

**LMS251**  
Laser Measurement Sensor



## LMS251 Software functionalities

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## 0. Versions

<b>Version</b>	<b>Notes</b>	<b>Date</b>
1.01	LMS251 Operation Instructions LMS251-11100	2011-10-15 V1.20

## 1. Applicable Documents

- LMS500 Operation Instructions (PN: 8013796/issue V043)
- LMS200 Technical Description (PN: 8008970/issue QI72)

## 2. For your safety

Since the LMS25x is based on the LMS5xx model, all the safety instructions are the same. Within this chapter the sensor is always called “LMS5xx” but also applies to the LMS25x.

This chapter deals with your own safety and the safety of the equipment operators.

- Please read this chapter carefully before working with the LMS5xx.

### 2.1 Authorized personnel

The LMS5xx laser measurement sensor must be installed, commissioned and serviced only by adequately qualified personnel.

## NOTICE

#### Risk of damage!

Repairs to the LMS5xx are only allowed to be undertaken by trained and authorized service personnel from SICK AG.

The following qualifications are necessary for the various tasks:

Activities	Qualification
Mounting and maintenance	<ul style="list-style-type: none"> <li>• basic technical training</li> <li>• knowledge of the current safety regulations in the workplace</li> </ul>
Electrical installation and replacement	<ul style="list-style-type: none"> <li>• practical electrical training</li> <li>• knowledge of current electrical safety regulations</li> <li>• knowledge on the use and operation of devices in the related application (e.g. crane, assembly system)</li> </ul>
Commissioning, operation and configuration	<ul style="list-style-type: none"> <li>• knowledge on the use and operation of devices in the related application (e.g. crane, assembly system)</li> <li>• knowledge on the software and hardware environment in the related application (e.g. crane, assembly system)</li> <li>• basic knowledge of the Windows operating system</li> <li>• basic knowledge of data transmission</li> </ul>

Tab. 2: Authorized personnel

### 2.2 Correct use

The LMS5xx is a non-contact optical distance measurement sensor for stand-alone or network operation. It is suitable for applications in which precise, non-contact optical measurements of contours and surroundings are required. It is also possible to create systems, for instance, for collision protection, for building surveillance or for access monitoring.

It must be handled only by qualified personnel and only in industrial environments.

**Important** In case of any other usage as well as in case of modifications to the LMS5xx, e.g. due to opening the housing during mounting and electrical installation, or to the SICK software, any claims against SICK AG under the warranty will be rendered void.

The LMS5xx is only allowed to be operated in the ambient temperature range specified (see [section 9.1 “Data sheet LMS5xx laser measurement sensor” on page 79](#)).

## 2.3 General safety notes and protective measures



### WARNING

#### Safety notes

Please observe the following items in order to ensure the correct and safe use of the LMS5xx.

- The notices in these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- When operating the LMS5xx, the national, local and statutory rules and regulations must be observed.
- National/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the laser measurement sensor, in particular:
  - the work safety regulations/safety rules
  - other relevant health and safety regulations
- Manufacturers and operators of the system on which the LMS5xx is installed are responsible for obtaining and observing all applicable safety regulations and rules.
- The tests must be carried out by specialist personnel or specially qualified and authorized personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- The operating instructions must be made available to the operator of the system where the LMS5xx is fitted. The operator of the system is to be instructed in the use of the device by specialist personnel and must be instructed to read the operating instructions.
- The LMS5xx is not a safety device for human protection and therefore it does not comply with any safety standards. For safety scanners, please contact SICK AG.

#### 2.3.1 Electrical installation work

- Only authorized personnel is allowed to perform the electrical installation work.
- Connect and disconnect electrical linkages between the LMS5xx and other devices only under de-energized conditions.
- Select and implement wire cross-sections and their correct fuse protection as per the applicable standards.
  - Do not open the housing.
  - Observe the current safety regulations when working on electrical systems.

### 2.3.2 Laser radiation from the laser measurement sensor



#### CAUTION

##### Laser radiation!

The LMS5xx corresponds to laser class 1 (eye safe) as per EN 60825-1 (for publication date see laser warning label on the device). Complies with 21 CFR 1040.10 with the exception of the deviations as per Laser Notice No. 50, June 2007. The laser beam cannot be seen with the human eye.

- Do not open the housing (opening the housing will not switch off the laser).
- Pay attention to the laser safety regulations as per IEC 60825-1 (latest version).

**Important** No maintenance is necessary to ensure compliance with laser class 1.

##### Laser output aperture

The laser output aperture is the front screen on the LMS5xx.

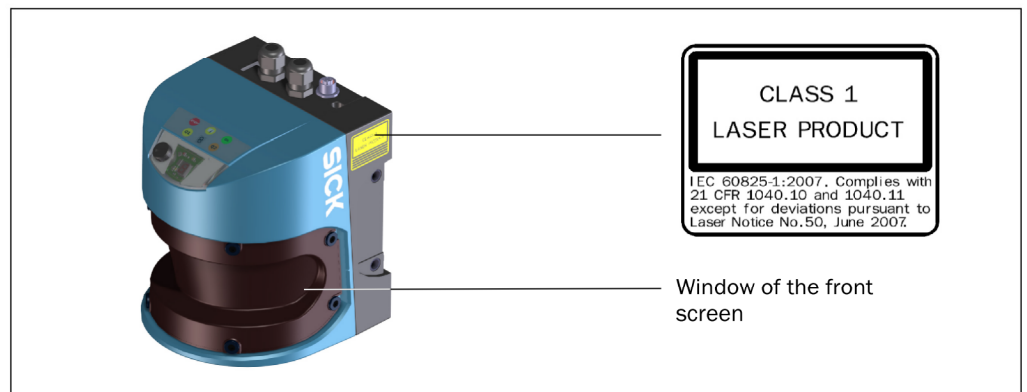


Fig. 1: Laser output aperture of the LMS5xx

##### Laser power

The laser operates at a wavelength  $\lambda = 905 \text{ nm}$  (invisible infrared light). The radiation emitted in normal operation is not harmful to the eyes and human skin.

##### Laser warning label

The laser warning is on the LMS5xx on the right side of the housing.

### 2.3.3 Damaging potential equalization currents due to different ground potentials

For electrical safety, the LMS5xx has been designed and checked according to EN 60950-1 (2006-04) and EN 60950-1/A11 (2009-03).

The LMS5xx is connected to the peripheral devices (power supply, encoder, PLC/host, if applicable other LMS5xx, etc.) by using shielded cables. The shield of each cable is connected to the metal housing of the LMS5xx via the system plug.

If the peripheral devices have metal housings and if the cable shield also is connected to their housings, it is assumed that all devices involved in the installation have the **same ground potential**.

This is achieved for instance by fulfilling the following conditions:

- mounting the devices on conductive metal surfaces
- correctly grounding the devices/metal surfaces in the system
- a low-impedance and stable current carrying equipotential bonding between areas with different ground potentials, if necessary

If these conditions are not met, e.g. on devices in a widely distributed system over several buildings, potential equalization currents may, due to different ground potentials, flow along the cable shields between the devices and may cause danger.



## DANGER

### Risk of injury/risk of damage via electrical current!

Potential equalization currents between the LMS5xx and the peripheral devices can have the following effects:

- dangerous voltages on the metal housing, e.g. of the LMS5xx
  - incorrect function or irreparable damage to the devices
  - damage/irreparable damage of the cable shield due to heating and cable fires
- Where local conditions are unfavorable and thus do not meet conditions for a safe earthing method (same ground potential at all grounding points), take measures according to [chapter 5.2 “Conditions for safe operation of the LMS5xx in an installation” on page 53](#).

## 2.4 Quick stop and restart

**To stop the LMS5xx, switch it off.**

- Switch off the voltage supply (power supply) for the LMS5xx or disconnect the system plug on the LMS500 or the M12 supply cable on the LMS511.

The LMS5xx retains parameters stored in the internal non-volatile memory. Measured values on the interface are lost.

**To restart the LMS5xx, switch it on.**

- Switch on the voltage supply (power supply) for the LMS5xx or re-connect the system plug on the LMS500 or the M12 supply cable on the LMS511.

The LMS5xx re-commences operation with the parameters last saved.



## 2.5 Environmental protection

The LMS5xx has been designed to minimize environmental impact. It uses only a minimum of power.

While working, always act in an environmentally responsible manner. For this reason please note the following information on disposal.

### 2.5.1 Power consumption

- The LMS500 consumes a maximum of 25 W in operation without output loads.
- In addition, the LMS511 draws a maximum of 45 W in cycles for the heating.

### 2.5.2 Disposal after final de-commissioning

- Always dispose of unserviceable or irreparable devices in compliance with local/national rules and regulations on waste disposal.
- Dispose of all electronic assemblies as hazardous waste. The electronic assemblies are straightforward to dismantle.

**Important** SICK AG does not accept unusable or irreparable devices that are returned.

### 3. General information

The LMS251 unit has been designed to accommodate a replacement unit in applications where the LMS200 Series is used for telegrams and measurement data. For field applications and detection only, please use the LMS500 Series.

Starting from the base of an LMS511-11100 Lite, the unit has been modified in both hardware and software.

Due to the technical differences between the LMS200 and LMS500 Series some features/specifications have been omitted.

The LMS251 shares characteristics from both LMS200 and LMS500 environment.

The main characteristics defined in the LMS251 are:

- An initial configuration via front USB using SOPAS ET will define the LMS200 variant.
- Any field configuration must be done via front USB using SOPAS ET.
- Any telegram communication must be done via the RS232/422 Host interface using LMS200 reduced telegram listing.

#### 3.1. Variants of LMS251

The unit created is an LMS251-11100 Standard Resolution Outdoor (PN: 1057767)

For further information regarding technical and mechanical specifications, please refer to the LMS5xx Series Operation Instructions under the 'Lite' variant. Any differences in between these two models will be mentioned in this manual.

See technical specifications in Section [7.3](#)

#### 3.2. Coverage of the LMS2xx Compatibility

##### 3.2.1. Data output

- The measurement results can vary slightly due to the different measurement techniques and accuracies.
- No support on RSSI values or telegrams containing such data.
- No support on the LMS2xx field functionality via LMSIBS. Instead the Field Evaluation application of the LMS251 will be available via SOPAS ET with the same functionalities as the LMS5xx Lite.

Most of the field application functionalities of the LMS2xx will be possible in the LMS251.

The only access to the LMS251 using SOPAS ET is via the front mini-USB.

##### 3.2.2. Models supported

- LMS200-OD (Standard-Outdoor)
- LMS2x1-S09 / LMS2x1-S14 (Fast-Variant)
- No support on LMS2x1-S19/S20/S28 (Security/Port)
- No support on LMS200-Indoor
- No support on LMS200-Ethernet versions (LMS2x1-S26/LMS2x1-S27)

### 4. Differences with the LMS2xx Serie

#### 4.1. Differences to LMS2xx

- Reduced number of telegrams supported. (See Section [5.4](#) for supported Telegrams)

- Partial support of some of the telegrams (subcommands)
- Pollution sensors parameter are partially not ,alive' (dummy)
- No support on output RSSI telegrams (related telegrams will not be supported)
- Limitation in the Synchronisation. Refer to Section 5.5 for further information.
- The LMS2xx telegram reflects the status of the fields. On the other hand, the LMS251 telegram reflects the status of the outputs. The outputs can be triggered according to the selection made in the output configuration via SOPAS.
- Error Status is not provided in detailed only consolidated. See Section [5.6.2](#) for further information.
- Incompatibility of RS232 pin configuration. See Section [7.2.1](#).

## 5. Specifications

### 5.1. Interfaces

- The LMS251 Telegrams can only be communicated via the Host interface (RS232/422).
- SOPAS ET communication can only be done exclusively via the front USB port. This is strictly required for the initial setup!
- Ethernet not available

### 5.2. Scan frequency and angular resolution

#### 5.2.1. How it works in the LMS200

The scanning frequency on the LMS2xx is always at 75 Hz and 1° angular resolution (response time 13 ms). In order to achieve 0.5° or 0.25° the LMS2xx works in an interlaced mode, that is, the scanner needs to do several scans with a small angular shift every scan. For a 0.5° angular resolution the LMS2xx will scan one time and will shift 0.5° and do a second scan at 1° steps but 0.5° shifted from the first scan, therefore doubling the response time from 13 ms to 26 ms.

If the user has not selected the interlaced mode, the scanner will store all the measurements after every scan and will output at the end a full measurement set. Each scan will increase the Index value by 1. The final value at a non-Interlaced mode is 4 for 0,25° and 2 for 0,5° angular resolution.

If the user has selected interlaced mode, the scanner will output the measurement at the end of every scan and it will not store them to generate a full set. The Index value will always be 1.

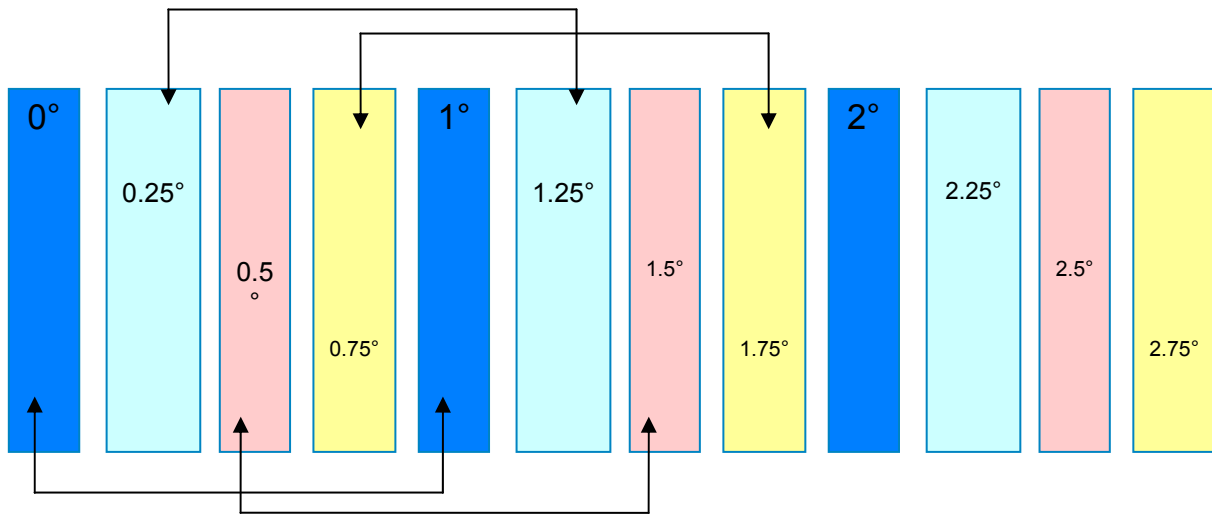


Diagram showing interlaced mode

### 5.2.2. How it works in the LMS251

The LM251 uses direct mode scan measurement, that is, it performs all the angular resolutions by varying the scanning angular resolution.

The LMS251 can measure at lower scanning speed however at higher angular resolution. It does not need to use interlaced mode.

### 5.3. General Information about Telegrams

The Telegram style and protocol for the LMS251 remains the same as the LMS200. This also includes Sensor Address, Status Byte and Real Time Indices.

### 5.4. Supported Telegrams

Please refer to the list of supported telegrams in the separate document in the LMS251 CD.

### 5.5. Synchronisation

Synchronisation between different LMS251 is compatible as long as the scanners operate at the same scanning frequency.

For further information see Section [6.2.5.6](#)

### 5.6. LMS200 Status Indicators

#### 5.6.1. Display

It behaves the same as LMS5xx Lite Series. There is the possibility to disable front panel or USB port via SOPAS ET. However, the disable status is not permanent, so after power restart they will be enable again as default.

#### 5.6.2. Error messages

The LMS200 errors have been consolidated into 5 error levels plus 2 front screen pollution channel errors (Err 18 & 19).

Please refer to the table below for the list of errors.

Err-No.	Err-Level	Description / text resource
95	0x84	Old FATAL ERRORS
96	0x01	General LMS25x INFO occurred
97	0x02	General LMS25x WARNING occurred
98	0x03	General LMS25x ERROR occurred
99	0x04	General LMS25x FATAL ERROR occurred
18	*	Front window pollution, measured channel 2
19	*	Front window pollution, measured channel 3

\* Warning & Error levels are taken from the “contamination” parameter configuration. See Section [6.2.5.1](#)

### 5.6.3. Power On counter & Operating hours

This telegram (0x35) is supported.

## 6. Operation

### 6.1. Initial parameterization

The LMS251 requires certain order of procedures to be followed. For this initial procedure the LMS251 **must be connected** via the USB port **only**. These procedures are described as follows:

#### 6.1.1. LMS200 Type configuration

Using SOPAS ET software via the USB connector, the scanner must be configured to its LMS2xx equivalent, together with Firmware Version & communication protocol. Please see section [6.2](#)

#### 6.1.2. Field configuration and parameters

Continuing using SOPAS ET the user can create new field configurations.

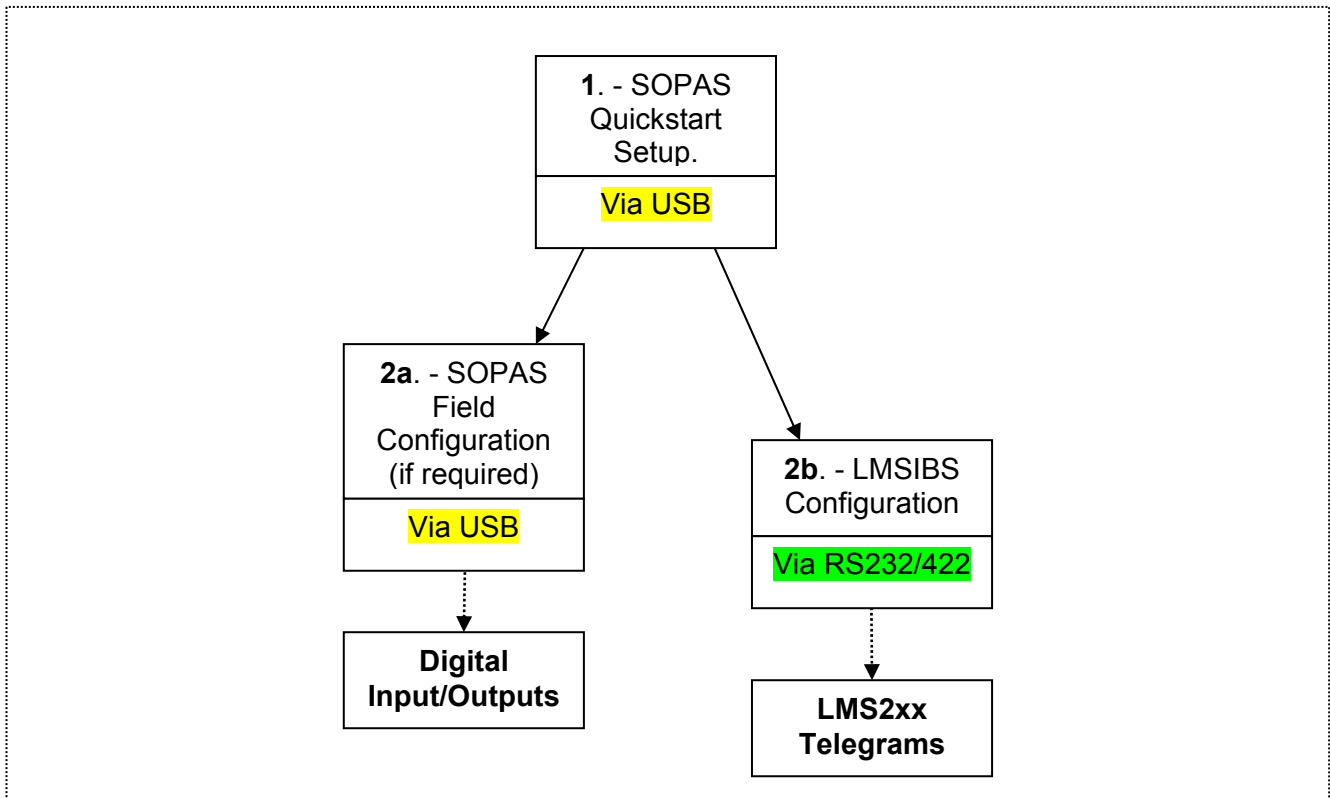
All parameters, except field configuration, must be done via LMSIBS or telegram. These parameters will be reflected in the SOPAS ET configuration. Any parameters configured via SOPAS ET **will not** be reflected in LMSIBS, only the parameters shown in the “Quickstart” page of SOPAS ET.

Now the LMS251 is configured as the corresponding LMS200 unit. The USB port can be disconnected.

If the user requires any changes from the factory default configuration, these must be done via the RS232/422 and LMSIBS software. See Section 6.2.6 for further details on the LMSIBS.

#### 6.1.3. Telegrams

The user can operate the LMS251 with the specific LMS251 Telegram listing. This functionality must be performed only via the Host communication RS232/422.



## 6.2. Initial parameterization with SOPAS ET (“Quickstart” menu)

### 6.2.1. LMS2xx-Type (LMS251 specific Parameter)

The first stage to set the LMS251 to work as the equivalent LMS2xx is to parameterize the unit to the correct type together with Firmware version & communication protocol.

This procedure can only be done by connecting the LMS251 via the front USB plug to the SOPAS ET software. The RS232/422 ports are not available for this initial setup.

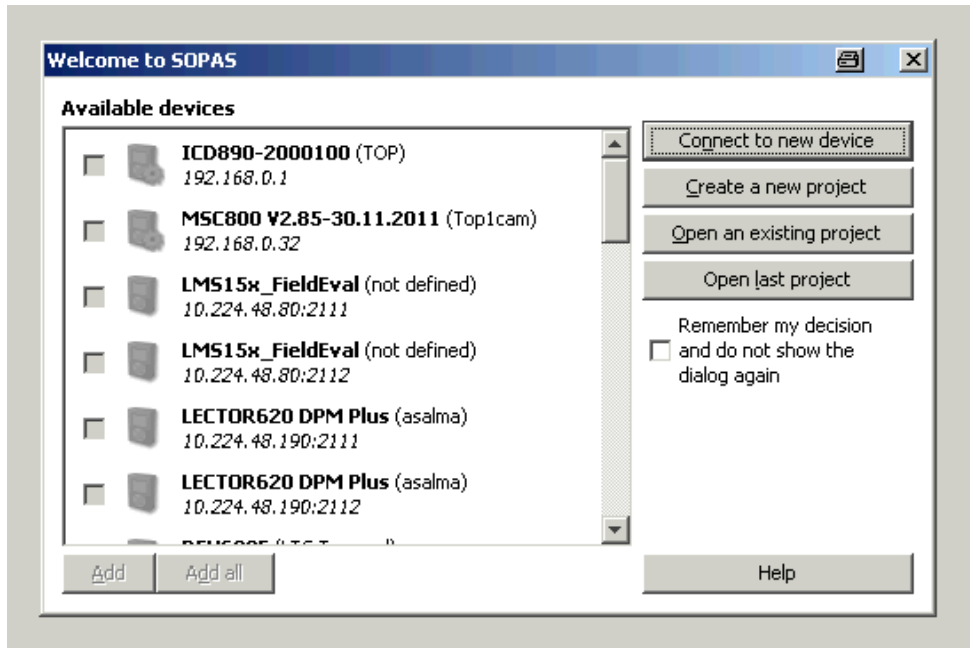
Once the SOPAS ET has been loaded in the PC, please load the UBS drivers provided. Then launch the application.

The LMS251 can be connected before or after the application is launched, however the steps taken in SOPAS ET are slightly different.

The first screen shown is as follows:

Please select “Connect to new device” if the LMS251 is already connected via the USB port (**Online mode**).

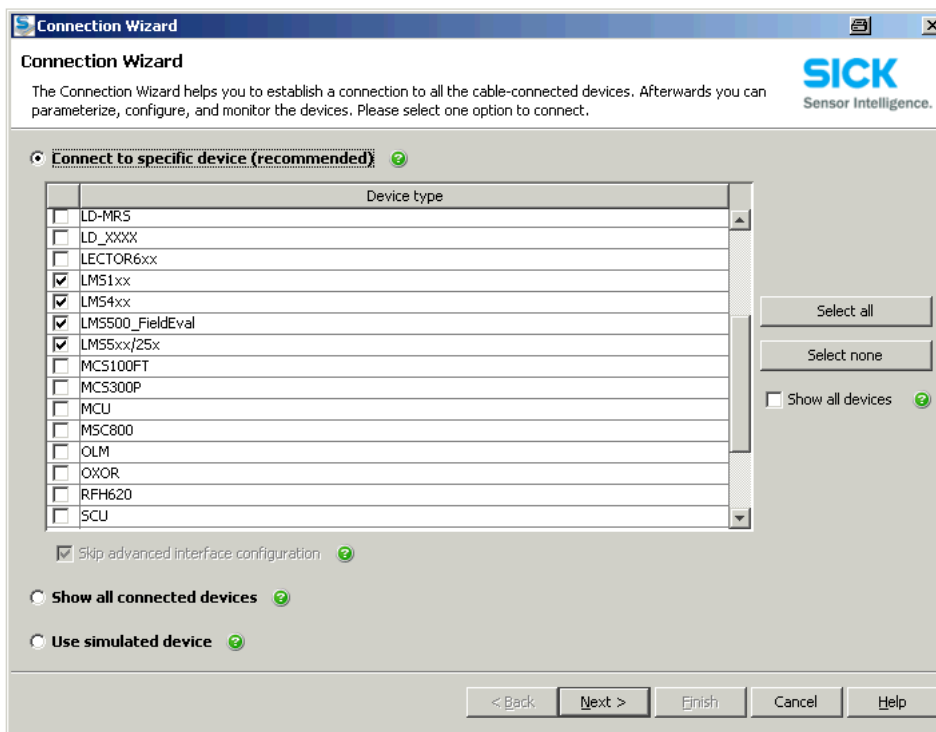
Please select “Create a new project” if the LMS251 is not yet connected and would like to configure settings for a later download to the scanner (**Offline mode**).



### 6.2.2. Online mode

Please select 'LMS5xx/25x' option. If any other option is also selected, please ignore it as the SOPAS will only connect to the device which is Online.

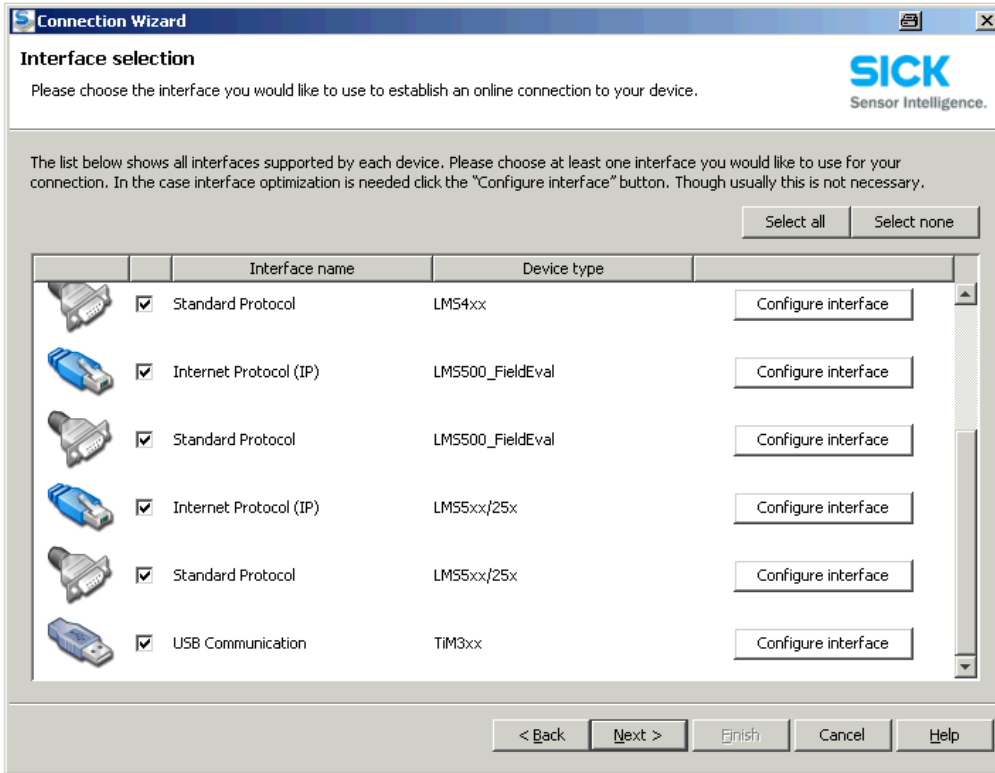
- Press 'Next'.



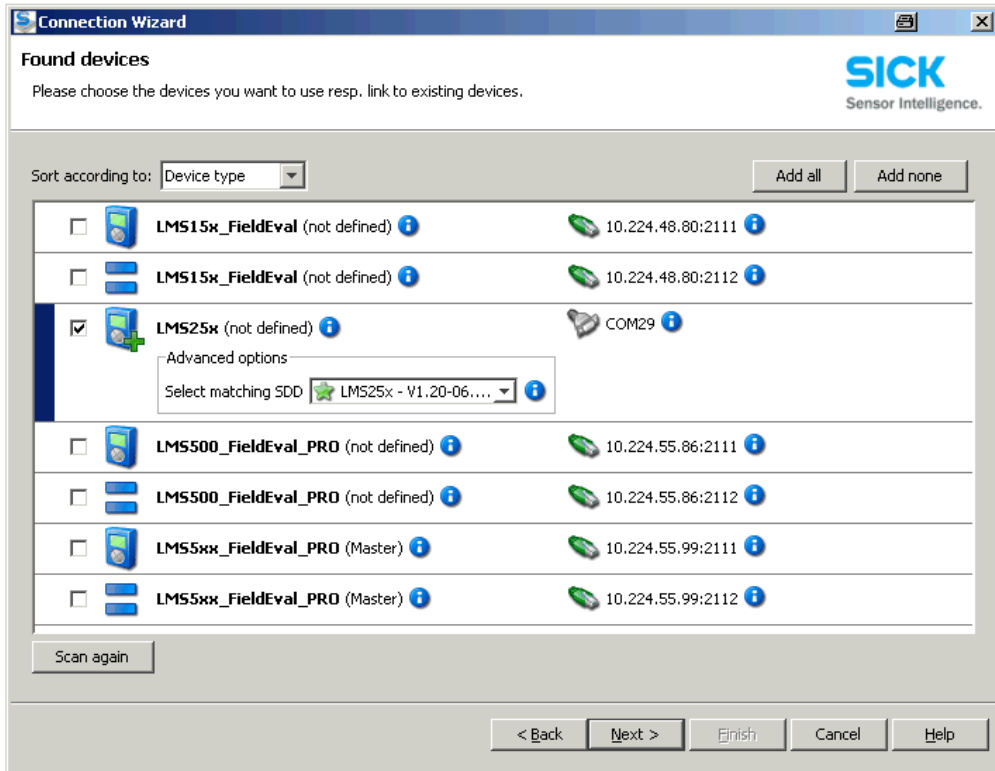
- Select 'Standard Protocol' on 'LMS5xx/25x'.
- Press 'Next'.

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If the user is experiencing problems communicating, please select the 'Configure Interface' button and enter manually the port number assigned by the USB driver.

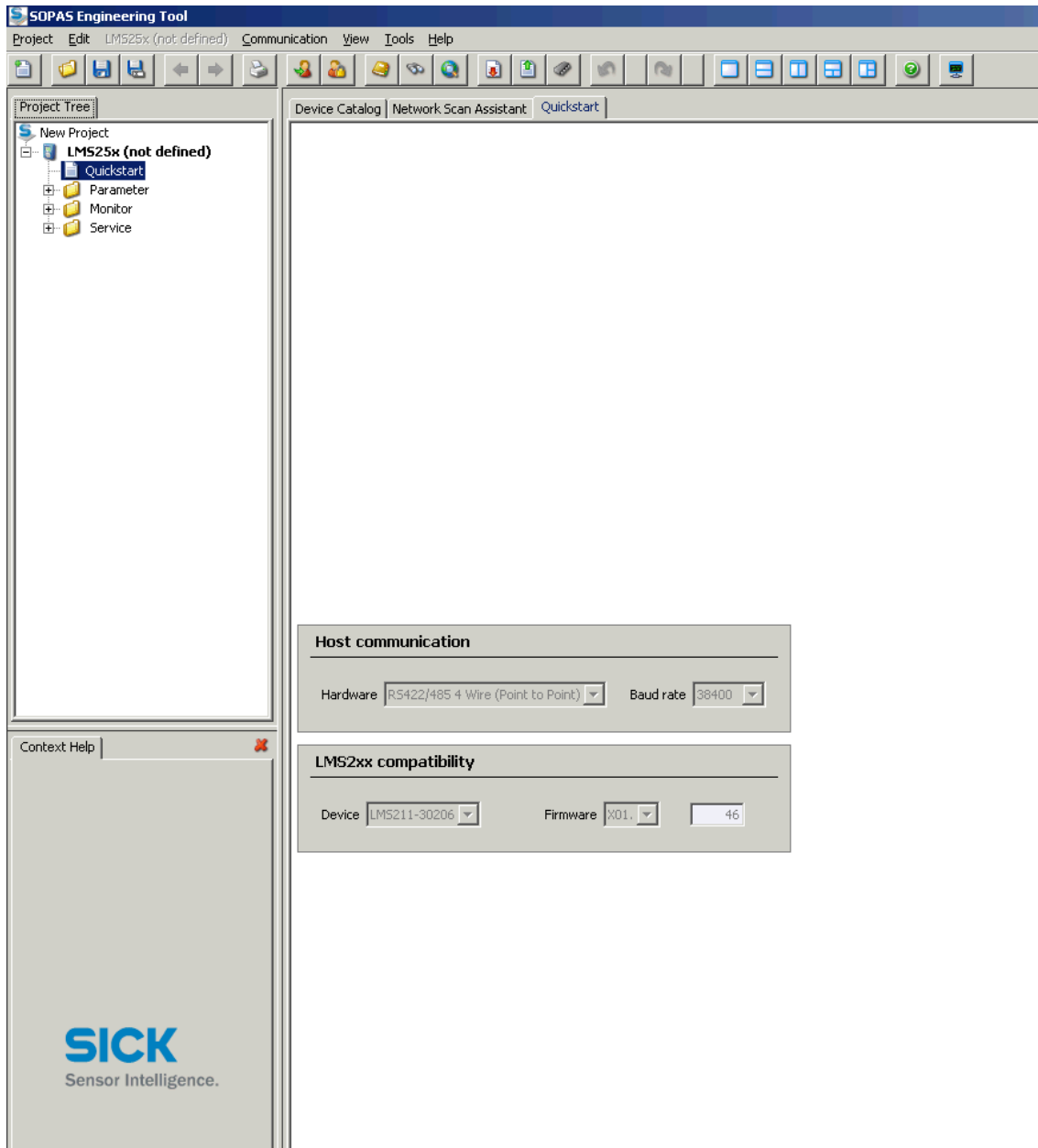


- Select the 'LMS25x' option.  
It will show the port number in which the device is communicating.



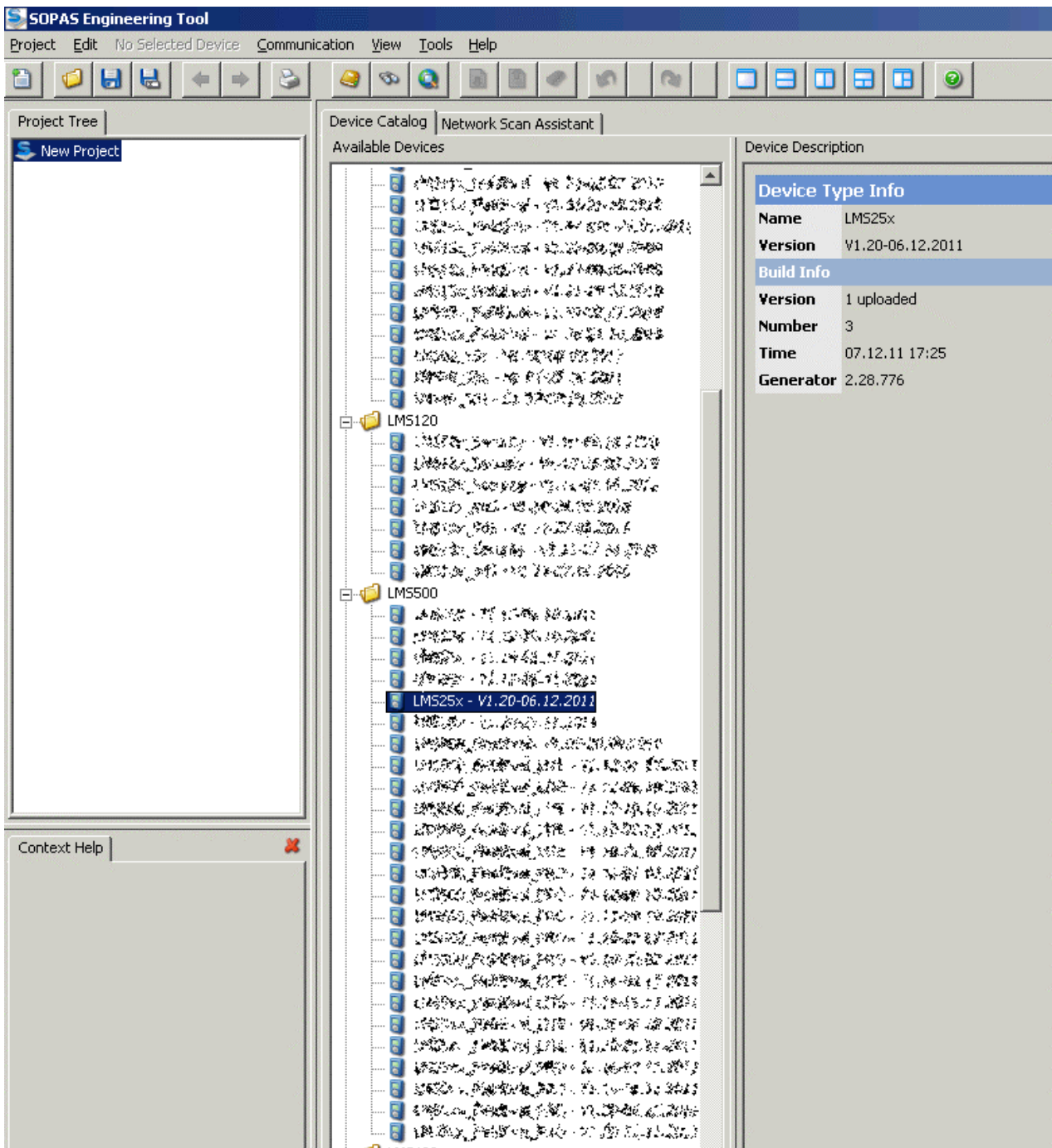


Then main screen will be shown as follows:



### 6.2.3.Offline mode

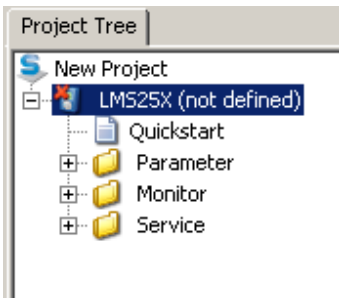
The starting screen will be as shown:




- Select the LMS25x latest version under the LMS5xx family tree by double clicking or just select and press “Add” at the bottom of the screen:

➔  LMS25X

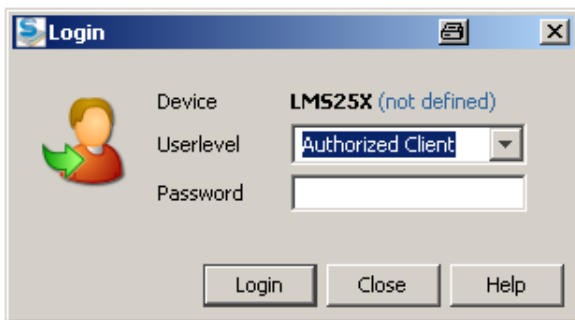
The LMS251 parameters will be loaded on the Project Tree section (left hand side).



Before modifying any parameter, the user must login first:

- Select the icon  or press 'Ctrl + I'.

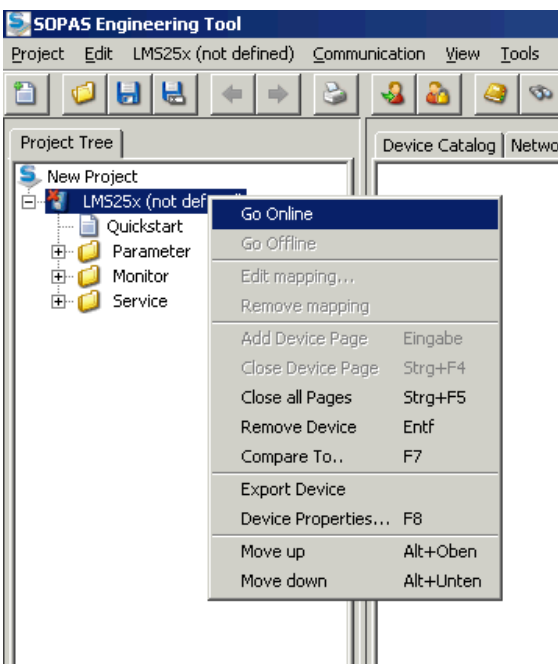
- Select 'Authorized Client' from the Userlevel list, password: 'client' then press 'Login'.



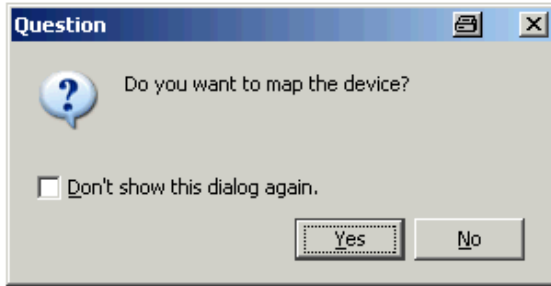
**NOTE:** Now the customer can create the new parameters and settings for a later download to the LMS.

Once the user is ready to download, please connect the unit via the USB port and proceed.

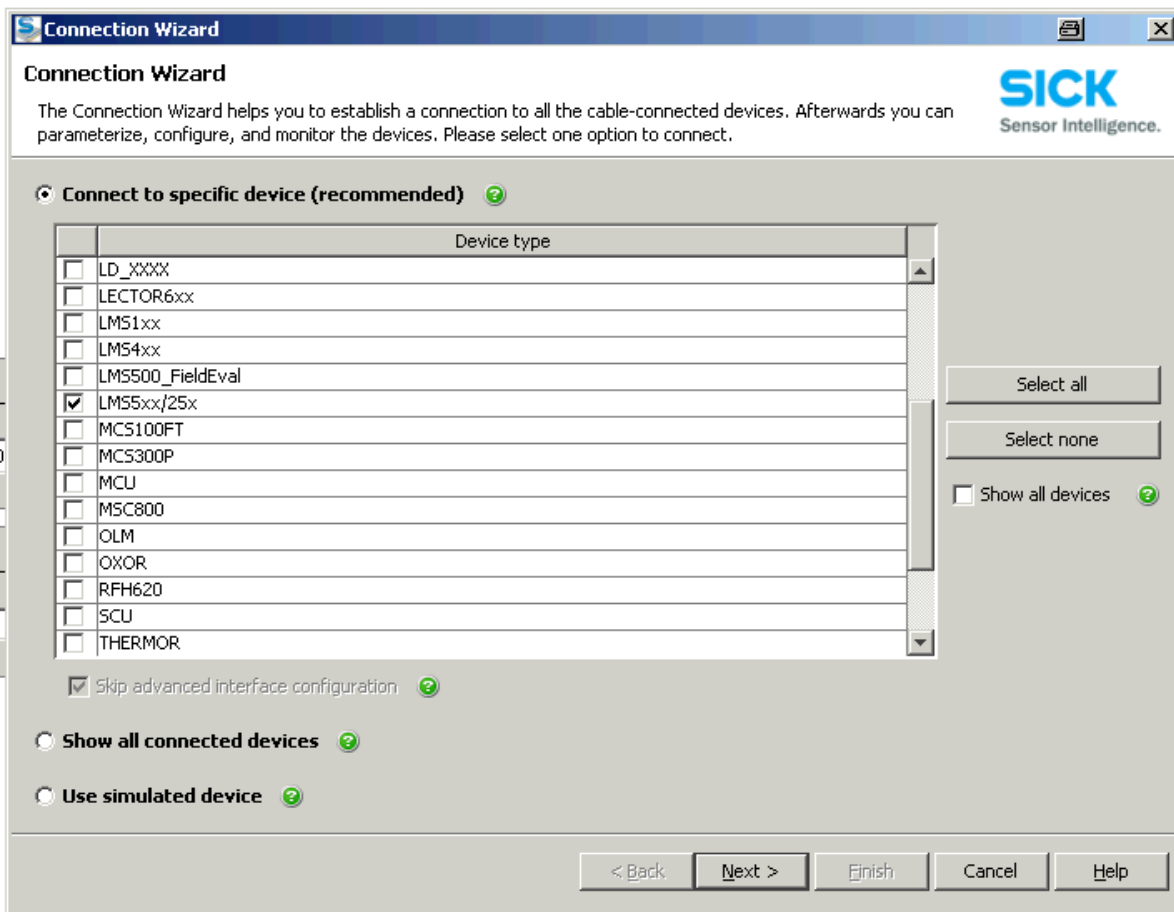
- Click on the device (*right hand button*) and select 'Go Online'.



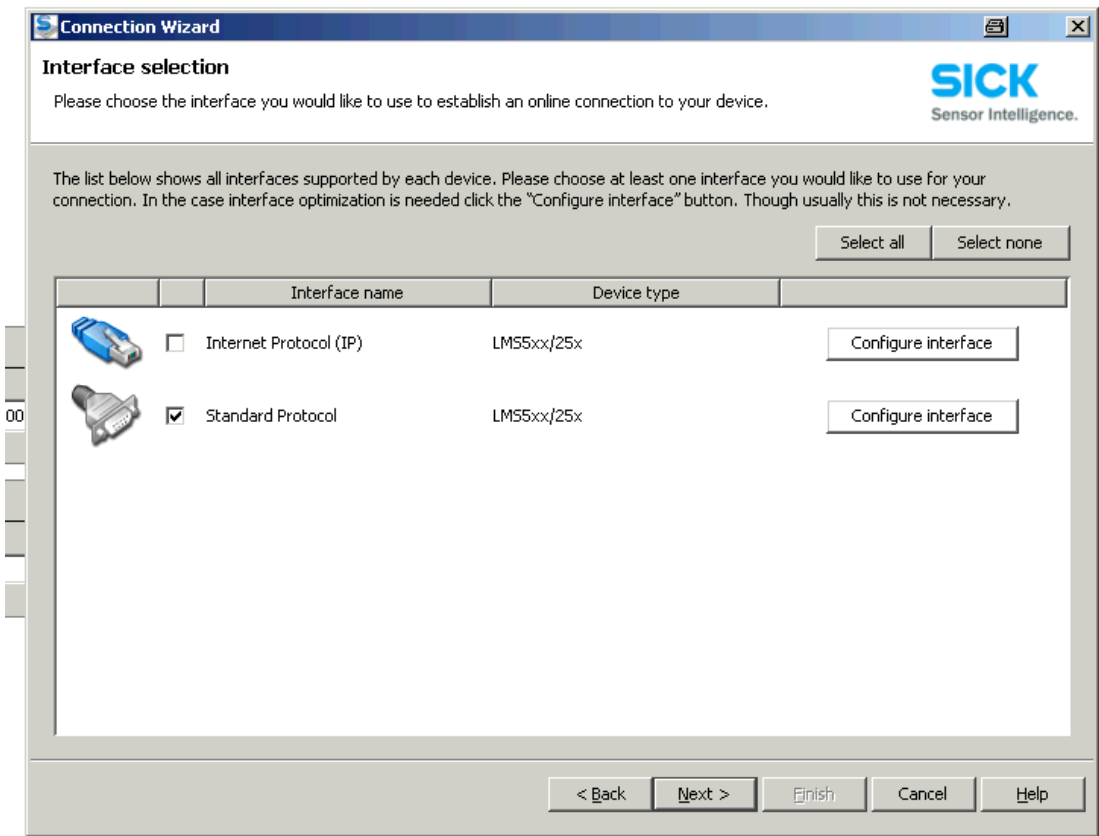
- Select 'Yes'.



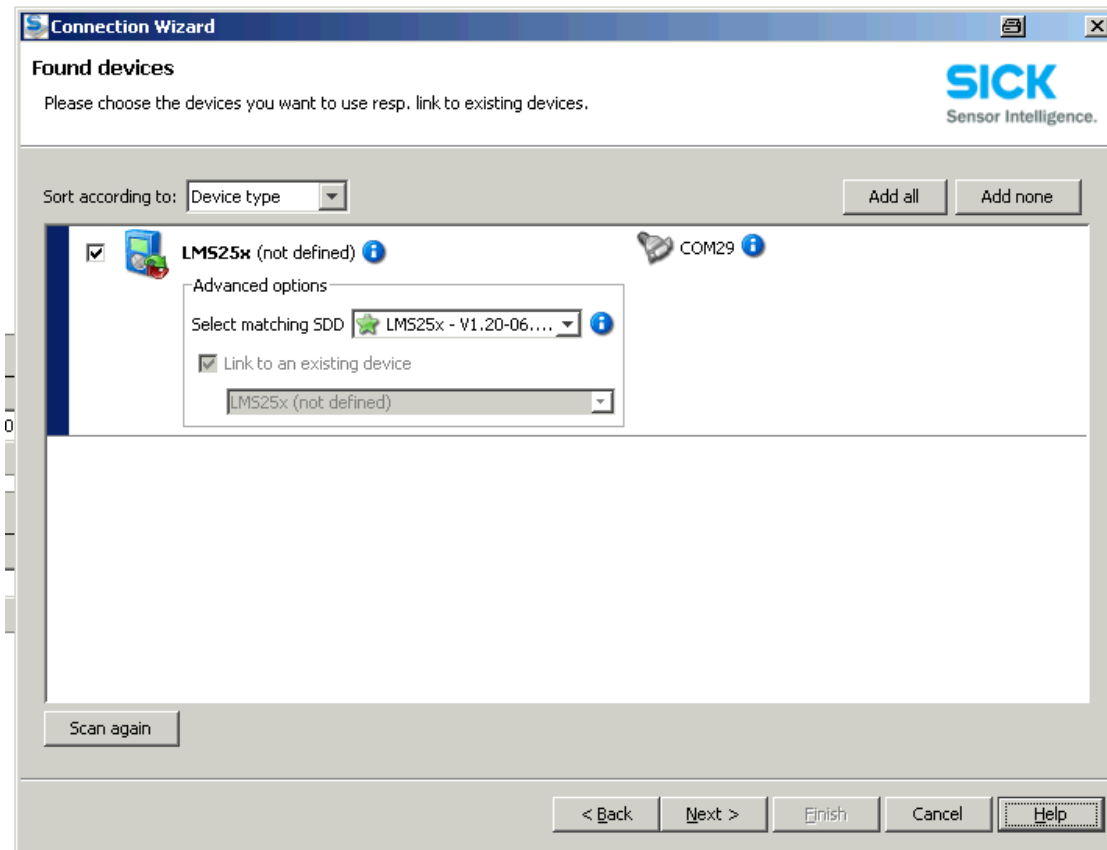
- Select 'LMS5xx/25x'.



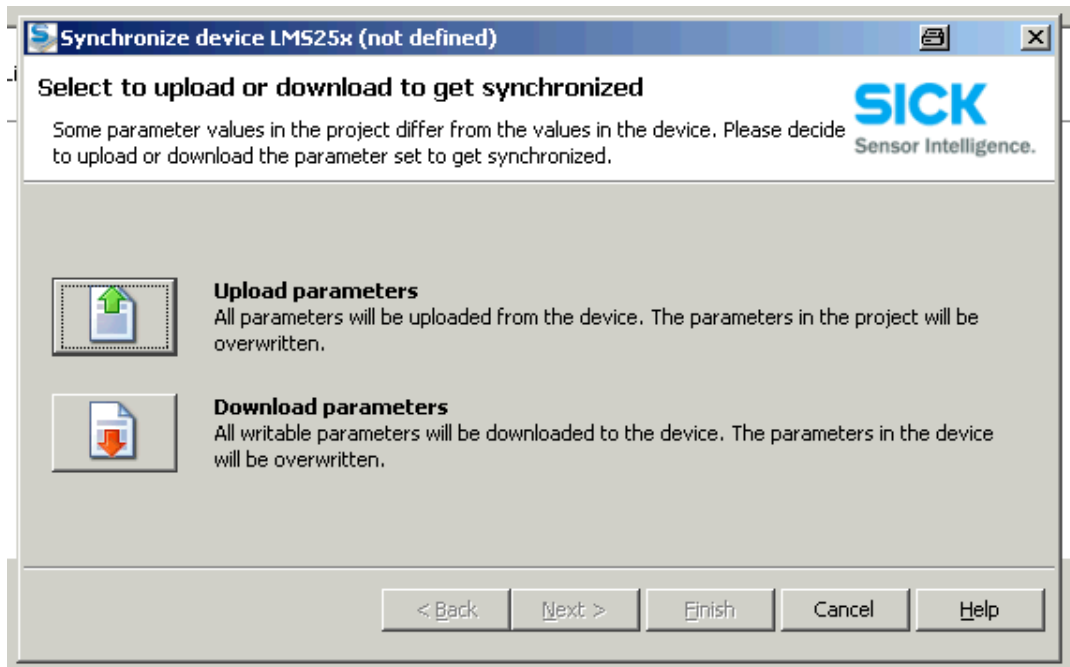
- Choose the COM port 'Standard Protocol' and press 'Next'.



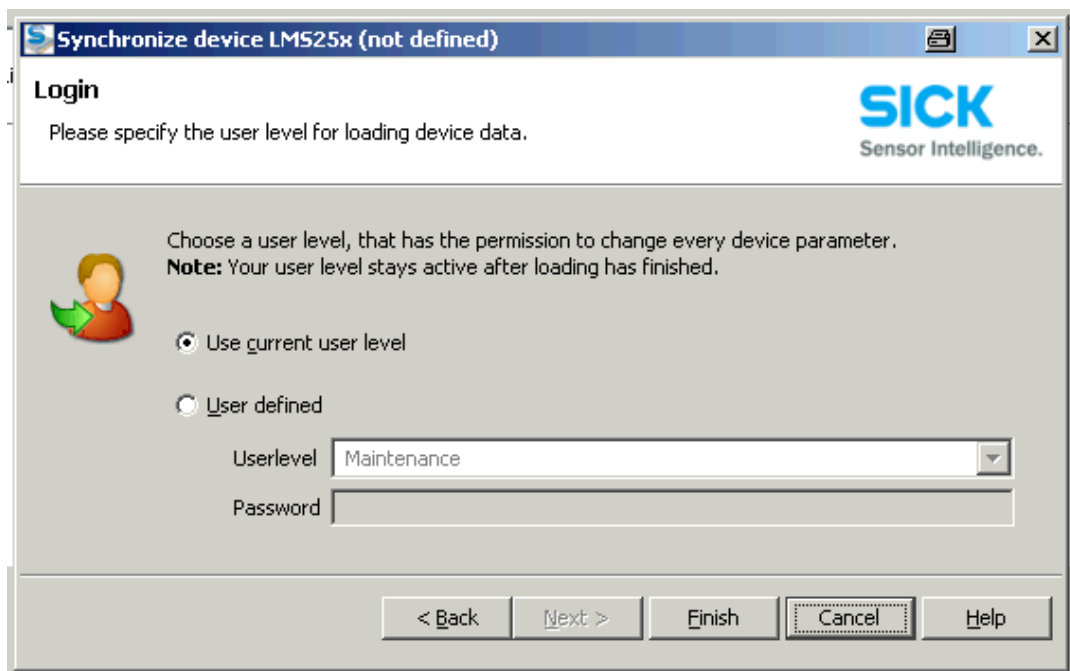
- On the found devices window please choose the LMS5xx/25x and 'Next'.



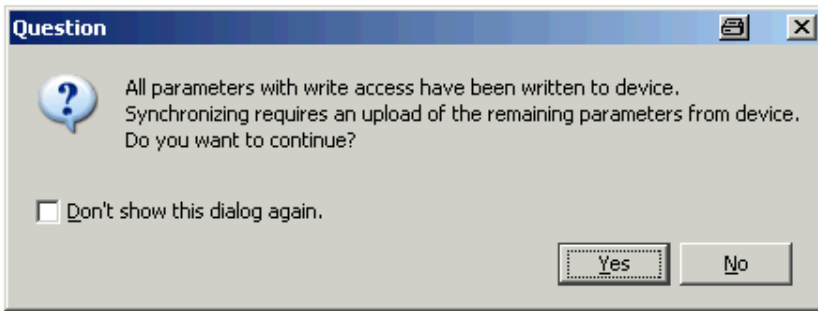
- Select 'Download Parameters'.



- Select 'Use current user level' and press 'Finish'.



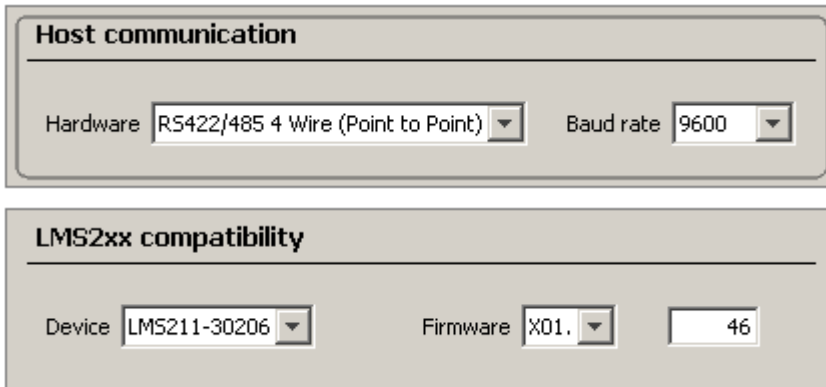
- On the last window select 'Yes'.



Then the user should arrive at the same window as the Online mode shown in Section 6.2.2.

### 6.2.4. Configuring the LMS251 via 'Quickstart'

As mentioned in Section 6.2.1, under the 'Quickstart' menu in the Project Tree the user must configure the LMS251 with the same communication configuration as it was in the LMS2xx.



**NOTE:**

The LMS251 does not require any hardware bridges to select the RS232 or RS422 as it was required in the LMS2xx. This is done internally in the scanner by software selection in SOPAS ET. However, please note that there are some pin-out differences between LMS2xx and LMS251. See Section [6.2.5.4](#).

A list of compatible units is listed in the pull down menu. The user must select the same Device and Firmware type as the LMS2xx used.

The drop down menu offers the following models and Firmware versions:



The Firmware can be either X01.xx or S01.xx. The last 2 digits must be entered by the user. Please check the current Firmware version of the LMS2xx to be replaced.

The Firmware Version does not change any behavior of the LMS251. The Firmware version will only be displayed in the relevant telegrams containing this info.

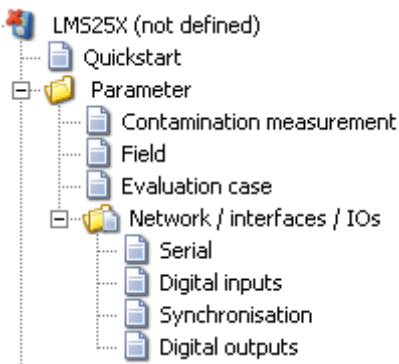
**Note:** The factory default parameters are:

- Hardware: RS422
- Baud rate: 9600 bps
- Device: LMS211-30206
- Firmware: X01.46

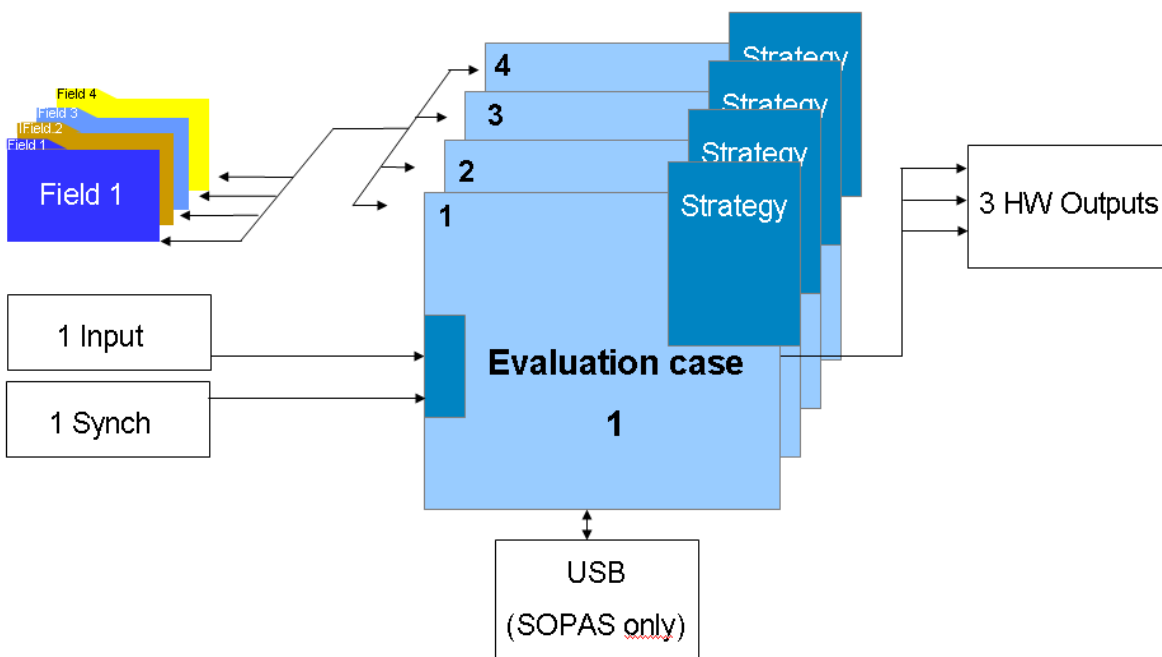
**!** The incorrect selection of Device type will affect the scan frequency, angular resolution and field of view.

### 6.2.5. SOPAS ET Field Parameters

Once the LMS251 has been configured to the customer’s compatible unit, the field parameters must be setup via SOPAS ET.



Overviews of the SOPAS ET parameters are shown below:





### 6.2.5.1. Contamination Measurement

The default values have been set the same as LMS2xx. If the user modifies these settings the behavior of the LMS251 will not be the same as the LMS200.

**Contamination**

---

Strategy       Response time  sec

Threshold warning  %      Threshold error  %

**Transparency of front screen**

---

Position of measurement channel

5°-channel  %    35°-channel  %    70°-channel  %





110°-channel  %    145°-channel  %    175°-channel  %

### 6.2.5.2. Field

The customer can create up to 4 fields using the SOPAS ET functionality. For further information how to build fields, please refer to the LMS500 Operation Instructions.

**Overview field**

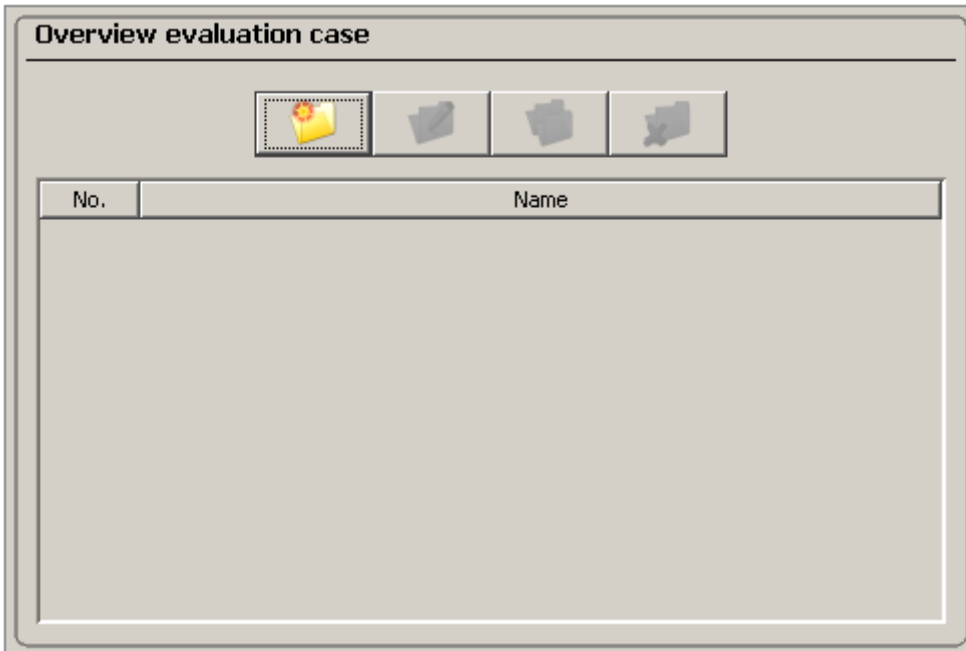
---

No.	Name	Linked with Evaluation Cases

### 6.2.5.3. Evaluation cases

There are 4 cases which can be used in conjunction with the fields. For further information how to build Evaluation cases, please refer to the LMS500 Operation Instructions.



### 6.2.5.4. Communication Interfaces

The front USB can only be used to parameterize the LMS251 via SOPAS ET. The parameters are described in the previous section [6.2.4](#).

The LMS251 can work in either RS232 or RS422 as mentioned in the previous sections. The LMS251 does not require any bridges in the electrical connector for the RS selection.

The RS232/422 can only be used for LMS2xx Telegrams or LMSIBS software.

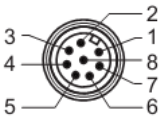
Please follow the correct parameterization order to ensure the correct functionality of the LMS251.

**NOTE:** The electrical pin-out for the RS232 on the LMS200 and LMS251 are slightly different. Please check carefully the pin-out when wiring.

Pin	Signal
1	RD-
2	RD+/RxD
3	TD-
4	TD+/TxD
5	GND
6	n.c.
7	Bridge to pin 8
8	Bridge to pin 7
9	n.c.
Device	Shield

Pin	Signal
1	RD-
2	RD+/RxD
3	TD-
4	TD+/TxD
5	GND
6	n.c.
7	Bridge to pin 8
8	Bridge to pin 7
9	n.c.
Device	Shield



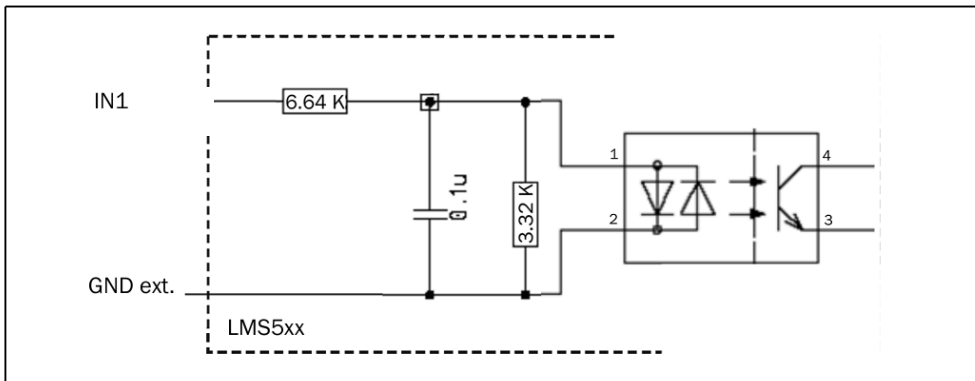
M12-Stecker, A-kodiert  
M12 plug, A-type encoded

Pin	Signal	Interface
1	RD-/RxD	RS-422/485/RS-232
2	TD-/TxD	RS-422/485/RS-232
3	RD+	RS-422/485
4	TD+	RS-422/485
5	Electronic GND	Ground serial data
6	NC	(do not use)
7	SyncIN	Synchronziation input
8	Electronic GND	Ground input SynIN

LMS251 pin-out

**6.2.5.5. I/Os**

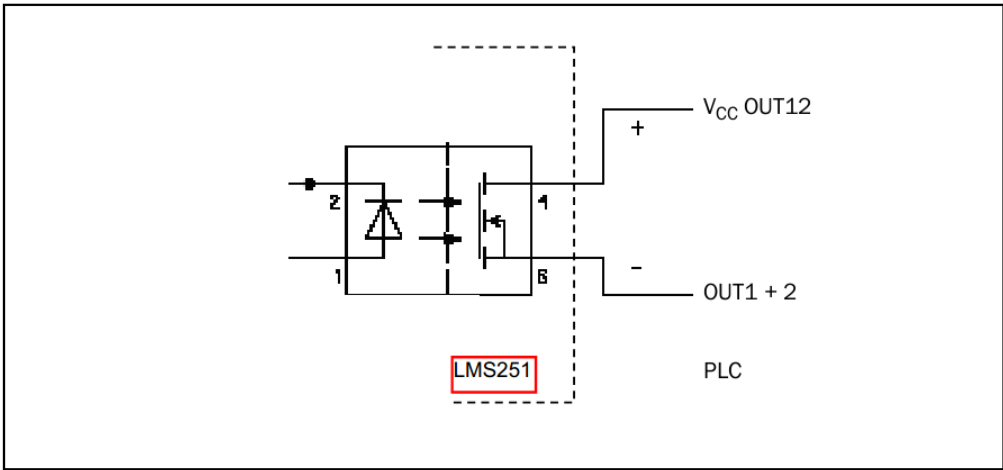
- Inputs: The inputs of the LMS251 are the same as the LMS5xx.



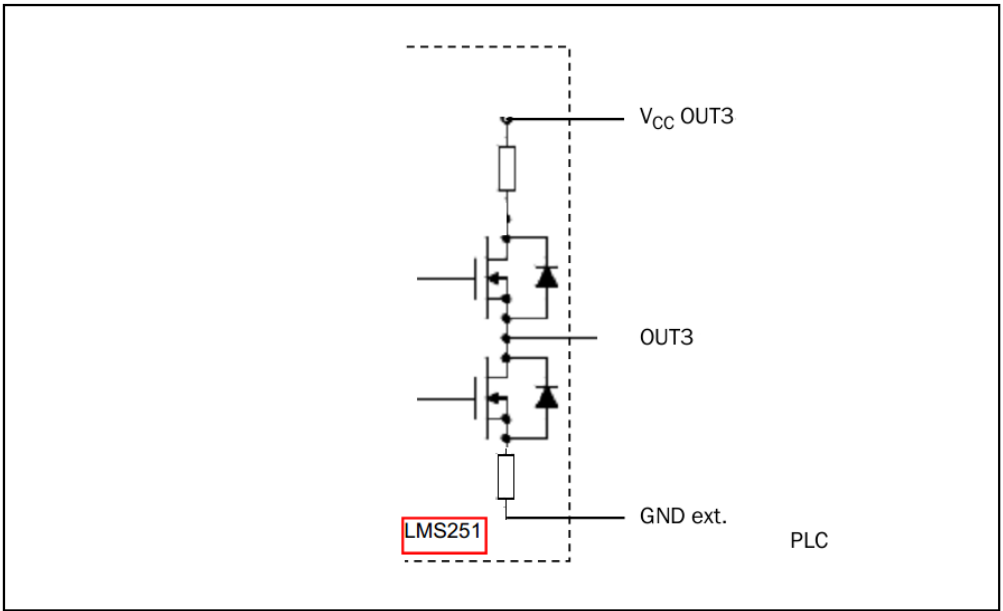
- Outputs:

Outputs 1 and 2 are normal switching outputs (power off state: low), the same as output 1 & 2 in the LMS5xx.

Output 3 is a push-pull type switching output (power off state: high), the same as output 3 - 6 in the LMS5xx.



Connection of the outputs 1 & 2 to a PLC (power off state: low)



Connection of the output 3 to a PLC (power off state: high)

**6.2.5.6. Synchronisation**

The synchronisation functionally is supported between LMS251s. The electrical wiring is the same as LMS5xx and must done via output 3, therefore please refer to the Output 3 electrical diagram.

The units used in the synchronisation must be set to the same scanning frequency.

Using SOPAS ET the Master/Slave synchronisation can be easily setup by selecting the output 3 of the Master to “Master Synchronisation” and the Input of the Slave to “Slave synchronisation”.

- Master setup:

**Output 3**

---

Output 3  Logic

Restart

- Slave setup:

**Input 1**

---

Control  Level  Logic  Debouncing  ms

**Synchronisation input**

---

Function synchronisation input

The following table describes the different scanning modes of the LMS200 and LMS251.


LMS200				LMS251
LMS2xx	Field of view [°]	Angular resolution [°]	Response Time [ms]	Scanning Frequency [Hz]
Standard	100	0,25	52	37,5
Standard	100	0,5	21,7	37,5
Standard	180	0,5	21,7	37,5
Standard	100	1	13,3	75
Standard	180	1	13,3	75
S09/S14	90	0,5	13,3	75

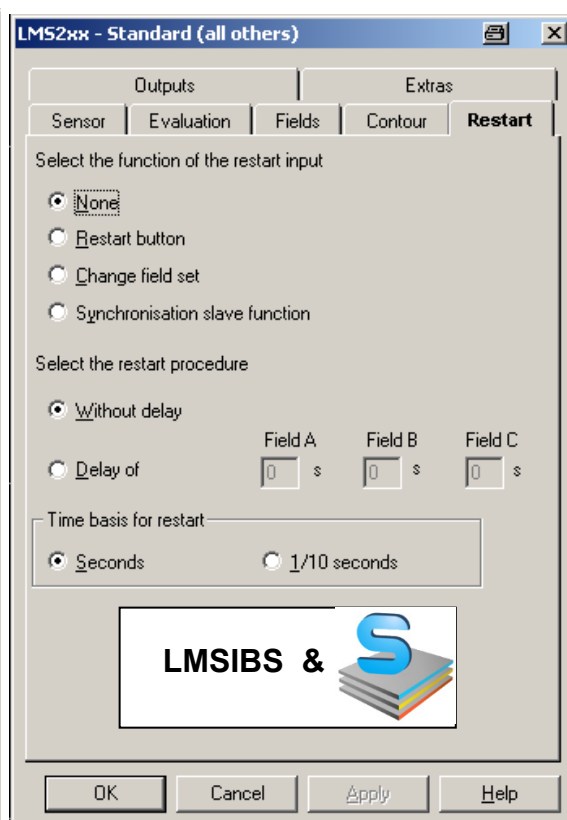
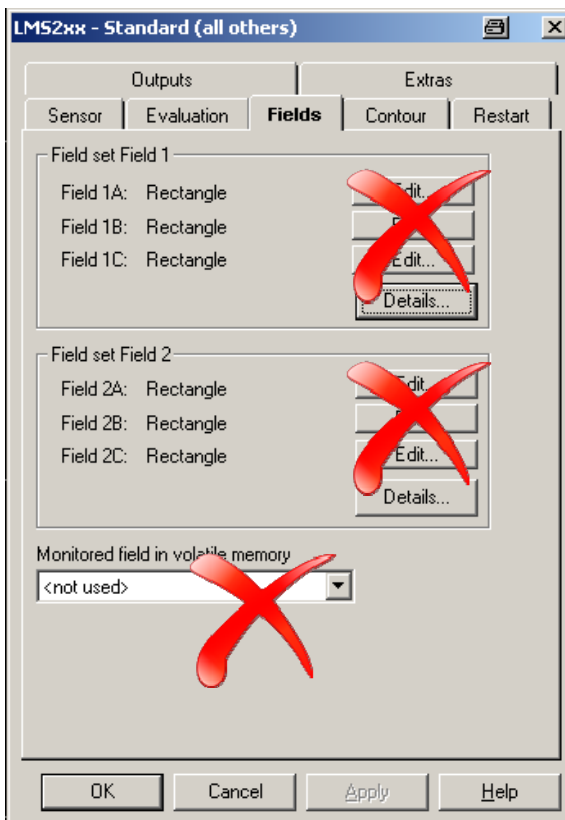
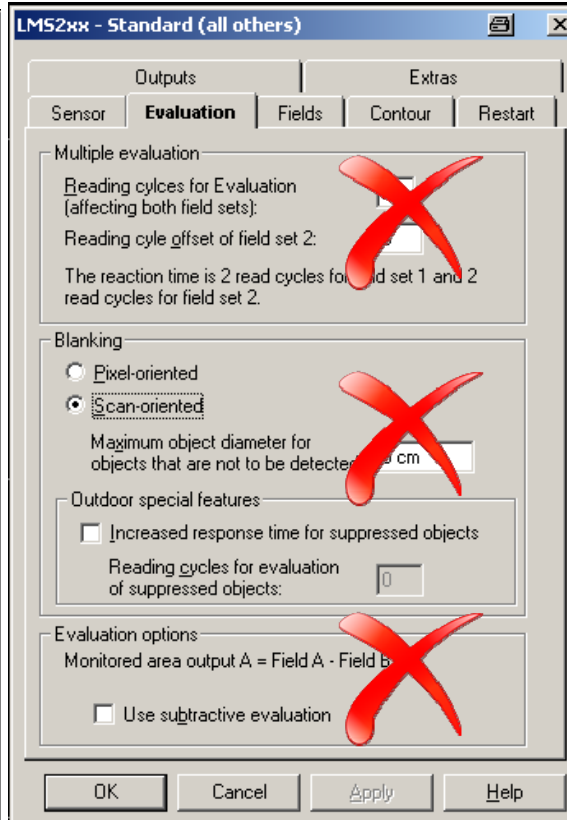
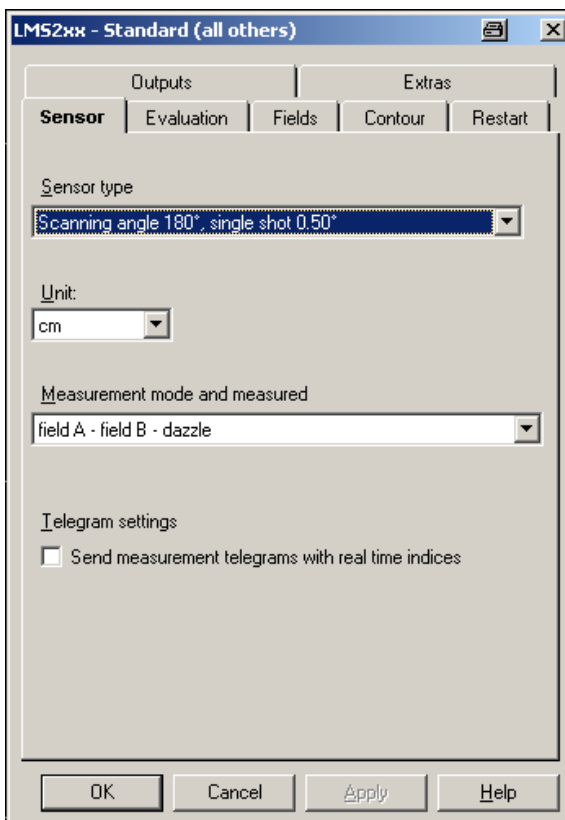
**6.2.6.LMSIBS**

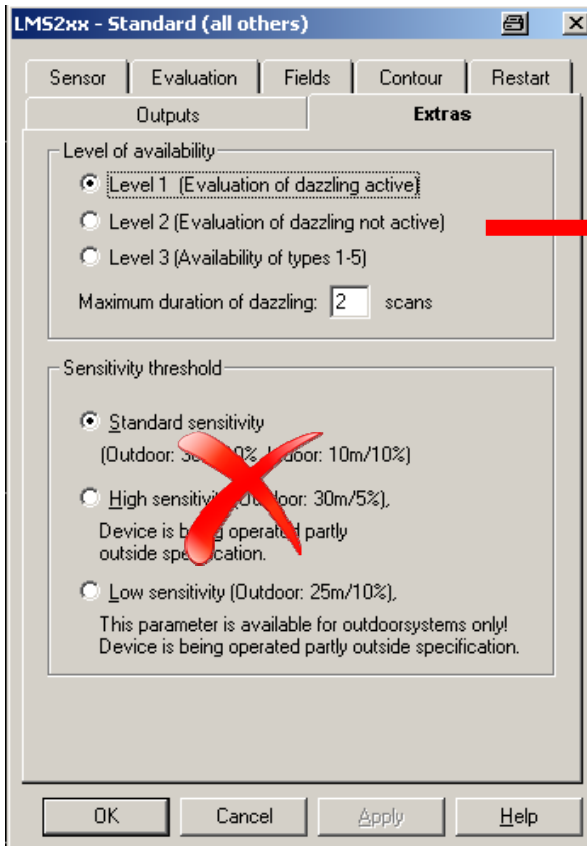
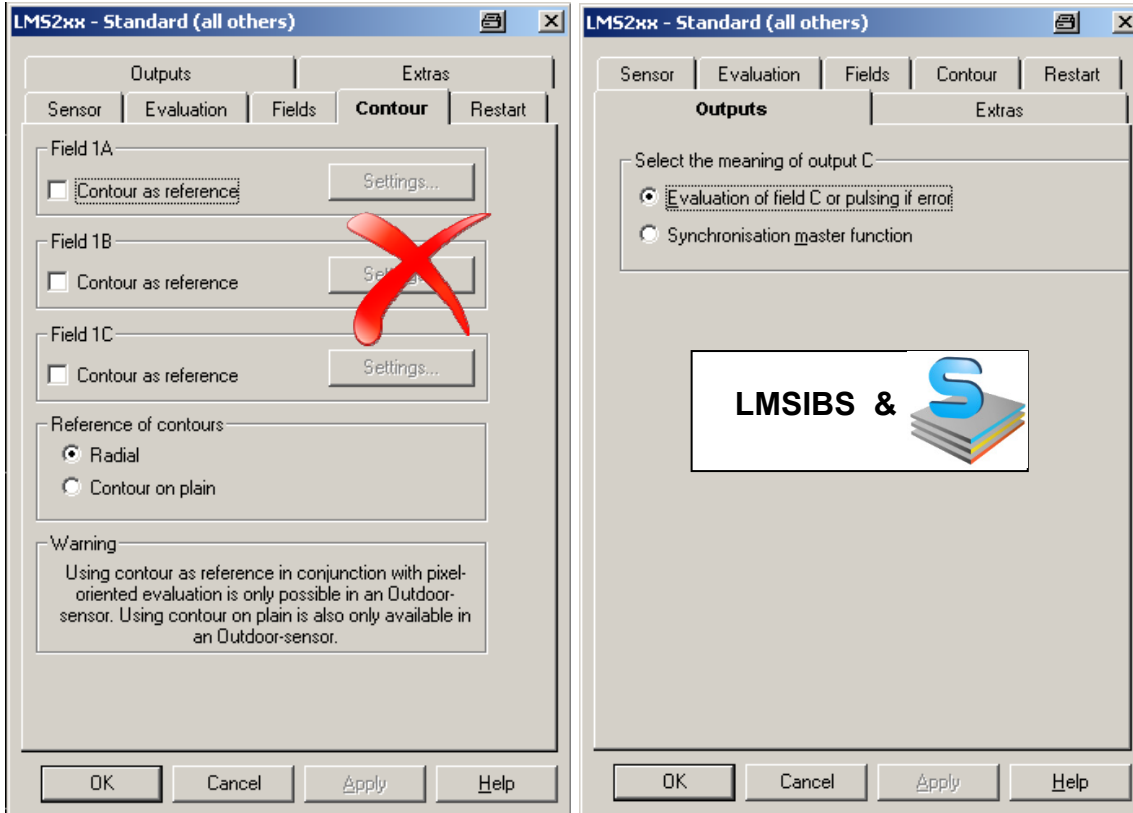
The LMS251 can work with the LMSIBS software with a limited functionality. For example, the fields cannot be saved permanently. Any configuration related to the field application must be done via the SOPAS software.

The LMSIBS can only be used for the setup of telegram communication and scanner parameters (scanning frequency, angular resolution, range, unit, etc).

NOTE: For fields configuration please use SOPAS ET software.

The settings that are supported via LMSIBS are shown below. The non-supported settings are marked with a red cross. The settings related to the field functionality are marked with the SOPAS logo .



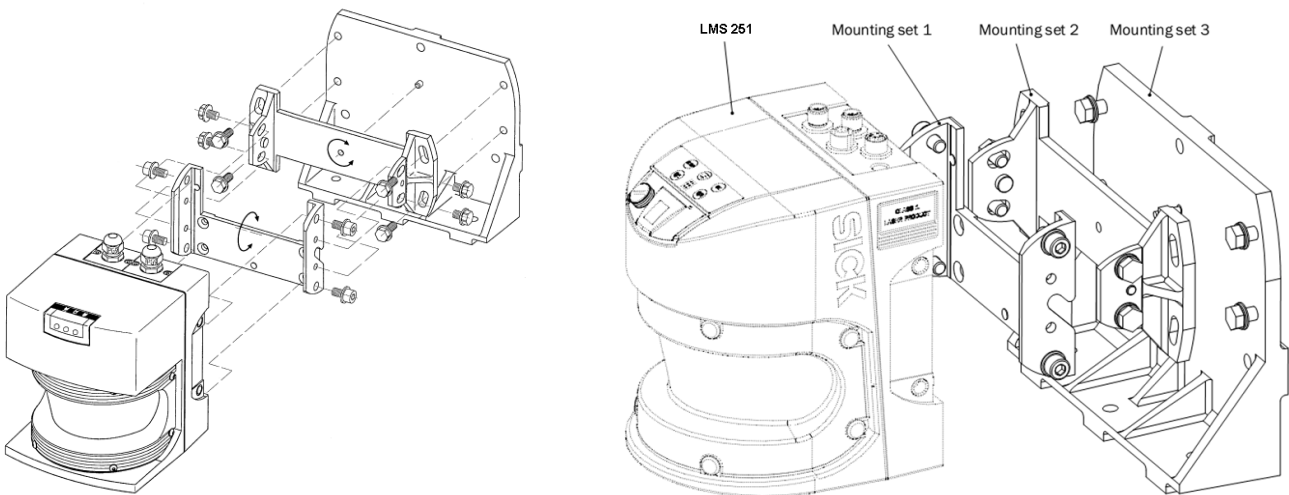


The LMS251 is based on the LMS5xx Lite therefore it can operate up to 100kLux. There is no need to adjust the 'dazzling'.

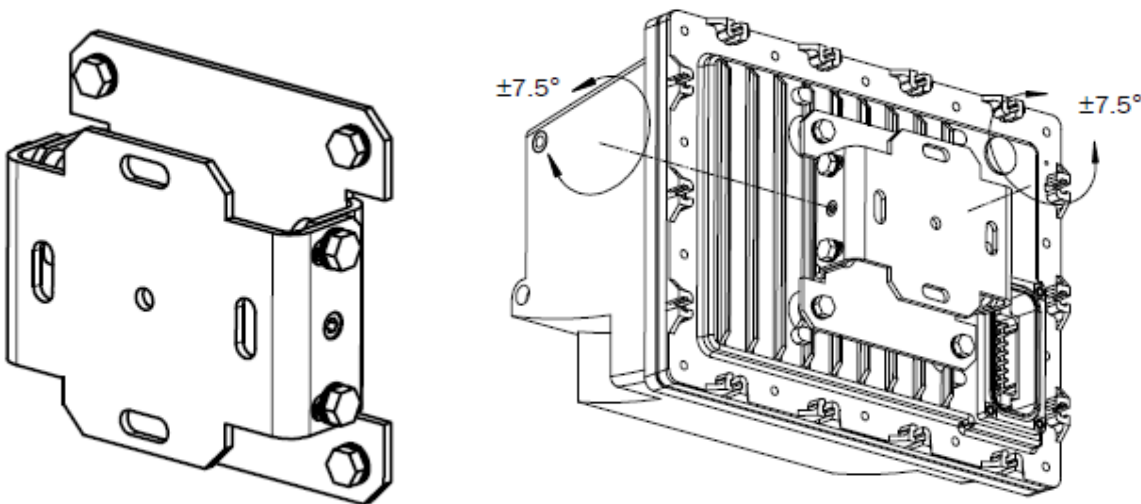
## 7. Accessories

### 7.1. Mechanical brackets

The LMS251 has the same mechanical housing as the LMS200/291 variants except no holes at the bottom, however a much smaller mechanical housing than the LMS221/211. Any LMS200/291 can easily be replaced by the same mechanical brackets (Mounting Set 1/2/3) shown below:



When replacing an LMS221/211 with an LMS251 the customer can use the existing LMS221/211 bracket (PN: 2018303) with the addition of an adapter bracket (PN: 2059271).



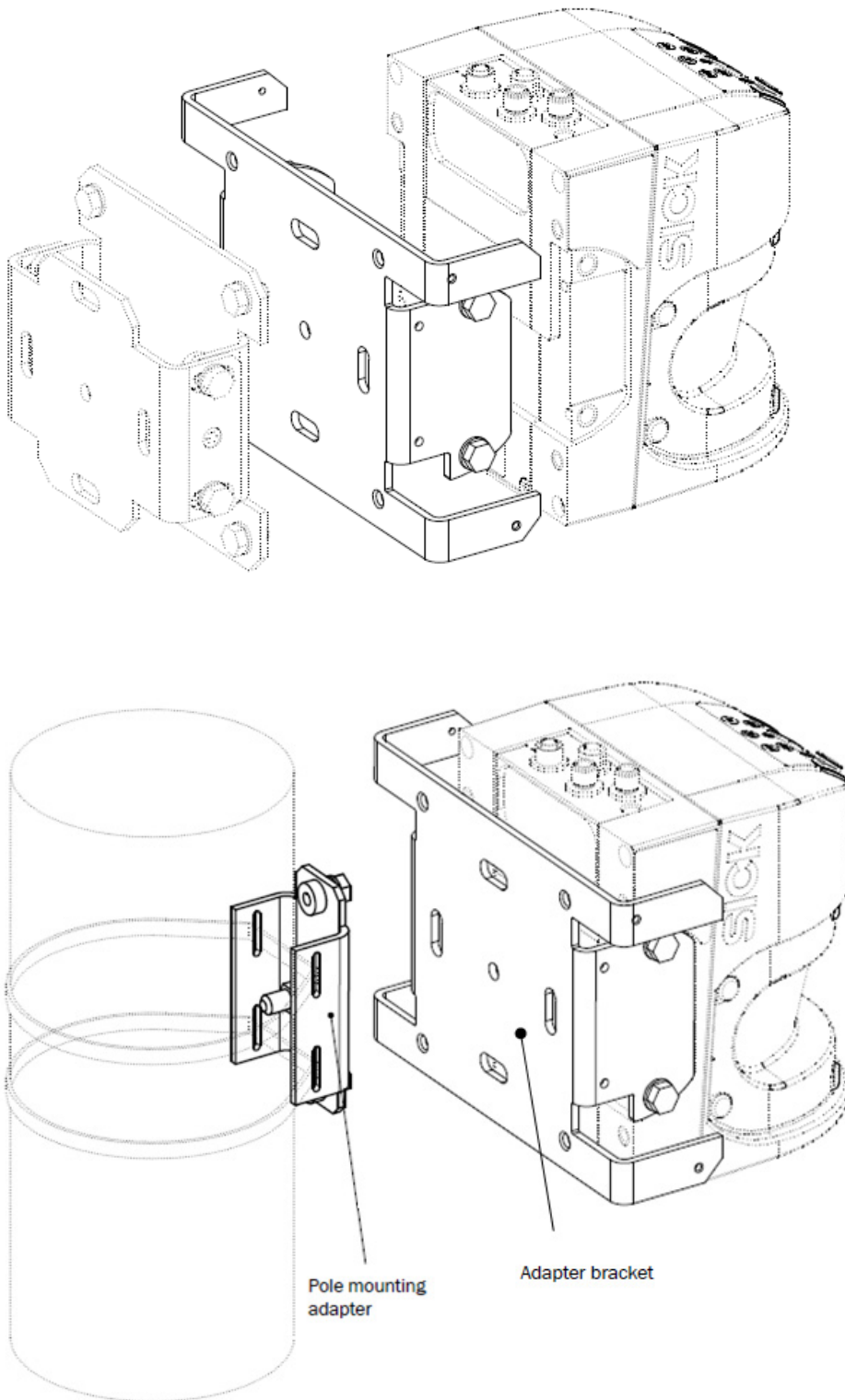
LMS221/211 Bracket (PN: 2018303)

The adapter bracket will place the LMS251 in the same horizontal and vertical position as the LMS221/211 axis point to ensure the same mechanical position of the internal mirror. Therefore there is no need to adjust any of the fields or measurement values.

This adapter bracket can also be used in conjunction with the pole mounting adapter (PN: 2018304).

NOTE: Please allow some mechanical deviations.





## 7.2. Electrical

The LMS251 is equipped with 3 x M12 connectors for Power, data & I/O.

The following picture shows the position on the scanner of each connector:



### 7.2.1. Electrical pin-out

The pin configuration for each connector is shown:

M12-Stecker, A-kodiert  
M12 plug, A-type encoded

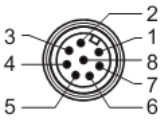
Pin	Signal	Interface
1	Electronic 24 V	Power supply sensor
2	Heat 24 V	Power supply heater
3	Electronic GND	Ground p. s. sensor
4	Reserved	(do not use)
5	Heat GND	Ground p. s. heater

Power Plug pin configuration

M12-Buchse, A-kodiert  
M12 socket, A-type encoded

Pin	Signal	Interface
1	Restart (IN)	Switching input 1
2	NC	(do not use)
3	Electronic GND	Ground input 1
4	OUT A	Switching output 1
5	OUT B	Switching output 2
6	OUT C	Switching output 3
7	Electronic GND	Ground outputs
8	Electronic 24 V	P. S. switching outputs

I/O Plug pin configuration

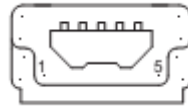


M12-Stecker, A-kodiert  
M12 plug, A-type encoded

Pin	Signal	Interface
1	RD-/RxD	RS-422/485/RS-232
2	TD-/TxD	RS-422/485/RS-232
3	RD+	RS-422/485
4	TD+	RS-422/485
5	Electronic GND	Ground serial data
6	NC	(do not use)
7	SyncIN	Synchronziation input
8	Electronic GND	Ground input SynIN

Data, I/O Plug pin configuration

**!** Please note the difference in the RS232 pin-out between LMS2xx and LMS251. See Section 6.2.5.4 for further details



USB socket (Mini B)

USB connection under knurled head screw on front (top)

### 7.2.2. Cables

The cables available are the same as the LMS511 Lite version. See below list:

Description	PN
Power supply cable, 4x 0.50mm <sup>2</sup> (AWG 22), shielded, M12 socket, 5-pin (A-type encoded) / open end, 5 m.	6036159
Power supply cable, 4x 0.75mm <sup>2</sup> (AWG 20), shielded, M12 socket, 5-pin (A-type encoded) / open end, 10 m.	6042565
Power supply cable, 4x 0.75mm <sup>2</sup> (AWG 20), shielded, M12 socket, 5-pin (A-type encoded) / open end, 20 m.	6042564
USB cable, 4-pole, shielded, plug type mini B / plug type A, 3 m.	6042517
Data I/O cable, 8-pole, M12 plug 8-pin (A-type encoded) / open end, 5 m	6036153
Data I/O cable, 8-pole, M12 plug 8-pin (A-type encoded) / open end, 10 m	6028420
Data I/O cable, 8-pole, M12 plug 8-pin (A-type encoded) / open end, 20 m	6036154
I/O cable, 8-pole, M12 socket 8-pin (A-type encoded) / open end, 5 m	6036155
I/O cable, 8-pole, M12 socket 8-pin (A-type encoded) / open end, 10 m	6036156
I/O cable, 8-pole, M12 socket 8-pin (A-type encoded) / open end, 20 m	6036157

### 7.2.3. Electrical Adapter box

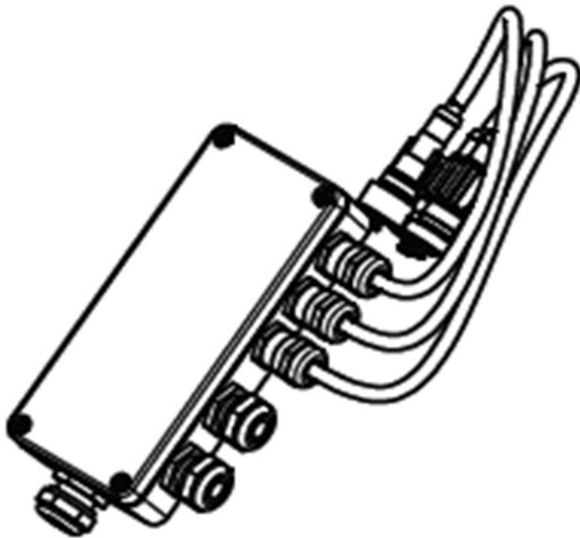
If the user already has an installation with LMS2xx and requires exchanging to an LMS251, the existing electrical wires may be connected to an LMS251 with the help of the special electrical adapter box (PN: 2063074).

This electrical box can also be used as an alternative if the cables in the accessory list do not have the suitable length.

LMS251 Laser Measurement Sensor

The electrical box has 3 pre-wired cables with M12 connectors for the LMS251. Inside the cover plate there is a pin description of the terminal block where to connect the customer's cable. The customer can use any of the 3 glands to insert their cables. To facilitate the connectivity, the pin out of the LMS251 electrical box is the same as the LMS2x1 connector, that is pin 1 of LMS251 same as pin 1 in LMS2x1, etc.

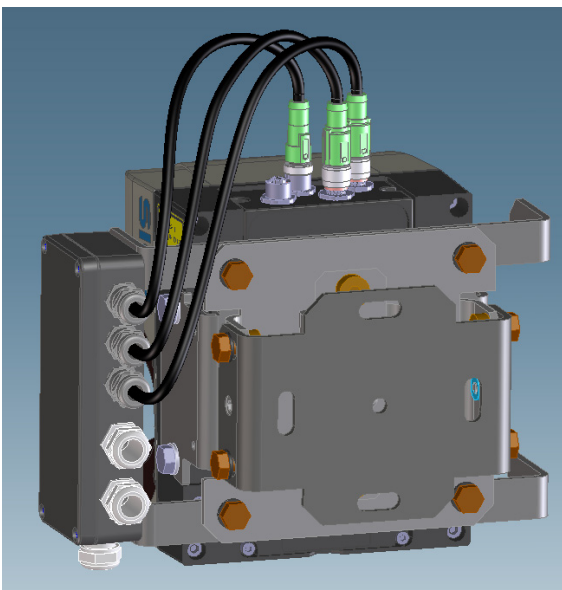
Please respect LMS251 wiring diagram and RS-232 pins.



**Advice:** Pin definition identical to Harting connector LMS2xx

<b>01</b>	RD-/RxD
<b>02</b>	RD+
<b>03</b>	Shield
<b>04</b>	Heat GND
<b>05</b>	-
<b>06</b>	-
<b>07</b>	OUT C
<b>08</b>	Electronic GND
<b>09</b>	TD-/TxD
<b>10</b>	TD+
<b>11</b>	-
<b>12</b>	Heat 24 V
<b>13</b>	OUT A
<b>14</b>	OUT B
<b>15</b>	Restart (IN)
<b>16</b>	Electronic 24 V
<b>17</b>	-
<b>18</b>	-
<b>19</b>	-
<b>20</b>	-
<b>21</b>	-
<b>22</b>	-

The electrical box can be attached to either side of the adapter bracket. (In the next figure is only shown on one side).



### 7.3. Technical Specifications LMS251

	Minimum	Typical	Maximum
<b>Functional data</b>			
Scan angle			180°
Scanning frequency	25 Hz		75 Hz
Remission	2%		Several 1,000% <sup>1)</sup> (reflectors)
Angular resolution	0.25°		1°
Measurement Accuracy <sup>2</sup>		±24 mm (±1.02 in)	
Measurement error			
Systematic error (at 10% object remission)			
Standard resolution 1 to 10 m		±25 mm (±0.98 in)	
Standard resolution 10 to 20 m		±35 mm (±1.38 in)	
Statistical error (1σ) (at 10% object remission)			
Standard resolution 1 to 10 m		±6 mm (±0.24 in)	
Standard resolution 10 to 20 m		±8 mm (±0.31 in)	
Standard resolution 20 to 30 m		±14 mm (±0.55 in)	
Immunity to external light		70klux	
Distance from mirror axis of rotation (zero point on the X and Y axis) to the rear of the device	93 mm (3.66 in)		
Distance between centre of the scan plane and the bottom edge of the housing	63 mm (2.48 in)		
Distance measuring range	0.7 m (2.30 ft)		80 m (262.47 ft)
Distance measuring range at 10 % object remission LMS251-11100	1 m (3.28 ft)		40 m (131.23 ft)
Power-up delay	30 s		60 s

**General data**

Laser protection class	Laser class 1 according to IEC 60 825 F 1 (2007 F 3) (complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, June 2007)		
Enclosure rating LMS251	As per EN 60 529 (1991 F10); A1 (2002 F 02) IP 67		
EMC test	As per EN 61 000 F 6 F 2 (2005 F 08), EN 61 000F 6 F 3 (2007 F01)		
Electrical safety	As per EN 60 950 F 1 (2006 F 04) and EN 60 950F 1/AF 11 (2009F 03)		
Operating temperature range LMS251	-30 °C (-22 °F)		+50 °C (122 °F)
Storage temperature range	-30 °C (-22 °F)		+70 °C (158 °F) max. 24 h
Humidity (taking into account the operating temperature range)	DIN EN 60 068F 2 F 61, method 1		
Vibration resistance	As per EN 60 068 F 2 F 6 (2008-10)		
Frequency range	10 Hz		150 Hz
Amplitude	5 g RMS		
Shock resistance	As per EN 60 068 F 2 F 27 (2009-05), EN 60 068F 2 F 29 (1995F03)		
Single shock	15 g (0.53 oz), 11 ms		
Continuous shock	10 g (0.35 oz), 16 ms		
Sender	Pulsed laser diode		
Wave length	895 nm	905 nm	915 nm
Divergence of the collimated beam (solid angle)		11.9 mrad	
Standard resolution		13.6 mm (0.54 in)	
Light spot size at the front screen			
Light spot size at 18 m(59.05 ft) scanning range			
Standard resolution		228mm (8.98 in)	
Housing			

Material	GDF ALSi12 3.2582.05		
Color LMS500	RAL 5012 (blue)		
Color LMS511	RAL 7032 (grey)		
Alloy	Excellent weather resistance as per DIN EN 106:1988, plate 3		
Front screen			
Material	Polycarbonate		
Surface finish	Outside with scratch-resistant coating		
System plug			
Material	GDF ALSi12 3.2582.05		
Colour	RAL 9005 (black)		
Cable entries (LMS511)			
Material	Stainless steel/plastic		
Dimensions <sup>5)</sup>			
Height			185 mm (7.28 in)
Width			155 mm (6.10 in)
Depth			160 mm (6.30 in)
Total weight (without connection cables)		3.7 kg (8.15 lb)	

**Electrical data**

Supply voltage LMS5xx at the scanner	19.2 V	24 V	28.8 V
Permissible residual ripple			±5 %
Supply voltage for the LMS511 heating	19.2 V	24 V	28.8 V
Switch on current			2 A
Operating current at 24 V		0.9 A	
Operating current with max. output load		1.9 A	
Operating current with maximum heating performance		2.3 A	2.5 A
Power consumption without output load		22 W	25 W
LMS511: Additional power consumption of heating		43 W	45 W
Electrical connection LMS511	Round M12 plug connectors		
Inputs			
Switching input	1		

Synchronisation input	1		
Input voltage	11 V		30 V
Input resistance on HIGH		2 kΩ	
Voltage for HIGH	11 V	24 V	30 V
Voltage for LOW	0 V		5 V
Input capacity		15 nF	
Static input current	6 mA		15 mA
Digital switching outputs	LMS251: 3		
Number			
Voltage drop load		2 V	
Maximum switching current			140 mA
Current limiting (after 5 ms at 25°C (77 °F))	100 mA		200 mA
Power-up delay	Negligible		
Switch off time		0.8 ms	2 ms
Maximum current output 1 + 2 <sup>6)</sup>			250 mA
Maximum current output 3			100 mA
Auxiliary interface	USB 2.0		
Communication protocol			
Data transmission rate (reduced)			500 kBd
Serial host interface	RS F232 (proprietary)/RS F 422		
Communication protocol			
Data transmission rate (selectable)	9.6 kBd	57.6 kBd	500 kBd
Cable length at 38.4 kBd and wire cross-section 0.25 mm <sup>2</sup> (approx. 24 AWG)			15 m (49.21 ft)
Galvanic de-coupling	Yes		
Wire cross-section of the connection cable			0.25 mm <sup>2</sup> (approx. 24 AWG)

<sup>1)</sup> Corresponds to Diamond Grade 3000X™ (approx. 1,250 cd/lx × m<sup>2</sup>).

<sup>2)</sup> Measured under SICK standard environment (LMS2xx equivalent): Temperature = 23 °C, object remission = 10 % at 20 m distance

<sup>3)</sup> The time after the first reflected pulse from which measurement can be performed with full accuracy is dependent on the target that reflected the first reflected pulse.

<sup>4)</sup> Environmental conditions: good visibility, temperature range = 0 °C to 50 °C, object remission = 10 to 20.000 %, ambient light < 70 klux.

<sup>5)</sup> Without fixing screws and projection of cable glands with system plug mounted.

<sup>6)</sup> Outputs are short-circuit protected (no overload protection).





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