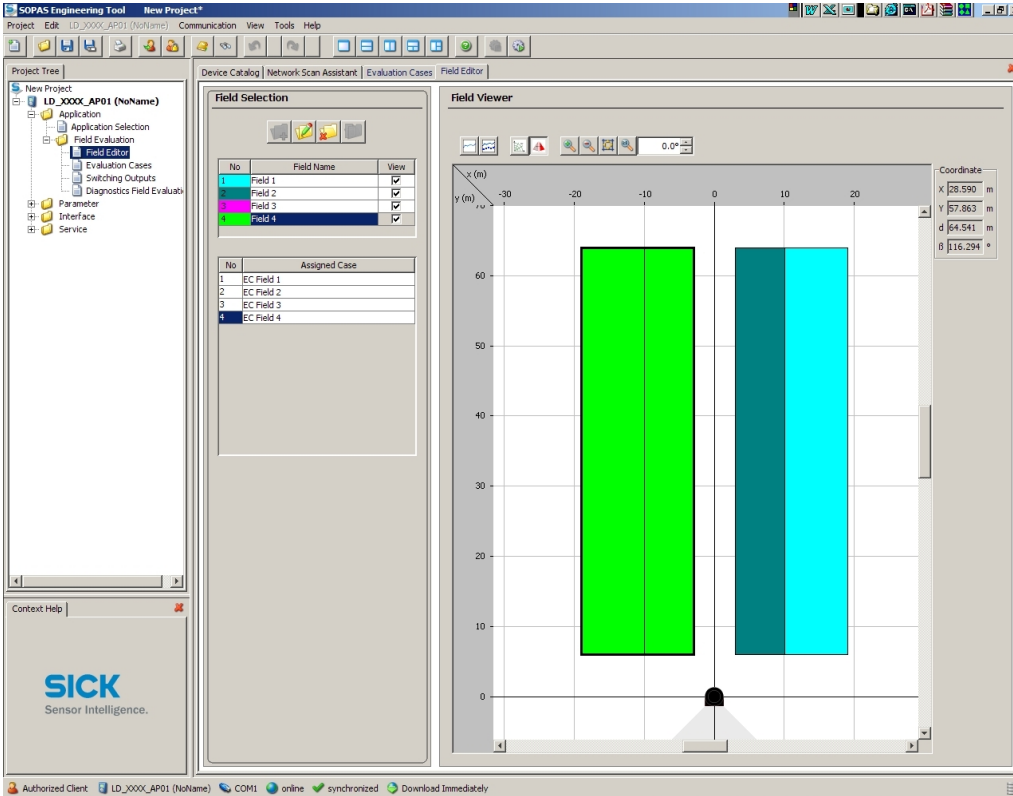
The minimum distance between the scanner and the boom trolley/cabin has been set to 6 m.

The scanner has additional settings which has been set to have the best performance under port environments.

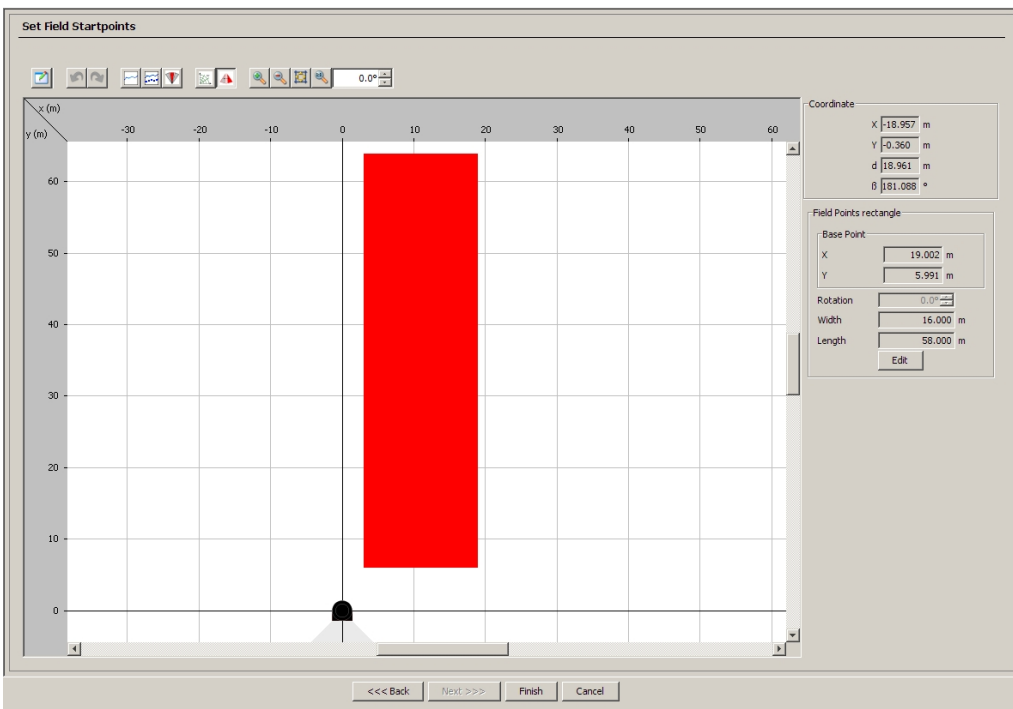
The settings and fields can be visualised using the SOPAS software contained in the CD.

Install the software and execute it following the instructions on the scanner's CD. Once the connection has been established the main window will appear as below:

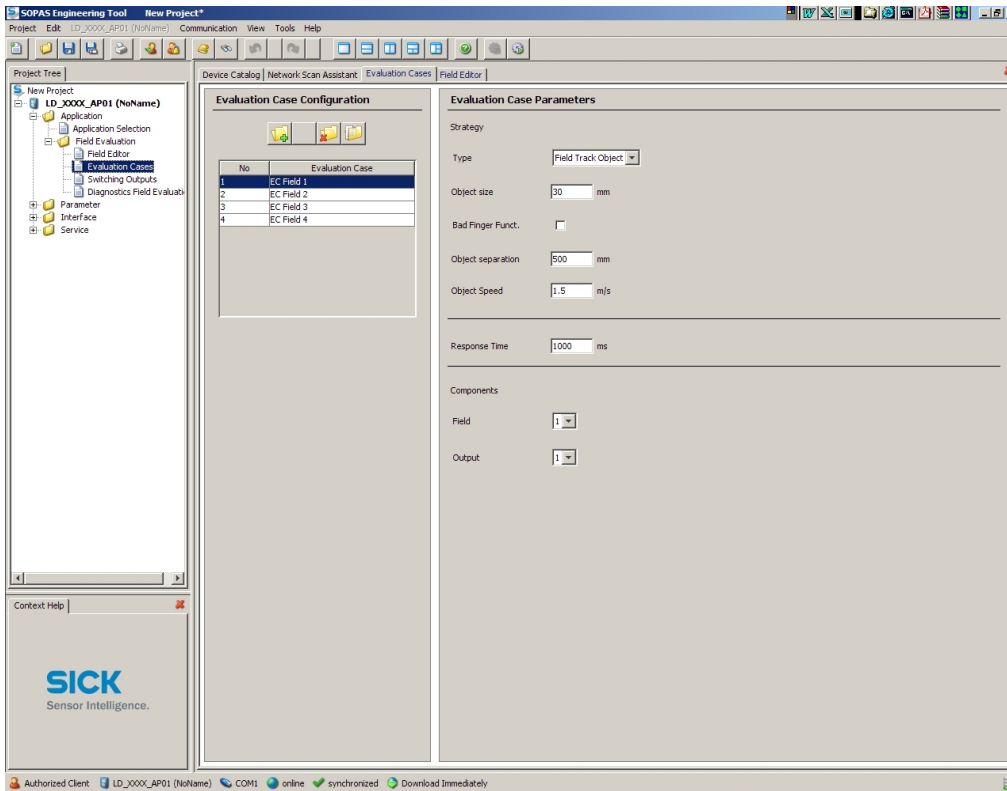
Through the Field Editor tab all the fields can be visualised.



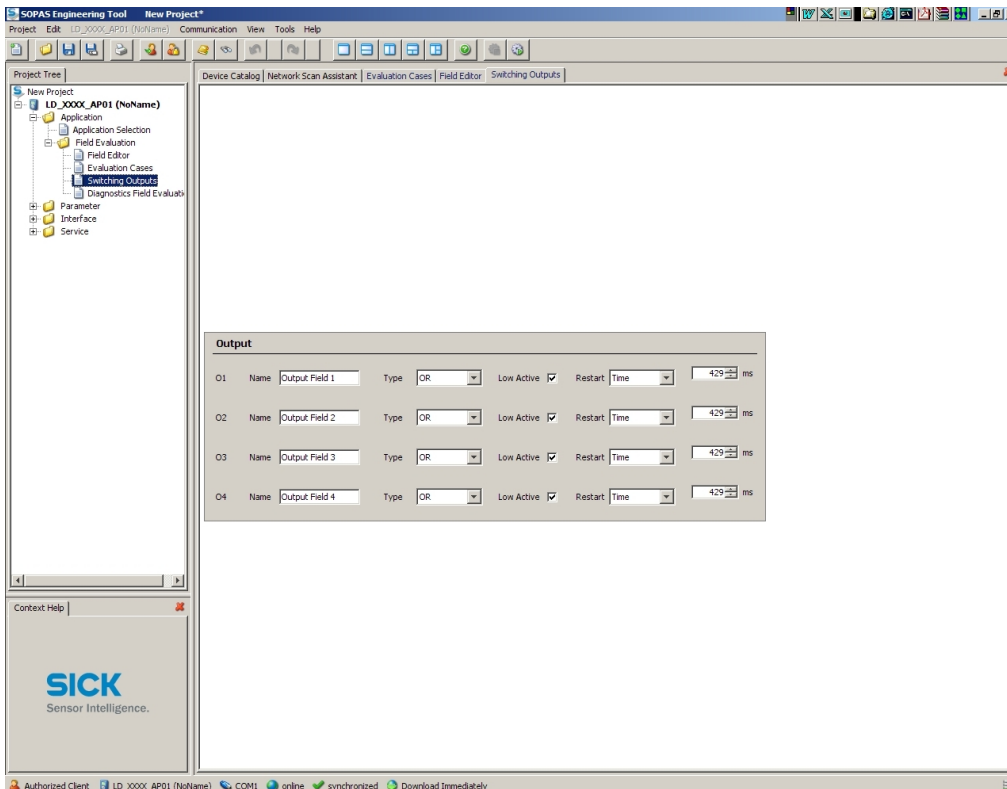
The fields can be individually visualised and edit them if required.



Each field is design with its own Evaluation case. The Evaluation cases are a set of parameters which each field will behave accordingly.



Each field is then connected to one of the four outputs of the scanners and can be assigned through the *Switching Output* tab.



20.2 Parameter's Description

20.2.1 Evaluation Cases

The main settings for the field's behaviour can be found under the *Evaluation Cases* tab.

There is a blanking size of 30 mm (*Object Size*), therefore objects smaller than this size will not be detected. This minimises the possibilities of false triggering due to rain, snow and small flying objects.

However, if there are two objects behind each other and gap between them is smaller than 500 mm then it will be considered as one single object.

- ⇒ Changing the object size can affect the triggering of the outputs. By increasing the value will allow the scanner to discard any smaller objects therefore antennas, cables and smaller items will not trigger the output.
- ⇒ Decreasing the value will make the scanner more susceptible to rain, snow, etc.

NOTE:

The customer should trial different settings according to their environment if the pre-set values are not suitable.

20.2.2 Outputs

The LD-LRS has 4 independent outputs. Each output can be freely assigned to a field, high or low active output signal and a delay on the restart after the field has been cleared.

The scanner has been preset with the 4 outputs directly to the 4 fields. Each Field is directly connected to each Output on the scanner (Field 1 -> Output 1, Field 2 -> Output 2, etc).

The scanner has a high immunity to dust and dirt on the screen, however, periodic maintenance is required. The care of the scanner will reflect on a reliable detection.

For further information, please refer to the Maintenance Section in this manual.

21 Maintenance

The LD-LRS is maintenance-free apart from the maintenance measures described in the scanner's manual. No maintenance is necessary to ensure the retention of laser class 1.

To obtain the full performance of the LD-LRS, the cover on the scanner must be regularly checked for contamination and should be included as part of the maintenance routine. This applies particularly in harsh operation environments (dust, powder, finger marks, etc).

Please refer to the Maintenance Chapter in the Operation Instructions manual included in the scanner's CD.

22 Accessories

- **Programming Cable (PN: 6032770)**

Configuration cable in Y version, screened, comprising a plug housing with 20-pin Harting socket, from which the following are derived:

1 x adapter cable (0.2 m) for RS-232 / RS-422 / CAN / Ethernet, screened, with 15-pin D-sub HD plug. For pin assignment please consult with LD-LRS Operation Manual.

1 x power supply cable (3 m) for electronics, 2-core, screened, with open ends.

- **LS 70B (PN: 6020756)**

LS-70B scan finder (alignment aid) for manual/continuous operation, with LED display and acoustic indicator, power supply 9 V block battery (supplied).



23 Other anti-collision Packages

SICK has designed 3 Boom Anti-Collision Packages according to the boom length and type.

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3. **LMPLRS-01 (Seeing in this manual)**

This package includes 1 long range LD-LRS Scanner with a maximum range of 250 m and 300° angle view.

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