

Short Description

SRL 1

Short Range Lidar Sensor

Technical Data

Version 1.01 en

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1. Overview

1.1 Important information



This short description must be read thoroughly before the device is connected up or put into operation. Dangerous situations may arise otherwise.

This short description is a standard description of most important technical data of the Short Range Lidar Sensor manufactured by A.D.C. GmbH, referred to hereafter as the SRL 1. Although plant and customer-specific deviations are possible, this documentation does not go into any further details.

All rights reserved by A.D.C. GmbH. No part of this short description may be reproduced and / or processed, copied or distributed using electronic systems, in any form whatsoever, without the express written permission of A.D.C. GmbH.

All due care was taken when preparing this short description. A.D.C. GmbH shall assume no liability whatsoever for any mistakes or omissions.

A.D.C. GmbH shall assume no liability for injury to persons or damage to property caused by failure to comply with this short description or through improper usage of the device. All warranty claims shall also become void.



Arbitrary reconstruction and/or modification of the device is not permitted for warranty, safety and CE approval-related reasons. In such cases, dangerous situations could arise and all guarantee claims shall become void.

In this description solely it is a matter to devices of generation 1 (G1).

We reserve the right to make technical modifications or to amend the delivery specifications.

Please contact your supplier if it should become necessary to check the technical functions or to repair the device.

Please retain the original packaging in order to protect the SRL 1 against transport damage.

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This document describes, in accordance with latest development status, the Short Range Lidar Sensor SRL 1 manufactured by A.D.C. GmbH. The document does not claim to cover all the possible applications or deployment areas for these devices. It is amended, corrected and enhanced as approved editions in keeping with development progress. Ensuing new versions are assigned an incremental index number (as underlined in the example below):

Example: ADC 1780_11_00 (00 = index number)

The contents of the latest released version are binding and make all preceding versions obsolete.

1.2 Device data

The SRL 1 is a infrared laser sensor that has been specially designed from A.D.C. GmbH for deployment in automotive applications. Its purpose is the contact-free measurement of distance and speed by using 3 independent measuring laser beams over short distances. The SRL 1 is typically mounted behind a wind screen of a car or of a housing.

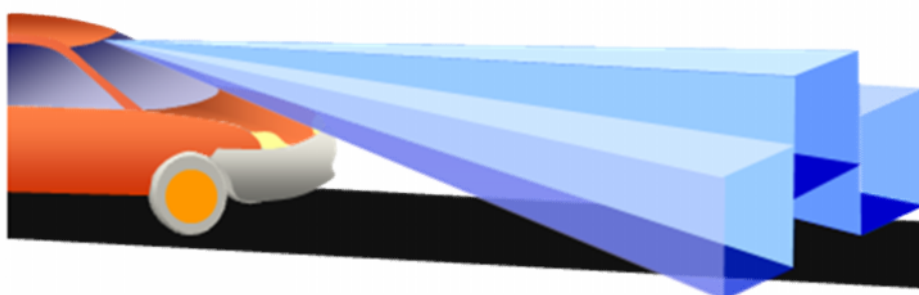


Figure 1: SRL 1 behind a wind screen of a car with 3 independent measuring laser beams

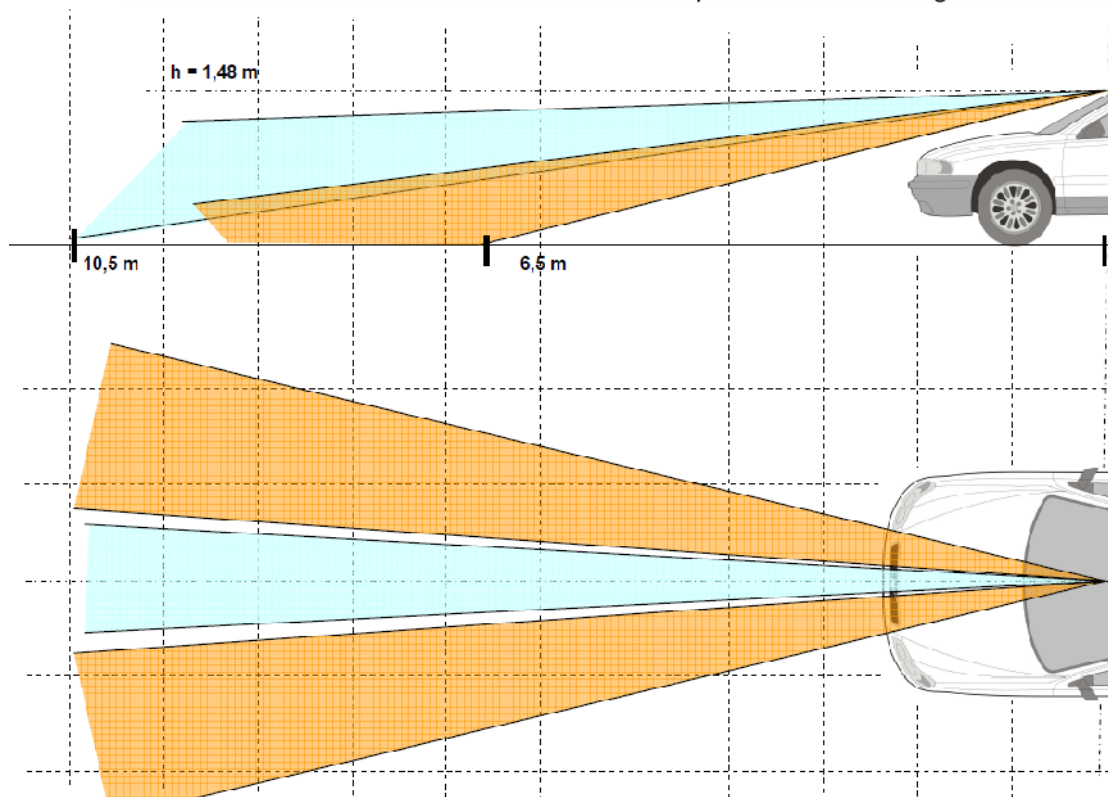


Figure 2: SRL 1 behind a wind screen of a car with possible distances of the laser beams

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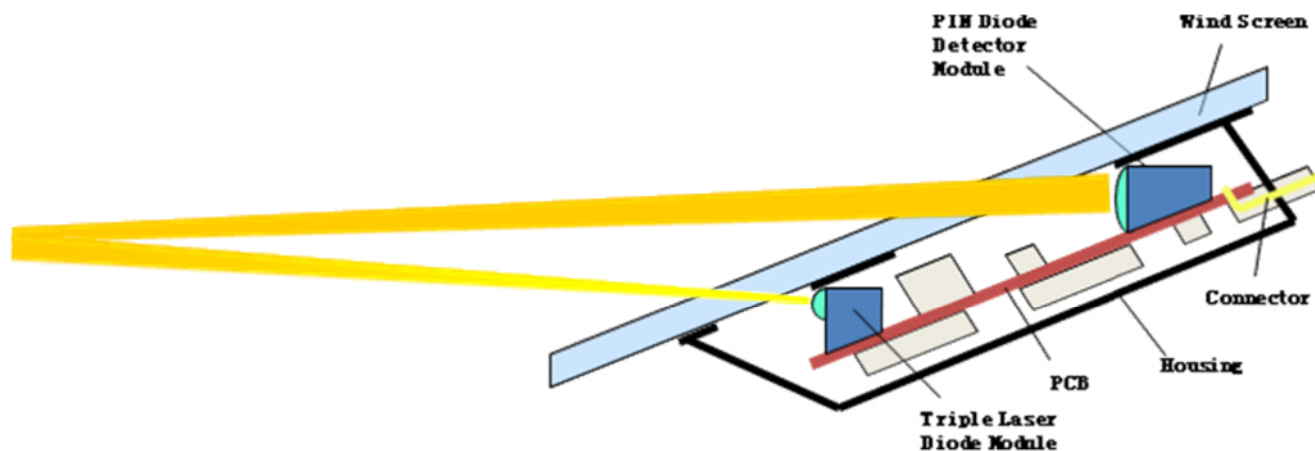


Figure 3: SRL 1 mounted behind a wind screen with laser beam exposure

Device data:

All necessary device data are described in the SRL 1 data sheet, which can be downloaded from www.continental-automotive.com/industrial-sensors.

1.3 Product identification

Exact specifications for the product are given on the type plate on the rear of the device:

Version (name to order)	Remarks	Device type and article no.:
SRL 1 VPE*	Sensor SRL 1 in packaging unit with cable, technical documentation, transport case	SRL 1 VPE.-no.: 10.005.186-00
SRL 1 complete (industrial)	Sensor SRL 1 standard version 1 – 10 m	SRL 1 Article.-no.: 10.005.185-00
Cable SRL 1, 5 m, Power Supply and CAN bus	5 m cable with connector for SRL 1 (Type Private CAN)	5 m cable Article no.:10.005.183-00
Connector SRL 1 (Power Supply and CAN bus)	7 pin connector for SRL 1 (Power Supply and CAN bus) JAE – Japan Aviation Electronics Industry (Type IL-AG5-7S-S3C1) color green	Connector Article no.:10.005.184-00

*VPE = Packaging Unit

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2. Device Settings

2.1 Connection

In order to check the SRL 1 or put it into operation, the SRL 1 must be connected to a power supply. The SRL 1 must also be connected to a PC or notebook via CAN bus and a separate and suitable interface converter CAN/USB – by example PCAN from company Peak-Systems.

2.2 Configuration

Having connected the SRL 1, the device needs to be configured by taking the following data protocol:

CAN-ID Description V.03					
CAN-ID (hexa-decimal)	DLC (Bytes)	Message Name	Content	Bit Arrangement	Description
001	8 (Rx=Output Message)	Extended Message	<ol style="list-style-type: none"> 1. Temperature 2. Monitor Diode 3. Voltage 4. Impact Speed 5. Impact Speed Status 6. Impact Type 7. Gain 1 8. Gain 2 9. Gain 3 <p>Empty</p>	0 - 7 8 - 15 16 - 23 24 - 31 32 - 33 36 - 39 40 - 47 48 - 55 56 - 63 34 - 35	-Sensor Temperature -Sensor Monitor -Operating Voltage -Crash Impact Speed -Confidence Level (Very High, High, Low, No Confidence) -No Crash, Full front, Angled Left/Right, Center Pole, Full Front with Intrusion -Gain values per channel (high value used when no targets in F.o.V.)
002 – 00D	8 each (Rx=Output Message)	Amplitude Value (AD Values)	16 Values per Channel (3 channels) - Each AD value is 2 bytes long - Hence 32 bytes per channel for 16 AD values - 96 bytes in total for the 16 amplitudes from 3 channels	Value 1 0 - 15 Value 2 16 - 31 Value 3 32 - 47 Value 4 48 - 63	Contains amplitudes of signals received from each channel (16 samples per channel obtained from AD converter)
00E	8 (Rx=Output Message)	Distance Offsets	<ol style="list-style-type: none"> 1. Distance offset Channel 1 2. Distance offset Channel 2 3. Distance offset Channel 3 <p>Status info messages:</p> <ol style="list-style-type: none"> 4. Close object 5. Hardware error 6. Reduced Performance 7. Burst type 8. Sensor blocked 9. Ice qualified 10. Reserved <p>Empty</p>	0 - 15 16 - 31 32 - 46 48 49 50 51 - 52 53 54 56 - 63 55	Distance offset values: Used for the computation of Distance and Velocity by algorithm. Status info messages: -Close object: 0.5 m – 1 m -Hardware error if value = 1 -Reduced performance: <0.5 m and reception in any 2 channels only -Burst type: Number of pulses (temperat. depend.) -Sensor blocked: Detects blockage of sensor with very nearby objects -Presence of Ice detected
CAN-ID	DLC	Message	Content	Bit	Description

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(hexa-decimal)	(Bytes)	Name		Arrange-ment	
00F	8 (Rx=Output Message)	Algo Result Distance	<ol style="list-style-type: none"> 1. Distance from Channel 1 2. Distance from Channel 2 3. Distance from Channel 3 4. Amplitude of Channel 1 5. Amplitude of Channel 2 	0 - 15 16 - 31 32 - 47 48 - 55 56 - 63	-Distances are computed using a special algorithm for each channel -Amplitudes are calculated from Gain values and Peaks in AD values (used in Algorithms)
010	8 (Rx=Output Message)	Algo Result Speed	<ol style="list-style-type: none"> 1. Speed from Channel 1 2. Speed from Channel 2 3. Speed from Channel 3 4. Amplitude of Channel 3 5. Ice Qualification 	0 - 15 16 - 31 32 - 47 48 - 55 56 - 63	-Speeds are computed by taking the slope of the distance values -Ice detection flag set to 0 or 1
12C	8 (Tx=Input Message)	Request Message	<ol style="list-style-type: none"> 1. RAM adress 	0 - 15	-Opens communication port

3. Installation

3.1 Mounting

3.1.1 Place of installation

The sensors have to be mounted in a way that they have directly contact to a wind screen to protect the sensor by using a higher protecting rate of an additional housing.

3.2 Connecting the device

3.2.1 Cable connection and fuse protection

The connecting cable for the SRL 1 can be ordered separately with cable plug connector (without CAN termination) in a standard cable length of 5 m. It is also possible to order only a connector with pins and sealing. The cable has a pre-assembled cable plug connector (female) for plugging into the device, with a 9 pin SUB-D connector (female) for CAN and two pin plugs (banana plugs) for Power Supply at the other end.



The device is to be protected externally without fail at the mains power supply using a cut-out fuse.

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3.2.2 CAN bus

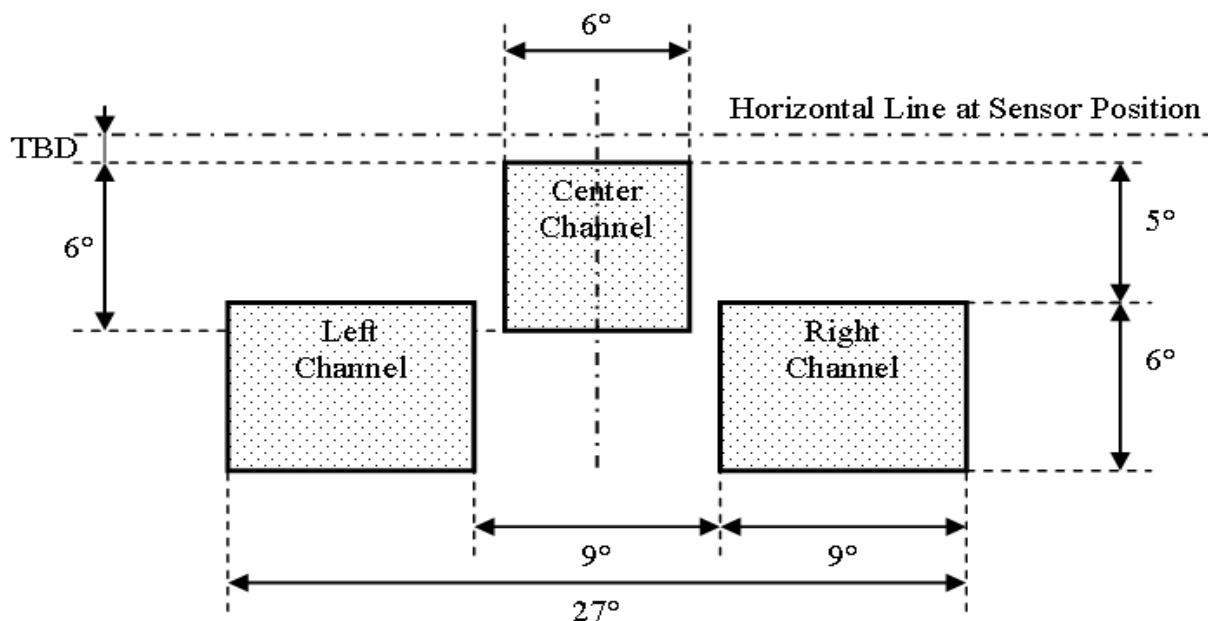
The CAN interface allows the communication between a Notebook or PC and the device via separately converter CAN to USB. The CAN bus must have a terminal resistance of respectively 120 between CAN H and CAN L at the first and last subscriber to avoid reflections. Further details about the CAN interface can be found in Chapter 6 “Interfaces”.

4. Technical Data

Please see the separately data sheet of SRL 1, which will be available on demand or by download on website www.continental-automotive.com/industrial-sensors .

4.1 Field of View (FoV) - Beam pattern

The 3 independent measuring beams from the SRL 1 does not run exactly parallel over a certain measuring distance, but spreads in three areas (beam spots). The so-called flare angle or Field of View (FoV) of the complete measuring beams is 27° horizontal and 11° vertical.



Energy sharing out

Basis: Central IR Laser diode	100 %
Center Channel	60 %
Left Channel	20 %
Right Channel	20 %

Figure 4: FoV Field of View of SRL 1 with energy sharing out

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4.2 Lens function and construction

**Lense for Left & Right Channel
Laser Pulse Receiver**

**Lense for Centre Channel
Laser Pulse Receiver**



Lense for Laser Pulse Emitter

Figure 5: Lense function and construction of SRL 1

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5. Connections

5.1 Connection configuration

Only plug connectors enabled and offered from A.D.C. GmbH are used for the SRL 1. The pin configuration and the pin assignment in the connecting cable are described below.



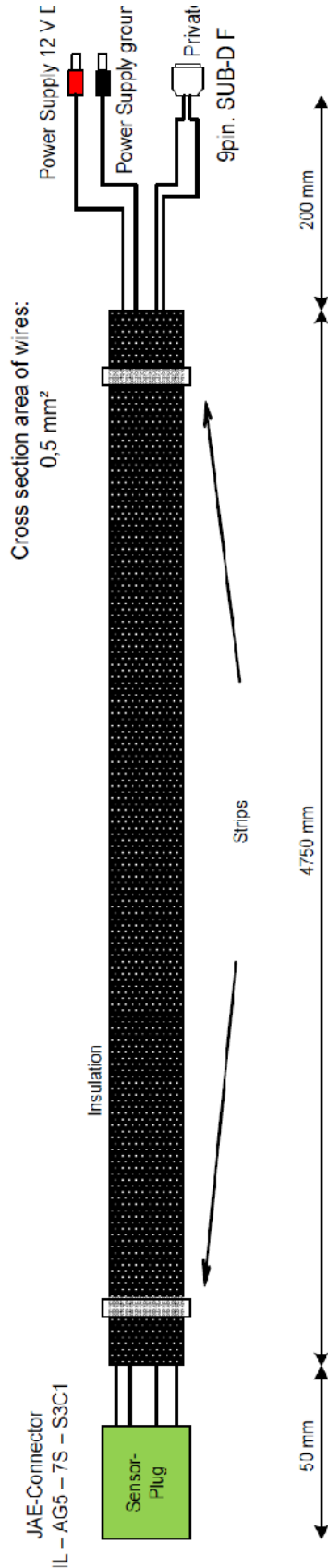
Figure 6: Frontal view with the built-in plug of the CAN and Power Supply in the device

Pin Function: SRL 1	
1	CAN_L Private_CAN
2	CAN_H Private_CAN
3	Not available for non-automotive
4	Not available for non-automotive
5	Power Supply - 12 V DC
6	----
7	Ground

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5.2 Cable configuration

Sensorcable SRL 1



Sensor Plug	Colour	Label	Description of Signal
Pin 01:	Brown	Private CAN	9pin. SUB-D F Pin 2 CAN Bus Low
Pin 02:	White	Private CAN	9pin. SUB-D F Pin 7 CAN Bus High
Pin 03:			n.c.
Pin 04:			n.c.
Pin 05:	Red	PS 12 V DC	Banana Connector 4 mm red
Pin 06:			n.c.
Pin 07:	Black	Ground	Banana Connector 4 mm black

Attention: CAN wires are twisted

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6. Interfaces

6.1 CAN interface

The CAN interface uses a special protocol as mentioned before, and is designed for communication directly via CAN or with converter e.g. from CAN to USB.

Generally shielded wiring with twisted pair (TP) conductors should be used to connect the SRL 1.

General information about the CAN interface:

OSI is an open layer model and serves as the basis for manufacturer-neutral network protocols. The model has 7 layers, whereby 7 is the highest layer. Layer 1 is the bit transfer layer and physical level in which, for example, mechanical plug connectors, electrical level, pulse form, wavelength, cable, glass-fiber and radio are defined. Layer 2 is the packet level, which governs how data packets are to be forwarded to the next nodes (subscribers) and defines the security status of the connection. A maximum of 255 nodes can be connected to a CAN interface. The identifier (ID number) defines the priority of a message. Each subscriber (station) can determine whether a message is relevant or not using this ID. It can then be processed by the subscriber or ignored accordingly. When a message is sent, all the other subscribers in the CAN bus system (network) become recipients.

Line length	Max. transfer rate	Specific line resistance	Cable cross section
0 – 40 m	1 Mbit/s	70 m /m	0.25 – 0.34 mm ²
40 – 300 m	200 Kbit/s	< 60 m /m	0.34 – 0.60 mm ²
300 – 600 m	100 Kbit/s	< 40 m /m	0.50 – 0.75 mm ²
600 – 1000 m	50 Kbit/s	< 26 m /m	0.75 – 0.80 mm ²

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7. Notes on Safety and Risks

This chapter is intended to enable owners and operators of the SRL 1 to recognize all usage-related risks in good time, i.e. in advance wherever possible.

The SRL 1 was developed for use in automobiles. Users must be in possession of basic technical knowledge, and it is assumed that this is the case. The device should only be used by trained operators.

The person or owner responsible for the device must ensure that all operators understand and observe these safety notes.

If the SRL 1 is part of a system, the system manufacturer is responsible for ensuring that the safety-related aspects are heeded, e.g. the operating manual, labeling and instructions.

7.1 Eye safety – laser classification

The SRL 1 includes a laser systems, whose beams exit the device from the front (front wind screen or similar). These is an invisible IR laser beam of the measuring system..

Measuring laser:

The measuring laser uses a pulsed beam and is classed as a **Class 1M laser product**. The Class 1M laser is eye-safety and a person could have the possibility to be injured directly his eyesight into the laser beam in close range without negative health effects.



*The following guidelines must be strictly observed when handling the SRL 1 as **Class 1M laser product**:*

- Do not stare into the invisible laser beam of the measuring channel.
- In particular, you must never look directly into the invisible laser beam using optical instruments (magnifying glass, binoculars, telescope, etc.).
- Never point the laser beam at people for a long period of time.
- Make sure that the laser beam is mounted above or below a person's line of sight. Particular attention is to be paid to this point when mounting the device permanently in installations, machines, etc.
- Do not open the casing. You could be exposed to a beam intensity which exceeds the Class 1M laser classification.

Frontal view

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The measuring laser is a **Class 1M laser product** in compliance with:

1. IEC 60825-1 1993+A2:2001 "Safety of Laser Equipment"
2. EN 60825-1 1993+A2:2001 "Safety of Laser Equipment"

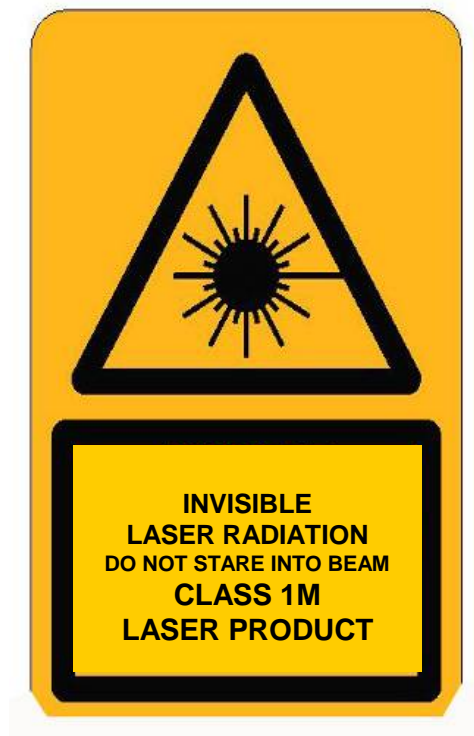


Figure 8: Information sign for Class 1M laser products

7.2 Areas of responsibility

Scope of responsibility of the manufacturer regarding the original device or equipment:

A.D.C. Automotive Distance Control Systems GmbH
Industrial Sensors
A Company of the Continental Corporation
Peter-Dornier-Straße 10
D-88131 Lindau
Germany

A.D.C. GmbH is responsible for supplying the device, including the short description and the original accessories, in a technically safe and sound condition.

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Scope of responsibility of the manufacturer of third-party accessories:

Manufacturers of third-party accessories are responsible for the development, implementation and communication of safety concepts for their products, and their effects in conjunction with the SRL 1 device from A.D.C. GmbH.

Scope of responsibility of the owner:



The owner is responsible for ensuring that the device (and equipment) are used for their intended purpose, for the actions of his employees, for giving instruction to the employees, and for the operational safety of the equipment.

The owner is subject to the following obligations:

- He must understand the safety information on the device and the instructions given in the operating manual.
- He must be familiar with the locally applicable accident prevention regulations.
- He is to notify A.D.C. GmbH, or one of its authorized dealers, as soon as a device or the equipment displays any safety defects.

7.3 Operating risks



Lacking or incomplete training can lead to incorrect operation or improper usage. This may result in accidents involving serious injury, or damage to property, assets or the environment.

Measures:

All operators are to observe the manufacturer's safety instructions and any instructions given by the owner.



Beware of falsified measurements when using a defective device after it has been dropped or subjected to any other prohibited stress or changes, which becomes an overstepping to the specified terms in this manual, e.g. after a lightning strike.

Measures:

Take control the correct measuring periodically, in particular following excessive usage of the device, as well as prior to and following important measuring jobs. May be it is necessary to replace the complete device. Also make sure that the optics or wind screens are kept clean and pay attention to any possible mechanical damage.



No labeling or warning notices on the SRL 1 are to be concealed when installing the device. This can lead to dangerous situations.

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Measures:

Make sure that all labels and signs are readily visible at all times. Additional information can or must be attached as required to ensure safe operation at all times.



When using the devices to measure the distance to, or positioning of, mobile objects such as vehicles, cranes, platforms, wagons, machines, etc., falsified measurements may occur as the result of unforeseen events (interruption of the laser beam).

Measures:

Your system must be designed and operated so that in the event of a falsified measurement, device malfunction or a power failure, suitable safety fittings or equipment, e.g. a redundant design, safety switches, etc., ensure that no damage can occur.



When deploying multiple sensors, ensure that there is no mutual interference between them and the SRL 1.

Measures:

1. Your system must be so designed, installed and operated so as to avoid any direct reception of signals from opposite-facing sensors.
2. Adjacently installed (i.e. parallel receiving) SRL 1 units must be situated an adequate distance apart so that they cannot be affected by data being transmitted from other sensors.



When installing the devices, it must be ensured that the optics or wind screens of the SRL 1 is not directly facing sunlight, spot lights or any other powerful light sources. Falsified measurements may be the result.

Measures:

Check in all directions and the immediate vicinity of the deployment site of the device, and if necessary mount a sunlight or extraneous light shield on the device.



When welding activities close to the place of installation of the device SRL 1 the device could be to damaged or destroyed.

Measures:

The lines of the device have to be separated during the welding activities.



Corresponding to WEEE guideline about Electric and Electronic Old-Devices the old devices have to be professional disposed respectively recycled by the manufacturer or importer after ending the durability. Make sure, that these old devices in no case have to be loaded to the generic domestic waste – signed by the symbol (icon) in figure 9.

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Measures:

Free of charge waste disposal of old devices after ending of the durability by the manufacturer or importer.



Figure 9: Icon for sign according to WEEE – prohibition for old devices into the domestic waste

The registration code of the A.D.C. GmbH: **WEEE-Reg.-No. DE 92447412**



Always make sure that the device or equipment is not operated, serviced or used by personnel who have not been properly trained to do so.

7.4 Electromagnetic compatibility

We regard electromagnetic capability to be the facility of the SRL 1 to function correctly in an environment with electromagnetic radiation and electrostatic discharges without causing electromagnetic interference in other devices.



Other devices may be disturbed by electromagnetic radiation. Although the SRL 1 fulfils the stringent requirements of the applicable guidelines and standards, A.D.C. GmbH cannot fully exclude the likelihood of interference from any other devices.

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7.5 Maintenance and care

The SRL 1 is practically maintenance-free. The optics or glass surfaces in a possible wind screen, should be cleaned depending upon the prevalent environmental factors. Only use a damp, lint-free cloth to clean the optics or glass surfaces. Under no circumstances should corrosive or aggressively reacting cleaning agents be used.



When cleaning the optics or wind screens of the SRL 1, it is absolutely imperative to avoid any scratches or indentations. You should treat the optics or wind screens with exactly the same care and attention as you would pay to spectacles, cameras and binoculars.

When working with safety and components of anti-collision applications, you should proceed in accordance with the valid BGV D6 crane regulations (previously the UVV-VBG 9 crane) by conducting a daily check to ensure that all components and devices of the A.D.C. GmbH and other components of the system integrator of the anti-collision protective system are installed, adjusted and functioning correctly before putting the plant into operation, e.g. during the course of checking the track end thresholds. The functions can be checked by taking test measurements at a defined distance.



A daily check should be performed to ensure that the SRL 1 and system are functioning correctly before putting the plant into operation.

7.6 Service

A.D.C. GmbH must be contacted prior to manipulating the SRL 1 for deployment in a special application or for any other reasons.

You can contact your supplier or the Technical Support team at A.D.C. GmbH regarding the necessity for technical support when putting the device into operation, in the event of operating problems, errors or defects, or regarding any other maintenance-related issues affecting the device or equipment.

7.7 Approval

Safety certification in compliance with DIN EN 61508 (EN 954) Category 1, 2, 3 or 4 is always to be viewed by the owner or plant constructor in conjunction with all the relevant plant components, such as A.D.C. laser distance sensors, control units, drive and breaking systems, power supplies or tachometer generators, etc., and is to be fulfilled in its entirety. Any required redundancies are to be taken into account accordingly.

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7.8 Additional information

Please contact your supplier if you are not sure how to correctly install or set up the SRL 1 during assembly with regard to aspects that are covered inadequately, or not all, in this operating manual.

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