Sensor Instruments

Manual
Software LR-Scope V2.31

(PC-Software for Microsoft® Windows® XP, 2000, NT® 4.0, Me, 98, 95)

for laser reflex light barriers of *R-LAS-LR Series*

and for luminescence sensors of *LUMI Series*

R-LAS-LR-O
R-LAS-LR-O-CL1
R-LAS-LR-R
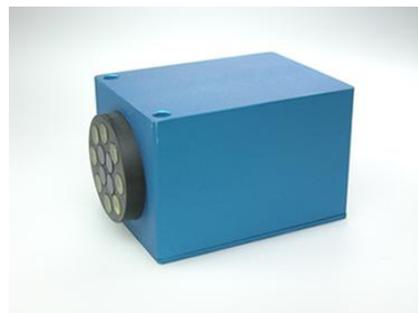
LUMI-30
LUMI-20/90
LUMI-35/95-2X

This manual describes the installation of the PC software for the laser reflex light barriers of *R-LAS Series* respectively the luminescence sensors of *LUMI Series* made by Sensor Instruments. It also explains the functional elements of the graphic Windows user interface.

The operation of the the laser reflex light barriers of type *R-LAS-LR* is similar to the auto-collimation principle, i.e. transmitter and receiver are arranged on the same optical axis. An integrated polarisation filter provides protection against spurious triggering caused by reflecting objects (with *R-LAS-LR-R*).

With the luminescence sensors of *LUMI Series* the transmitter (UV LEDs) and receiver optics are arranged in-plane.

Through the RS232 interface parameters and measured values can be exchanged between the PC and the laser reflex light barriers of *R-LAS Series* respectively the luminescence sensors of *LUMI Series.*

All the parameters can be stored in the non-volatile EEPROM of the *R-LAS-LR* respectively *LUMI* sensor through the serial RS232 interface.

1   Installation of the *LR-Scope V2.31* software

Hardware requirements for successful installation of the *LR-Scope V2.31* software:

- I BM PC AT or compatible
- VGA graphics
- Microsoft® Windows® XP, Me, 2000, 98, NT® 4.0 or 95
- Serial RS232 interface at the PC
- Microsoft-compatible mouse
- Cable for the RS232 interface (cab-las5/PC)
- CD-ROM drive
- 5 MByte of free hard disk space

Please install the *LR-Scope V2.31* software as described below:

The *LR-Scope V2.31* software can only be installed under Windows. Windows must therefore be started first, if it is not yet running.

It is recommendable to make a backup copy of the original floppy disk before starting the installation

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1.   The software can be installed directly from the installation CD-ROM. To install the software, start the SETUP program in the INSTALL folder of the CD-ROM.

2.   The installation program displays a dialog and suggests to install the software in the C:\FILENAME directory on the hard disk. You may accept this suggestion with **OK** or [**ENTER**], or you may change the path as desired. Installation is then performed automatically.

3.   During the installation process a new program group for the software is created in the Windows Program Manager. In the program group an icon for starting the software is created automatically. When installation is successfully completed the installation program displays "Setup OK".

4.   After successful installation the software can be started with a left mouse button double-click on the icon.


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MS-DOS® is a registered trademark of the Microsoft Corp.
VGA™ is a trademark of the International Business Machines Corp.

2 Operation of the *LR-Scope V2.31* software

When the LR-Scope V2.31 software is started the following window appears on the Windows interface:

Please read this chapter first before you start to adjust and parameterise the *R-LAS-LR* respectively the *LUMI* sensor!
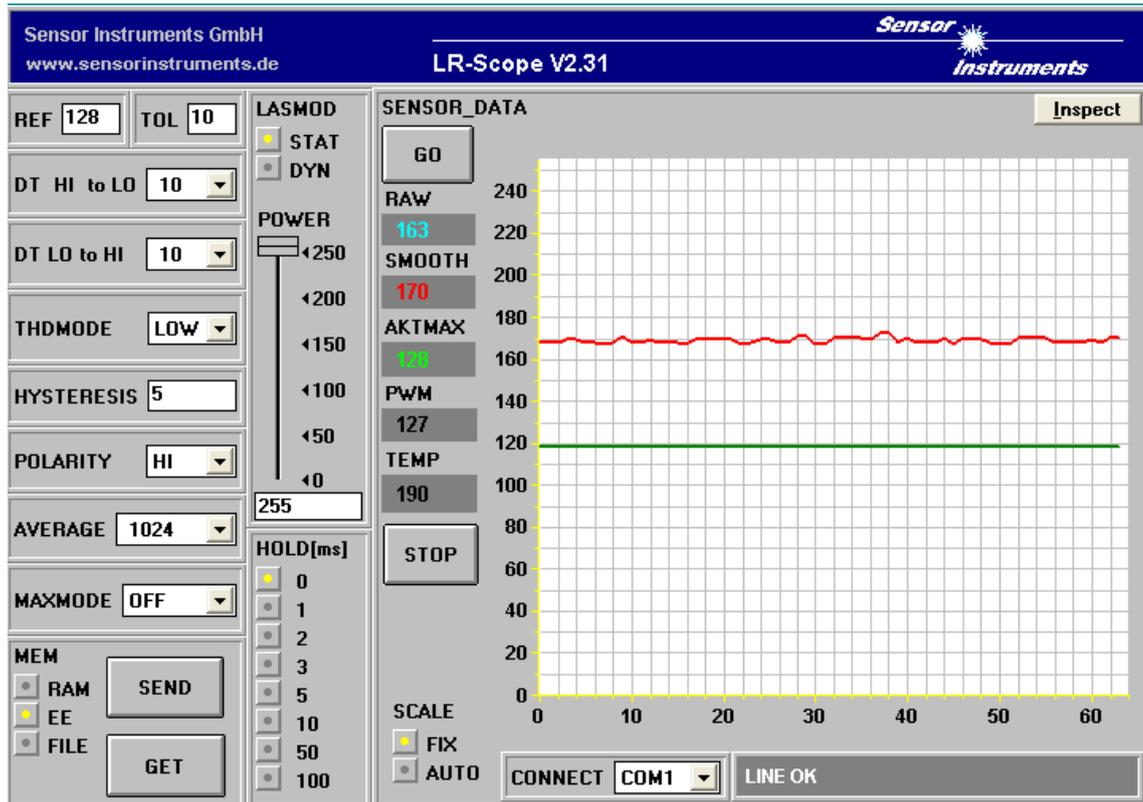
The functions of the individual LR-Scope V2.31 control elements will be explained on the following pages:

REF setting:
After a mouse-click on this edit-box the reference value can be specified here by entering a numerical value. The REF value (setpoint value) corresponds with the laser power with *R-LAS-LR sensor* respectively UV luminous power with *LUMI sensor* that is reflected to the receiver from the respective object.

TOL setting:
With this edit-box a tolerance band can be applied around the currently specified reference value (setpoint value of the laser power respectively UV luminous power reflected from the object). If the set tolerance limit is exceeded, this leads to a change of switching state at pin 4 of the 4-pole M8 connector (digital output TOLOUT).

DT HI to LO:
In this function field a time constant DT for the speed of automatic threshold correction can be set. The current maximum value is cyclically checked by the µC software. The numerical value specified here determines the time interval between two maximum value scans. If the current maximum value decreases (HI to LO), the current monitoring threshold is automatically corrected with the set delay DT.

Value range: 0 .. 15
Value 0:   Minimum time delay, fastest correction.
Value 15: Maximum time delay, slowest correction.

(only active when MAX MODE = ON!)

DT LO to HI:
In this function field a time constant DT for the speed of automatic threshold correction can be set. The current maximum value is cyclically checked by the µC software. The numerical value specified here determines the time interval between two maximum value scans. If the current maximum value increases (LO to HI), the current monitoring threshold is automatically corrected with the set delay DT.

Value range: 0 .. 15
Value 0:   Minimum time delay, fastest correction.
Value 15: Maximum time delay, slowest correction.

(only active when MAX MODE = ON!)

THDMODE:
In this function field one of three possible positions of the monitoring thresholds with respect to the reference value can be selected.

LOW:
The monitoring threshold lies below the current reference value. If the current measured value falls below this threshold, the digital error output TOLOUT is activated.
HI:
The monitoring threshold lies above the current reference value. If the current measured value rises above this threshold, the digital error output TOLOUT is activated.
WIN:
The monitoring thresholds form a symmetric tolerance band around the current reference value. If the current measured value violates this tolerance band, the digital error output TOLOUT is activated.

HYSTERESIS 5

HYSTERESIS:
The hysteresis setting value applies an additional switching threshold around the currently set tolerance threshold. The switching hysteresis has an effect on the digital output TOLOUT. It increases the signal stability at the digital output of the *R-LAS-LR* or *LUMI* sensor.

The illustration below demonstrates the effect of HYSTERESIS presetting:
REF: 120
TOL: 40
HYSTERESIS: 15
THDMODE: LOW
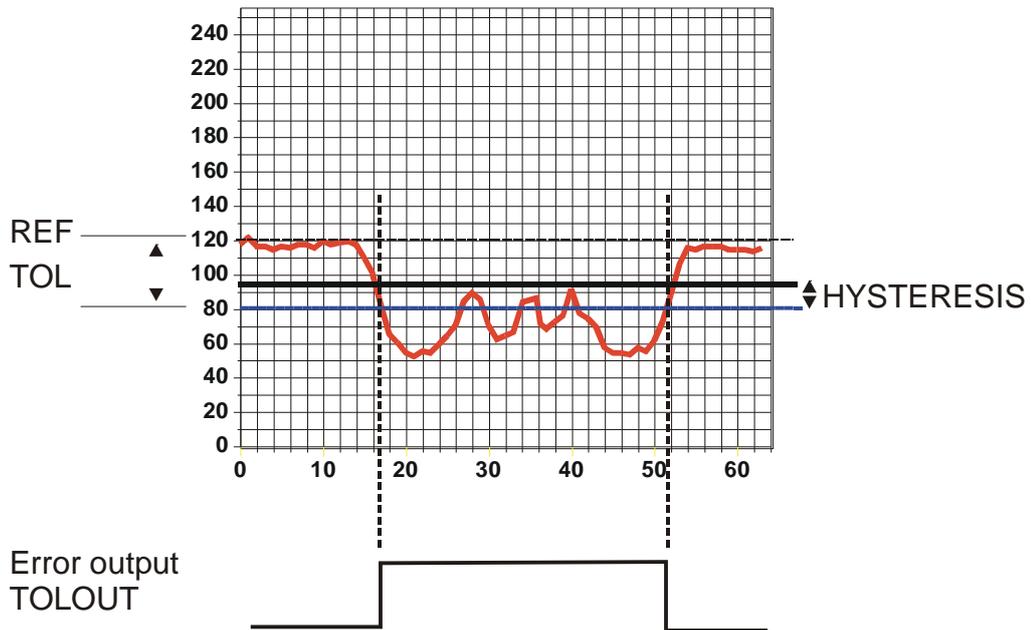
POLARITY LO

POLARITY:
Determines the polarity change of digital output TOLOUT in case of exceeding of a tolerance threshold. L0 = Low-active; HIGH = High-active.

AVERAGING -4-

AVERAGING:
Determines the number of measured values (raw data) over which the sensor signal arriving at the receiver is averaged (noise suppression).

MAXMODE ON ▼

MAXMODE:
With this function field automatic correction of the monitoring thresholds can be switched on and off.
ON:
Automatic threshold correction is active. The current maximum value is checked cyclically.
If the current maximum value decreases, e.g. due to increasing dirt accumulation, the set monitoring thresholds are automatically corrected accordingly.
OFF:
Automatic threshold correction is deactivated.

MEM
● RAM   SEND
● EE
● FILE   GET

MEM :
This group of function buttons is used for exchanging parameters between the PC and the *R-LAS-LR or LUMI* sensor through the serial RS232 interface.

SEND: When the SEND button is clicked, all the currently set parameters are transferred between PC and *R-LAS-LR or LUMI* sensor or are sent to an output file. The target of the respective parameter transfer is determined by the selected selection button (RAM, EE, or FILE).

GET: With a click on the GET button the current setting values can be interrogated from the *R-LAS-LR or LUMI* sensor. The source of data exchange is determined by the selected selection button (RAM, EE, or FILE).

RAM: The current parameters are written to the RAM memory of the *R-LAS-LR or LUMI sensor*, or they are read from the RAM, **i.e. these parameters are lost when the voltage at the *R-LAS-LR or LUMI* sensor is switched off.**

EE: The current parameters are written to the non-volatile EEPROM memory of the *R-LAS-LR or LUMI* sensor, or they are read from the EEPROM, **i.e. the parameters in the internal EEPROM are stored when the voltage at the *R-LAS-LR or LUMI sensor* is switched off.**

FILE: A click on this selection button opens an info field with the file name of the current parameter file.
           PLEASE NOTE: The current parameters are only stored in the current output file, or retrieved from the current output file, when the SEND or GET button is activated with a mouse click.
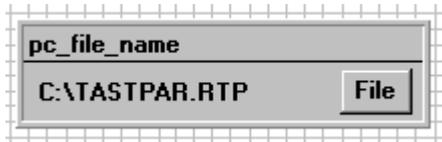
pc_file_name:
This info field displays the currently selected file name of the output file with the corresponding directory path. The current parameters are stored (SEND button) or retrieved (GET button) in or from the output file displayed here.

If another output file should be accessed, the file button must first be activated with the mouse pointer. Another dialog window will open then, where an existing output file can be selected, or where a file name for a new output file can be entered.
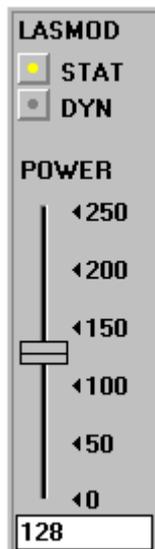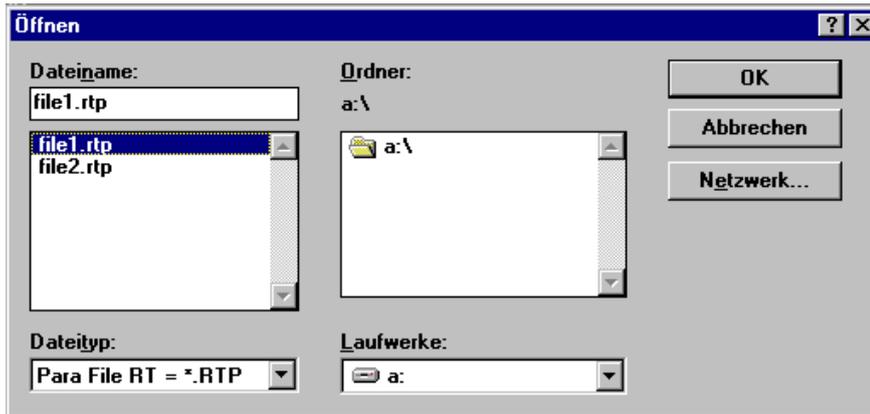
LASMOD setting:
In this function group the laser operating mode and the laser power at the *R-LAS-LR sensor* respectively the UV luminous power at the *LUMI sensor* can be adjusted.

STAT:
With this selection button the laser power at the *R-LAS-LR sensor* (respectively the UV luminous power at the *LUMI sensor)* is constantly kept at the value that is set at the slider.

DYN:
The laser power at the *R-LAS-LR sensor* (respectively the UV luminous power at the *LUMI sensor)* is automatically and dynamically adjusted by means of the amount of radiation reflected from the object. By way of dynamic adaptation of the laser power (respectively UV luminous power) the µC software tries to keep the current maximum value detected at the receiver in the range of 100 to 200 A/D values. In this operating mode the POWER slider has no effect.

POWER:
With this slider the laser power (respectively UV luminous power) is adjusted to a fixed value between 0 and 255 in STAT mode. Any change only becomes effective after the SEND button is pressed.

ATTENTION !	The value 0 means full intensity, and the value 255 stands for the lowest intensity !
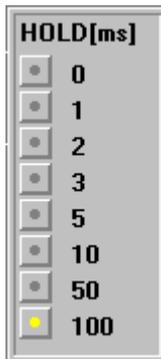
HOLD :
The *R-LAS-LR sensors* respectively the *LUMI sensors* operate with minimum scan times in the range of 100µs. For this reason most of the PLCs that are connected to the digital error output TOLOUT have difficulties with the safe detection of the resulting short changes of switching states. By activating the respective HOLD selection button a pulse lengthening at the digital output of the *R-LAS-LR* or *LUMI sensor* of up to 100 ms can be set.

NUMERICAL VALUE OUTPUT FIELDS:
RAW:
Display of the current measured value (raw data) from the receiver diode.
SMOOTH:
Display of the current average value over the last N measured values. The value N of the measured values to be averaged is specified in the AVERAGING function field.
AKTMAX:
Display of the current maximum value.
PWM:
Display of the current power in DYN mode. The laser power (UV luminous power) is adjusted by way of pulse width modulation PMW.
TEMP:
In this field a value (0 ... 255) is displayed that corresponds to the inside temperature of the sensor **(value does not mean °C!)**.

PLEASE NOTE:
These output fields are only updated in case of active data transfer (GO button) between PC and *R-LAS-LR or LUMI* sensor.
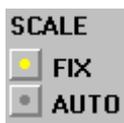
SCALE setting:
These selection buttons are used for setting the scaling type of the y-axis.

FIX:
Fixed y-axis scaling (value range 0 ... 255 - resulting from 8-bit A/D conversion)
AUTO:
Automatic adaptation of y-axis scaling to the current measured values (zoom function).

Inspect button:
This button fixes the current screen of the display window. A dialog box then opens and offers different possibilities for further processing of the display window under Windows. The individual function elements of the Inspect button are excellently suited for documentation purposes.

Print: Prints the current display window.

Copy Page: Copies the display window to the Windows clipboard, from where it can be inserted and further edited in various Windows programs (documentation in the word processor, graphics software, spreadsheet, ...).

Zoom: For zooming in or zooming out the display window.

The following chapters describe how the *LR-Scope V2.31* software can be used as an aid for setting the *R-LAS-LR* or *LUMI sensors* in practice.

The stable function of the RS232 interface (LINE OK status message after program start) is a basic prerequisite for measured value transfer from the PC to the *R-LAS-LR* or *LUMI sensor*.

After the LR-Scope V2.31 software is started, it displays the standard configuration COM1 and the respective communication status.

CONNECT COM1 ▼ | TRY SER LINE

The system provides the following status messages:

TRY SER LINE :   The PC tries to establish a connection with the *R-LAS-LR* or *LUMI sensor* through the respective selected interface, or the serial interface is activated.

LINE OK: The connection between PC and *R-LAS-LR* or *LUMI sensor* could be established successfully.

TIMEOUT: A connection between *R-LAS-LR* or *LUMI sensor* and PC could not be established, or the connection is faulty.
In this case it should first be checked whether the *R-LAS-LR* or *LUMI sensor* is supplied with voltage, and whether the RS232 interface cable is correctly connected.
If the interface assignment at the PC is not known, a selection can be made from COM1, COM2, COM3, and COM4 by clicking on the [↓] selection field in the CONNECT group.

NOT AVAIL: The selected interface is not available at the PC.

The following is based on the assumption that the connection between PC and *R-LAS-LR* or *LUMI sensor* could be successfully established (LINE OK status message after program start).

## 2.1 *LR-Scope V2.31* as an aid for sensor adjustment:

Prior to the use of the software aids (graphic display of the sensor signal) the *R-LAS-LR* or *LUMI sensor* must be manually adjusted to the respective target and/or background as accurately as possible.

Fine adjustment of the *R-LAS-LR* or *LUMI sensors* is facilitated by the graphic display of the analog signal (raw signal from the receiver diode). For this purpose measurement data transfer from the *R-LAS-LR* or *LUMI sensor* to the PC must first be activated by clicking on the GO button.

GO:
Activation of measurement data transfer through the serial interface.
The current raw data are shown in scroll mode in the graphic display window (the latest value comes from the right side).
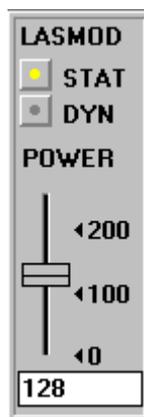
The raw signal (red) from the receiver diode of the *R-LAS-LR* or *LUMI sensor* should now appear in "scroll mode" in the graphic display window. If this is not true (signal at the upper limit = 255, or at the lower limit = 0), the laser power (UV luminous power) must first be set correctly.
For this purpose the laser mode is set to STAT (static) and the laser power (UV luminous power) is then adjusted with the POWER slider until the raw signal (red) approximately lies at the centre of the measuring range (0 .. 255   8-bit A/D converter) or around the set reference value REF.

Please note:
The change of the laser power (UV luminous power) is only updated at the *R-LAS-LR* or *LUMI sensor* after a click on the SEND button !.
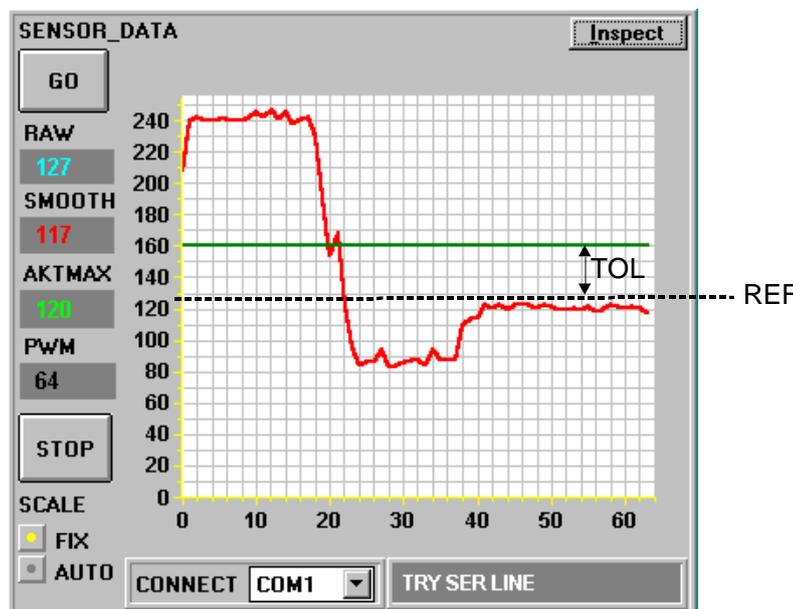
2.2 *LR-Scope V2.31* as an aid for threshold setting:

Threshold mode THDMODE HI:
In this mode the monitoring threshold lies above the current reference value. The distance of the TOL threshold from the reference value REF is determined by the TOL presetting value. In THDMODE HI the hysteresis range lies below the TOL threshold.
If automatic threshold correction is active (MAXMODE=ON), the time constants for threshold correction must be chosen appropriately:

DT LO to HI 12

A high value must be chosen for the DT LO to HI time constant (slow correction).
Slow threshold correction prevents the threshold from "moving along" in case of slow entry of the target into the laser beam (respectively UV spot).

DT HI to LO 4

A small value must be chosen for the DT HI to LOW time constant (fast correction). After passage of the target through the laser beam (respectively UV spot) the TOL threshold quickly is brought to the reference value again.
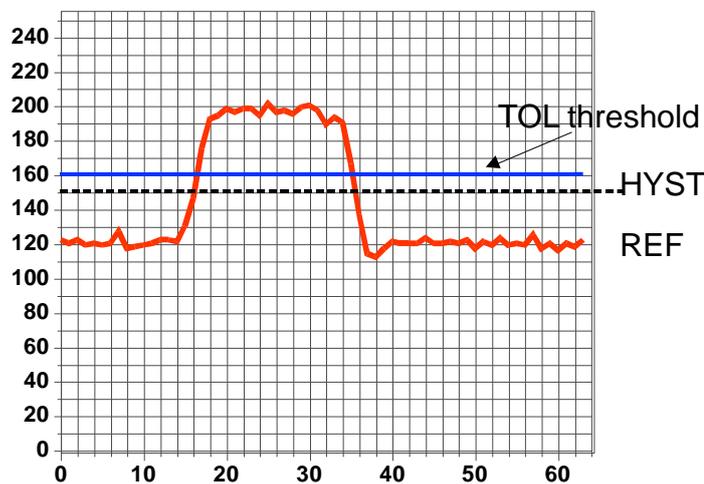
The laser power (respectively UV luminous power) is adjusted such that the radiation reflected from the background (e.g. conveyor belt) lies at the preset reference value, in this case e.g. REF=120. The increase of the signal intensity is caused by a more reflective target. The TOL value must be chosen such that the TOL threshold is exceeded in any case when the target passes.
The HYSTERESIS presetting value prevents switching of the digital output, if the measured value for a short time drops below the TOL threshold.

Threshold mode THDMODE LOW:
In this mode the monitoring threshold lies below the current reference value. The distance of the monitoring threshold from the reference value REF is determined by the TOL presetting value. In this mode the hysteresis range lies above the TOL threshold. If automatic threshold correction is active (MAXMODE=ON), the time constants for threshold correction must be chosen appropriately:

DT LO to HI 2

A small value must be chosen for the DT LO to HI time constant (fast correction). After passage of the target through the laser beam (respectively UV spot) the TOL threshold quickly is brought to the reference value again.

DT HI to LO 10

A high value must be chosen for the DT HI to LOW time constant (slow correction).
Slow threshold correction prevents the threshold from "moving along" in case of slow entry of the target into the laser beam (respectively UV spot).
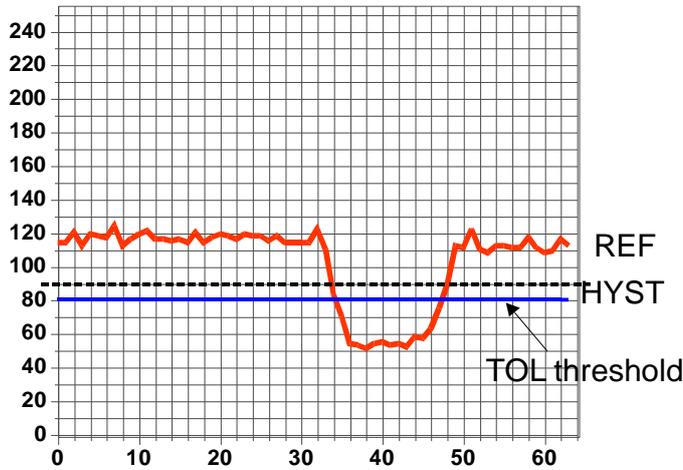
The laser power (respectively UV luminous power) is adjusted such that the radiation reflected from the background (e.g. conveyor belt) lies at the preset reference value at the receiver, in this case e.g. REF=120. In the illustration shown here the decrease of the signal intensity is caused by a low reflective target. The TOL value must be chosen such that the measured value in any case falls below the TOL threshold when the target passes.

The HYSTERESIS presetting value prevents switching of the digital output, if the measured value for a short time rises above the TOL threshold.

Threshold mode THDMODE WIN:

This mode operates with two monitoring thresholds that lie symmetrically around the current reference value REF. The distance of the monitoring thresholds from the reference value REF is determined by the TOL presetting value. In this mode the two hysteresis ranges lie within the tolerance band. If automatic threshold correction is active (MAXMODE=ON), the time constants for threshold correction must be chosen appropriately:


A high value must be chosen for the DT LO to HI time constant (slow correction).
Slow threshold correction prevents the upper threshold from "moving along" in case of slow entry of the target into the laser beam (respectively UV spot).

A high value must be chosen for the DT HI to LOW time constant (slow correction).
Slow threshold correction prevents the lower threshold from "moving along" in case of slow entry of the target into the laser beam (respectively UV spot).
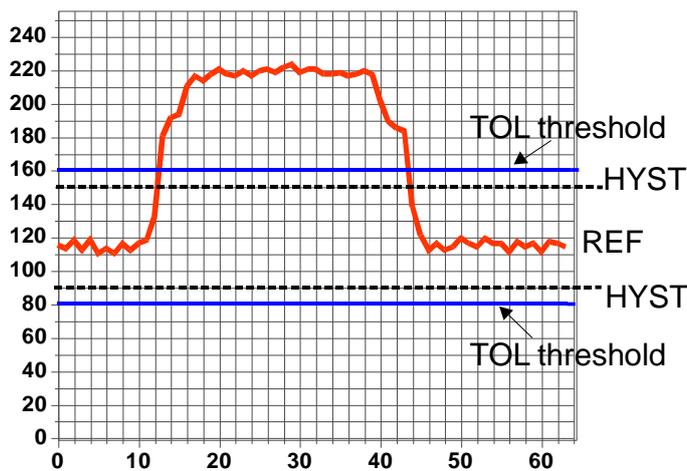
The laser power (respectively UV luminous power) is adjusted such that the radiation reflected from the background (e.g. conveyor belt) lies at the preset reference value at the receiver, in this case e.g. REF=120. In the illustration shown here the decrease of the signal intensity is caused by a more reflective target. The TOL value must be chosen such that the measured value in any case leaves the tolerance band when the target passes.

The HYSTERESIS presetting value prevents switching of the digital output, if the measured value for a short time "re-enters" the tolerance band.

When suitable parameters for the respective application have been found by observing the signal characteristics, the current parameters must be written to the non-volatile EEPROM memory of the *R-LAS-LR* or *LUMI sensor* by clicking on the SEND button.

Attention ! The selection button in the MEM field must be set to EE !!

When the parameters have been entered and the sensor has been adjusted with the help of the graphic representation provided by the *LR-Scope V2.31* software, the PC is no longer required for the actual measuring task. The PC can then be disconnected from the *R-LAS-LR* or *LUMI sensor* by removing the RS232 interface cable.

The *R-LAS-LR* or *LUMI sensor* then performs the measuring task in STAND-ALONE operation in accordance with the parameters stored in the EEPROM.

2.3   Application examples

R-LAS-LR-O for contrast detection: **LUMI-30 for contrast detection:**
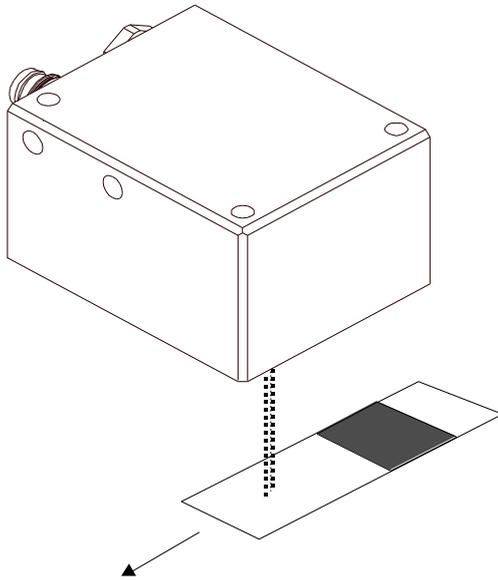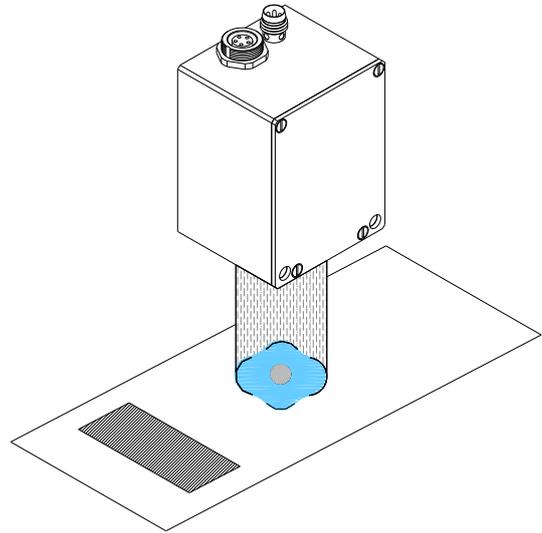
R-LAS-LR **as a digital light barrier:**
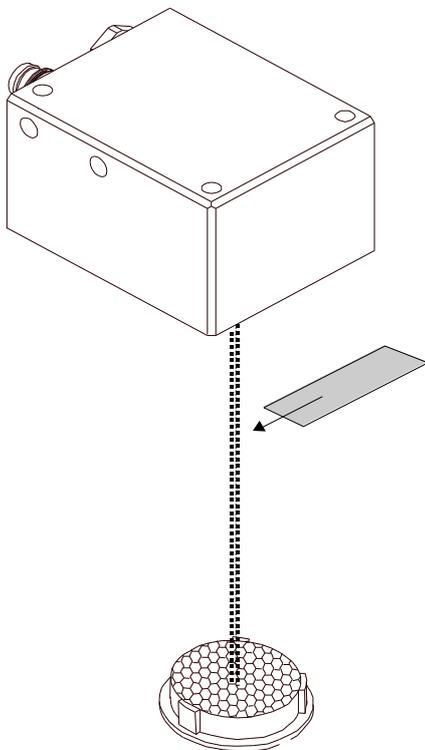
2.3 Technical Data

| Laser reflex light barriers R-LAS-LR-O or R-LAS-LR-R	
Min. detectable object	0.1 mm
Reproducibility	0.05 mm
Optical filter	**R-LAS-LR-R**: Red light filter RG630+interference filter+polarisation filter **R-LAS-LR-O**: Red light filter RG630+interference filter
Receiver	Differential diode
Pulsating-light operation	100 kHz
Ambient light	Up to 5000 Lux
Type of protection	IP 67
Current consumption	Typ. 110 mA
Interface	RS232, parameterisable under Windows®
Connector type	4-pole M8 connector (PLC), 5-pole female connector Binder 712 (PC)
EMC test acc. to	DIN EN 60947-5 CE
Housing	Aluminium, anodized in blue
Operating temperature range	-20°C to +55°C
Storage temperature range	-20°C to +85°C
Pulse lengthening	Parameterisable under Windows® 0 ms ... 100 ms
Max. switching current	200 mA, short-circuit-proof
Switching frequency	Typ. 6 kHz
Outputs	Parameterisable under Windows®
Bright / dark switching	Parameterisable under Windows®
Power supply	+12VDC ... +30VDC, reversed polarity protected, overload-protected
Switching state indication	Visualisation by means of an orange LED, integrated in M8 plug

LASER:
Solid-state laser, λ=670 nm, 1mW max. optical power, laser class 2 according to EN 60825-1 Therefore no additional protective measures are required for use of these laser transmitters.

Do not stare into the laser beam Laser class 2

Laser reflex light barrier R-LAS-LR-O-CL1 (class 1 laser product)

Min. detectable object	0.1 mm
Reproducibility	0.05 mm
Optical filter	**R-LAS-LR-O-CL1**: Red light filter RG630+interference filter
Receiver	Differential diode
Pulsating-light operation	100 kHz
Ambient light	Up to 5000 Lux
Type of protection	IP 67
Current consumption	Typ. 110 mA
Interface	RS232, parameterisable under Windows®
Connector type	4-pole M8 connector (PLC), 5-pole female connector Binder 712 (PC)
EMC test acc. to	DIN EN 60947-5 CE
Housing	Aluminium, anodized in blue
Operating temperature range	-20°C to +55°C
Storage temperature range	-20°C to +85°C
Pulse lengthening	Parameterisable under Windows® 0 ms ... 100 ms
Max. switching current	100 mA, short-circuit-proof
Switching frequency	Typ. 6 kHz (depends on averaging)
Outputs	Parameterisable under Windows®
Bright / dark switching	Parameterisable under Windows®
Power supply	+12VDC ... +30VDC, reversed polarity protected, overload-protected
Switching state indication	Visualisation by means of an orange LED, integrated in M8 plug

LASER:
Solid-state laser, λ=670 nm, 0.4mW max. optical power, laser class 1 according to EN 60825-1 Under reasonably foreseeable conditions a class 1 laser is safe. The reasonably foreseeable conditions are kept during specified normal operation. The use of these laser transmitters therefore requires no additional protective measures..

CLASS 1 Laser Product
IEC 60825-1: 2008-05
THIS LASER PRODUCT COMPLIES
WITH 21 CFR 1040 AS APPLICABLE

Luminescence sensors LUMI-…	
Light source	**LUMI-30**: 4x UV-LEDs, AC-operation, $\lambda < 400$ nm **LUMI-20/90**: 28 UV-LEDs, AC-operation, $\lambda < 400$ nm ($\lambda > 400$ nm lopped by means of a black light filter)
Spot size	LUMI-30: In a distance of 30 mm: typ. Ø 15 mm LUMI-20/90: In a distance of 20 mm<. typ. 80 mm x 10 mm
Optical filter	Transmitter: Black light filter Receiver: Blue filter (B), Yellow filter (Y), or Red filter (R)
Power supply	+12VDC ... +30VDC, protected against polarity reversal, overload-protected
Pulsating-light operation	100 kHz
Ambient light	Up to 5000 Lux
Type of protection	IP 67 (optics), IP54 (electronics)
Current consumption	Typ. 110 mA
Interface	RS232, parameterisable under Windows®
Connector type	**LUMI 30**: 4-pole M8 connector (PLC), 5-pole female connector Binder 712 (PC) **LUMI-20/90**: 4-pole M12 connector (PLC), 5-pole female connector Binder 712 (PC)
EMC test acc. to	DIN EN 60947-5 CE
Housing	Aluminium, anodized in blue
Operating temperature range	-20°C to +55°C
Storage temperature range	-20°C to +85°C
Pulse lengthening	Parameterisable under Windows® 0 ms ... 100 ms
Max. switching current	100 mA, short-circuit-proof
Switching frequency	Typ. 1 kHz
Output DIGITAL (1x)	Qinv or Q, parameterisable under Windows®: npn n.c./pnp n.o. (Qinv); pnp n.c./npn n.o. (Q)
Output ANALOG (1x)	0V ... +10V
Beam divergency	Typ. 5°
Sensitivity	Parameterisable under Windows® (threshold/tolerance window)
Operating range	**LUMI-30**: typ. 20 mm … 80 mm **LUMI-20/90**: typ. 10 mm … 40 mm
Power supply	+12VDC ... +30VDC, reversed polarity protected, overload-protected
Switching state indication	Visualisation by means of an orange LED integrated in the M8 plug
UV luminous power	Parameterisable under Windows® respectively in addition with a potentiometer with type LUMI-…-P
Averaging	Up to 32 000 values (parameterisable under Windows®)

2.4 Connector Assignment

R-LAS-LR sensors:

4-pin M8 connector *R-LAS-LR / PLC* Connecting cable: cab-M8/4-g-…		
Pin No.:	Color	Assignment:
1	br	+U_b (+12VDC ... +30VDC)
2	wh	ANALOG OUT (0VDC ... +10VDC)
3	bl	0V (GND)
4	bk	TOLOUT
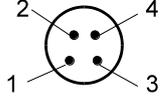
5-pin fem. connector Binder 712 *R-LAS-LR / PC* Connecting cable: cab-las5/PC		
Pin No.:		Assignment:
1		0V (GND)
2		TxD
3		RxD
4		Not connected
5		Not connected

LUMI sensors:

4-pin M8 (M12) connector *LUMI / PLC* Connecting cables: LUMI-30: cab-M8/4-g-… LUMI-20/90: cab-M12/4-g-… LUMI-35/95-2x: cab-M12/4-g-…		
Pin No.:	Color:	Assignment:
1	brown	+U_b (+12VDC ... +30VDC)
2	white	ANALOG OUT (0 ... +10V)
3	blue	0V (GND)
4	black	OUTPUT (0V)
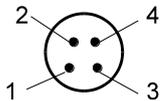
5-pin fem. connector Binder 712 *LUMI / PC* Connecting cable: cab-las5/PC		
Pin No :		Assignment:
1		0V (GND)
2		TxD
3		RxD
4		Not connected
5		Not connected

LR-Scope V2.31	RS232 communication protocoll / R-LAS-LR-Series and LUMI Series

serial data transfer
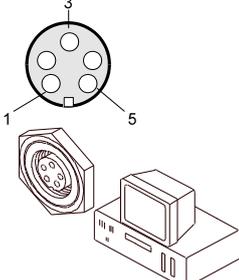
The personal computer (PC) can be replaced by any system (e.g. PLC unit), which executes a special serial communication protocoll.

It is possible to connect a PLC to the serial interface of the sensor by using the 5-pole connection at the housing of the sensor:

Pin 1 GND
Pin 2 TxD
Pin 3 RxD
Pin 4 not connected
Pin 5 not connected

Standard RS232 serial interface without hardware-handshake:

3-wire: GND, TxD, RxD

4800 baud, 8 data bits, no parity bit, 1 stop bit in binary mode

The control device (PC or PLC) has to send a data frame of 14 bytes to the R-LAS-LR or LUMI hardware.

All bytes must be transmitted in binary format. The meaning of the parameters is described in the software manual LR-Scope V2.31.

Method:

The R-LAS-LR or LUMI hardware is permanently reading (polling) the incoming byte at the RS232 connection.

If the incoming byte = 0x55 (**synch-byte**), then the 2.byte (**order-byte**) is read in, after this, 12 bytes (parameters) are read in. After reading in the completely data frame, the R-LAS-LR or LUMI hardware executes the order which is coded at the 2. byte (**order-byte**).

R-LAS-LR or LUMI	format of the RS232 data frame:

Byte No.	Meaning	Comment
1	synch-byte = 0x55	hex-code, binary 01010101
2	**order-number**	order byte,
3	parameter TOL	tolerance band width (0 .. 127)
4	parameter POLARITY	polarity of digital output (0,1)
5	parameter HOLD [ms]	hold time 0,1,2,3,5,10,50, or 100 ms coded to (0,1,2,3,4,5,6,7)
6	parameter LASMOD	operating mode of the laser power control STAT or DYN (0,1)
7	parameter POWER	laser power: 0 ... 255 – attention inverse opreration!!
8	parameter HYSTERESIS	hysteresis band (0 .. 50)
9	parameter AVERAGEING	signal averaging (1,2,4,8,16,32,64,128,256,512,1024,2048,4096, 8192,16384,32768) coded to (0,1,2,3,…,15)
10	parameter MAXMODE	automatic threshold correction ON/OFF (1,0)
11	parameter REF	reference value (0 ... 250)
12	parameter THDMODE	positon of tolerance threshold (LOW,HI or WIN) coded to (0,1,2)
13	parameter DT HI to LO	time constant for auto threshold correction DOWN (0 .. 15)
14	parameter DT LO to HI	time constant for auto threshold correction UP (0 .. 15)

R-LAS-LR or LUMI	order number:

No.	Order	Comment
0	nop	no operation
1	save parameter from PC into RAM	volatile - normal operation
2	save parameter from PC into RAM + EEPROM	nonvolatile
3	send parameter from RAM to PC	12 byte binary to PC
4	send parameter from EEPROM to RAM + to PC	12 byte binary to PC
5	send raw data from RAM to PC (RAW,SMOOTH,AKTMAX,PWM1)	4 byte binary to PC
6	nop	no operation
7	send line ok = 0xAA to PC	1 byte binary to PC