

# SPECTRO-1 Series

## ► SPECTRO-1-CONLAS

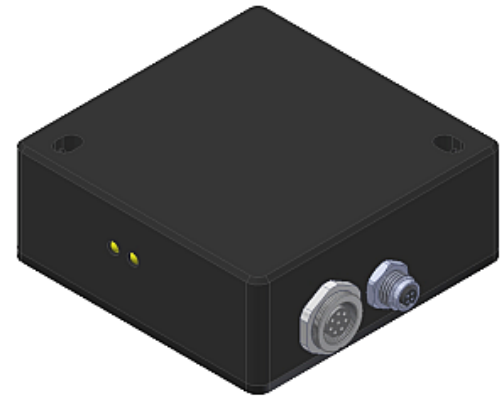
- Electronic control unit for control of a laser light barrier of A-LAS-N-...-C Series or FK-...-LAS-IR Series
- High scan frequency (up to 175 kHz in LED mode DC or OFF)
- Gray scale detection (12-bit resolution)
- Insensitive to outside light (in LED mode AC)
- Brightness correction can be activated (STAT/DYN)
- Averaging can be activated (from 1 up to over 32000 values)
- TEACH via PC or PLC
- 2 digital inputs (0V/+Ub)
- 2 digital outputs (max. 60 kHz switching frequency)
- 1 analog output (0V...+10V or 4...20mA), selectable via software
- Switching state indication by means of 2 yellow LEDs
- RS232 interface (USB or ETHERNET converter available)
- Parameterizable via Windows® software, scope function
- Temperature compensated (from 0°C to 60°C)
- Automatic threshold correction can be activated
- Switching threshold can be parameterized relative or absolute
- Various switching threshold functions (window, upper/lower threshold)

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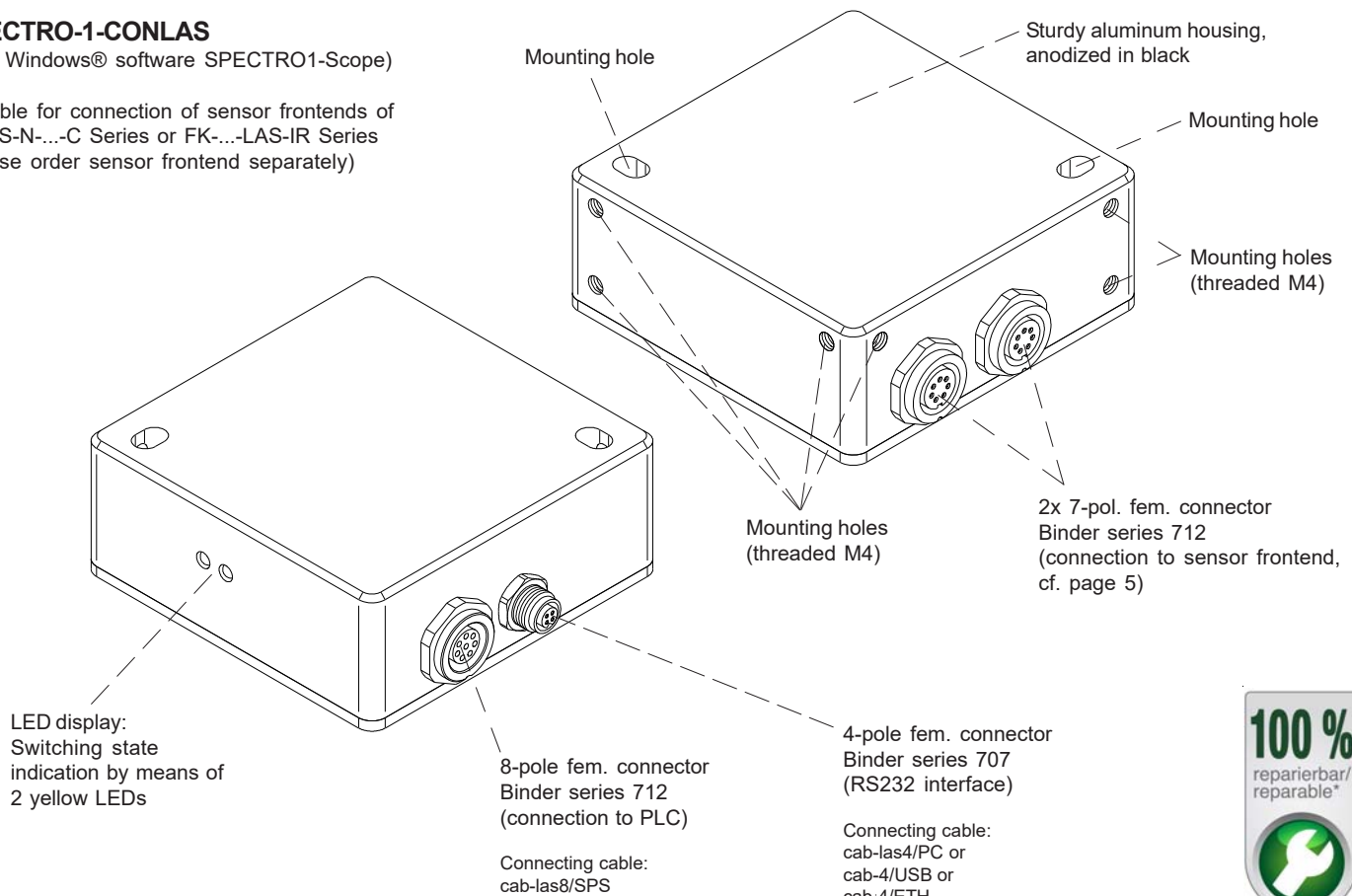
## Design

### Product name:

### SPECTRO-1-CONLAS

(incl. Windows® software SPECTRO1-Scope)

Suitable for connection of sensor frontends of  
A-LAS-N-...-C Series or FK-...-LAS-IR Series  
(please order sensor frontend separately)



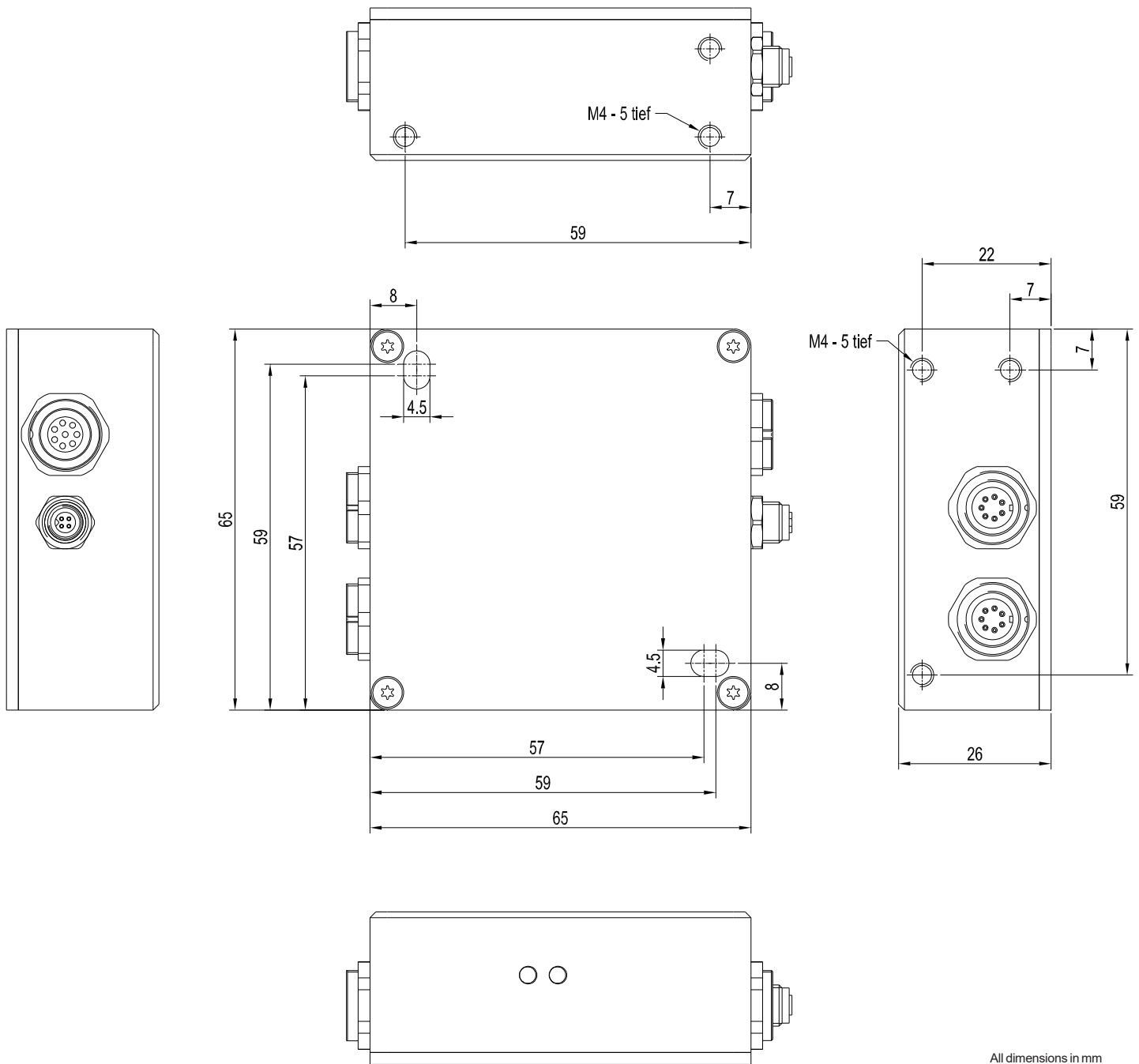
Sensor  
Instruments



**Technical Data**

Type	SPECTRO-1-CONLAS		
Voltage supply	+24VDC (± 10%), reverse polarity protected, overcurrent protected		
Current consumption	< 160 mA		
Max. switching current	100 mA, short circuit proof		
Switching state indication	2 yellow LED visualize the physical state of the outputs OUT0 and OUT1		
Digital inputs (2x)	IN0 and IN1 (Pin 3 and 4): digital (0V/+24V)		
Digital outputs (2x)	OUT0 and OUT1 (Pin 5 and 6): digital (0V/+24V), npn/pnp-able (bright-/dark-switching, can be switched)		
Analog output (1x)	ANALOG (Pin 8): voltage 0 ... +10V or current 4 ... 20mA, adjustable via PC software		
Interface	RS232		
Pulse lengthening	0 ... 100 ms, adjustable via PC software		
Averaging	max. 32768 values, adjustable via PC software		
Scan frequency (LED mode AC, DC or OFF, can be switched via PC software)	LED mode AC (depends on parameterization):		LED mode DC / OFF (depends on parameterization):
	Frequency [Hz]	Digital outputs	Analog output
	Max. 50 000	Off	Off
	Max. 48 000	On	Off
	Max. 42 000	Off	On
Max. 41 000	On	On	
	Measurements were made with the smallest gain at the receiver (AMP1). At the highest gain (AMP8), the frequency is reduced by a factor of 10.		The frequency is independent of the gain set at the receiver.
Switching frequency	max. 60 kHz		
Analog band width	max. 90 kHz (-3 dB)		
Transmitter (light source)	via external sensor frontend: solid-state laser, 670 nm, DC-operation, 0.39 mW max. opt. power, laser class 1 acc. to DIN EN 60825-1.		
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF)		
Measuring range	depends on the sensor frontend used		
Receiver	by means of external sensor frontend		
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software		
Ambient light	max. 5000 Lux (in AC-operation)		
Size of light spot	depends on the sensor frontend used		
Reproducibility	2 digits at 12-bit A/D conversion		
Housing dimensions	LXWxH approx. 65 mm x 65 mm x 26 mm (without connectors)		
Housing material	aluminum, anodized in black		
Enclosure rating	IP64		
Type of connector	connection to PLC: 8-pole fem. connector (Binder 712) connection to PC: 4-pole fem. connector (Binder 707) connection to sensor frontend: 7-pole fem. connector (Binder 712)		
Connecting cables	to PLC: cab-las8/SPS or cab-las8/SPS-w to PC/RS232 interface: cab-las4/PC or cab-las4/PC-w to PC/USB interface: cab-4/USB or cab-4/USB-w to PC/Ethernet interface: cab-4/ETH (no connecting cable is required to connect the sensor front end)		
Operating temp. range	-20°C ... +55°C		
Storage temperature range	-20°C ... +85°C		
EMC test acc. to	DIN EN 60947-5-2		

Dimensions



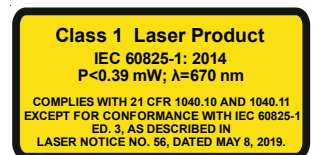
All dimensions in mm

Laser Information

For the use of sensor frontends of A-LAS-N-...-C series and FK-...-LAS-IR series in connection with an electronic control unit SPECTRO-1-CONLAS the following is valid:

The laser transmitters of A-LAS-N-...-C series and FK-...-LAS-IR series comply with 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.

The laser transmitters of A-LAS-N-...-C series and FK-...-LAS-IR series are supplied with a laser information label „CLASS 1 Laser Product“.



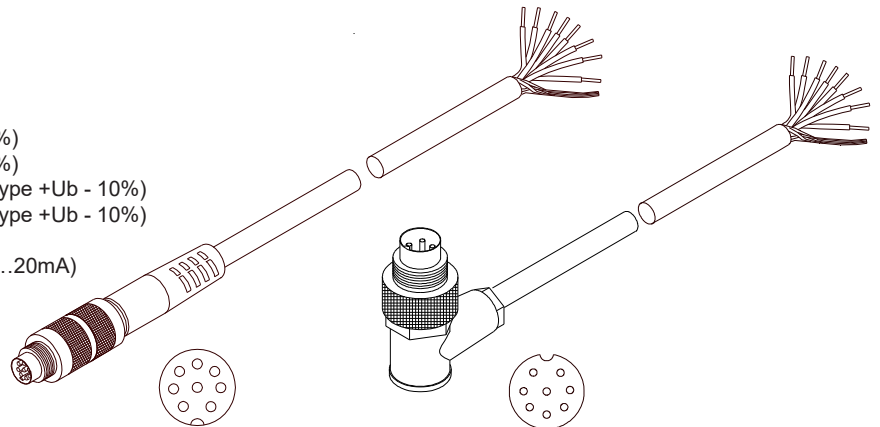
## Connector Assignment

**Connection to PLC:****8-pole fem. connector Binder series 712**

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC ( $\pm 10\%$ )
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
6	pink	OUT1 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
7	blue	not connected
8	red	ANALOG (voltage 0...+10V <u>or</u> current 4...20mA)

**Connecting cable:**

cab-las8/SPS-(length)  
cab-las8/SPS-w-(length)  
(standard length 2m)



cab-las8/SPS-...  
(max. length 25m, outer jacket: PUR)

cab-las8/SPS-w-...  
(max. length 25m, outer jacket: PUR)

**Connection to PC:****4-pole fem. connector Binder Series 707**

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

**Connection via RS232 interface at the PC:****Connecting cable:**

cab-las4/PC-(length)  
cab-las4/PC-w-(length) (angle type 90°)  
(standard length 2m)

**alternative:****Connection via USB interface at the PC:****USB converter (incl. driver software):**

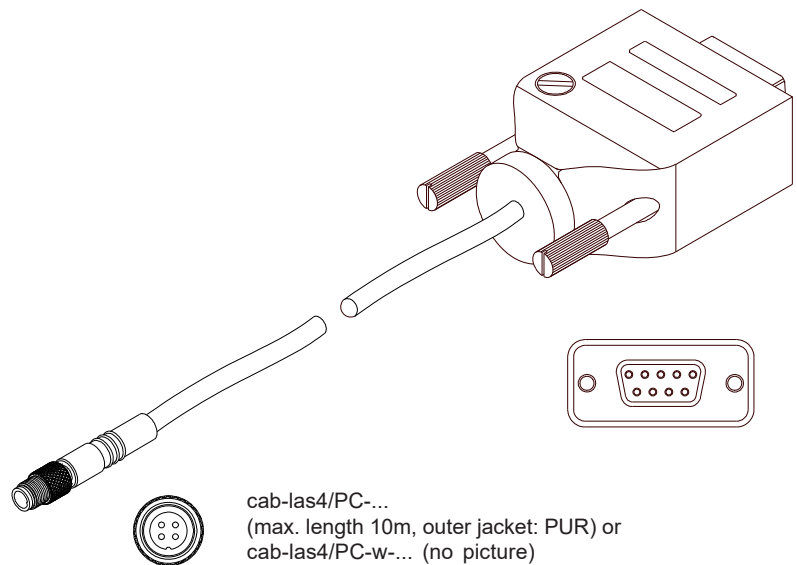
cab-4/USB-(length)  
cab-4/USB-w-(length) (angle type 90°)  
(standard length 2m)

**alternative:****Connection to local network via Ethernet bus:****Ethernet converter (incl. software „SensorFinder“):****cab-4/ETH-500**

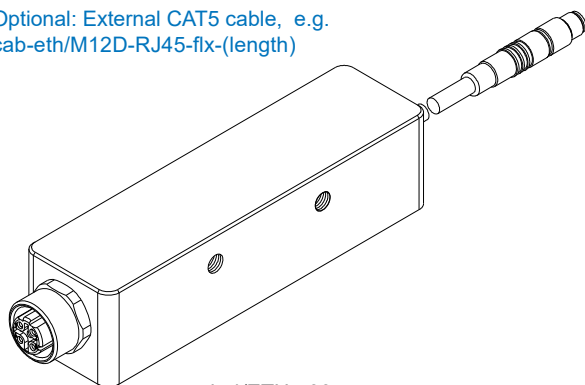
(standard length 0.5m)

**Optional: External CAT5 cable, e.g.**

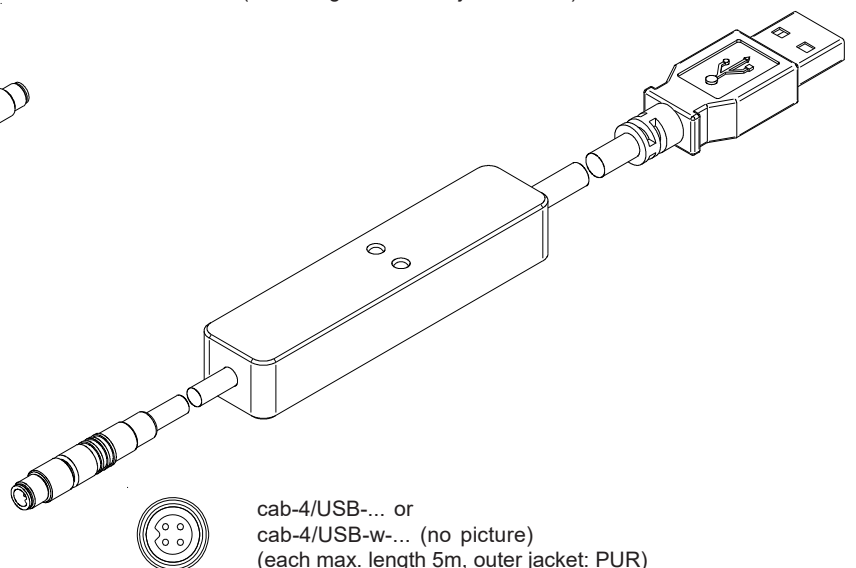
cab-eth/M12D-RJ45-flx-(length)



cab-las4/PC-...  
(max. length 10m, outer jacket: PUR) or  
cab-las4/PC-w-... (no picture)  
(max. length 5m, outer jacket: PUR)



cab-4/ETH-500  
(length 0.5m, outer jacket: PUR)  
4-pole M12 fem. conn. (D-coded)  
for connection of an external  
CAT5 cable, e.g.  
cab-eth/M12D-RJ45-flx-(length)



cab-4/USB-... or  
cab-4/USB-w-... (no picture)  
(each max. length 5m, outer jacket: PUR)

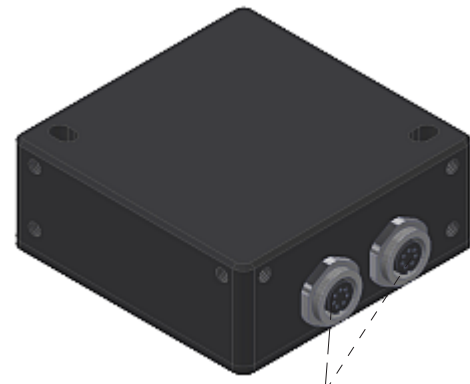
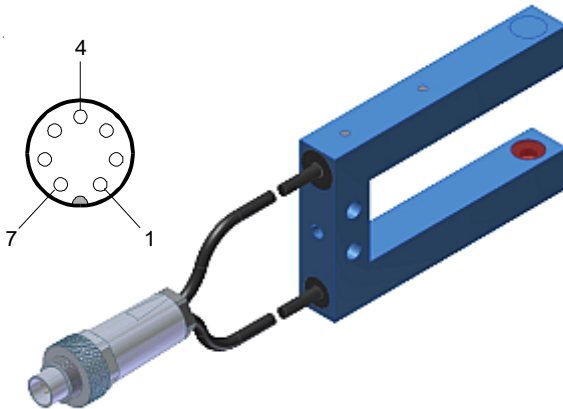


Connector Assignment

Connection SPECTRO-1-CONLAS to sensor frontends of A-LAS-N-...-C series or FK-...-LAS-IR series:

Connection to A-LAS-N-...-C-(cable length) or to FK-...-LAS-IR-C-(cable length)

Pin:	Assignment:
1	GND (0V)
2	+5V
3	Intensity
4	+5V
5	ANALOG
6	Clock
7	GND (0V)



Connection directly to SPECTRO-1-CONLAS (no connecting cable necessary)

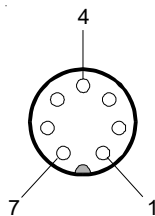
Optionally available:  
 Extension cable  
 cab-las7/712-fem-male-...  
 (cable length 1m, 2m, 3m, 4m)  
 Please note:  
 Total cable length (A-LAS-N-...-C + extension cable) = max. 5m

Connection sensor frontend A-LAS-N-...-C-... or FK-...-LAS-IR-C-... directly to one of the two 7-pole fem. connectors (can be selected as required)

Connection SPECTRO-1-CONLAS to split sensor frontends (= separat transmitter and receiver) of A-LAS-N-...-C series:

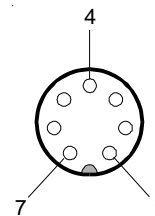
Connection to A-LAS-N-...-T-C-(cable length) (transmitter)

Pin:	Assignment:
1	GND (0V)
2	+5V
3	Intensity
4	n.c.
5	n.c.
6	Clock
7	n.c.



Connection to A-LAS-N-...-R-C-(cable length) (receiver)

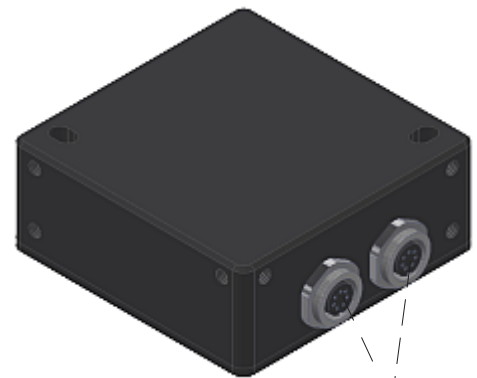
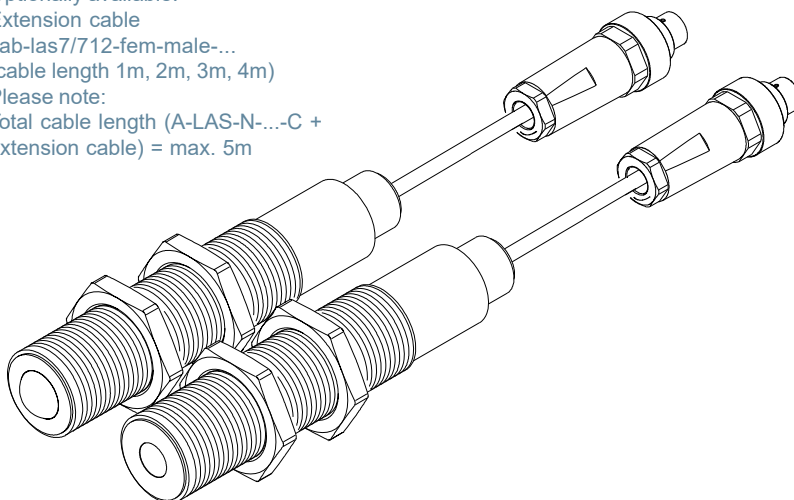
Pin:	Assignment:
1	n.c.
2	n.c.
3	n.c.
4	+5V
5	Analog
6	n.c.
7	GND (0V)



Connection of transmitter directly to SPECTRO-1-CONLAS (no connecting cable necessary)

Connection of receiver directly to SPECTRO-1-CONLAS (no connecting cable necessary)

Optionally available:  
 Extension cable  
 cab-las7/712-fem-male-...  
 (cable length 1m, 2m, 3m, 4m)  
 Please note:  
 Total cable length (A-LAS-N-...-C + extension cable) = max. 5m



Connection of split sensor frontend (fem. connector can be freely selected for receiver and transmitter)



**Extension Cable**
**Optionally available:**

**Extension cable for sensor frontends of A-LAS-N-...-C series  
cab-las7/712-fem-male-(cable length\*)**

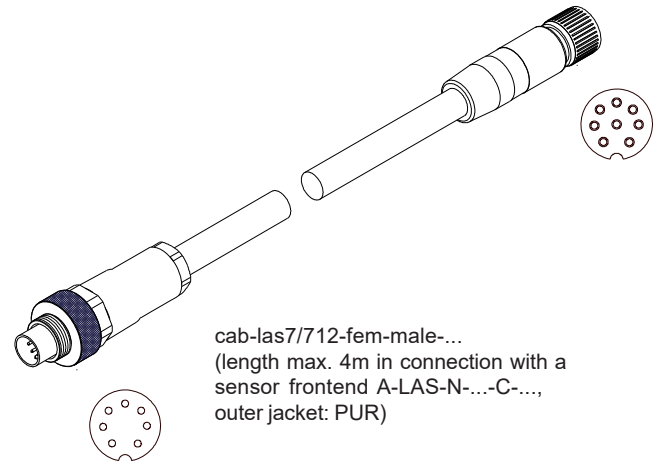
**7-pole circular connector Binder 712:**

Pin:	Assignment:
1	GND (0V)
2	+5V
3	Intensity
4	+5V
5	ANALOG
6	Clock
7	GND (0V)

Serves to extend the integrated connection cable in case of an already existing sensor front end of the type A-LAS-N-...-C series to the Control electronics SPECTRO-1-CONLAS  
\*cable length 1m, 2m, 3m, 4m

**Please note:**  
The total cable length of A-LAS-N-...-C + extension cable may not exceed 5m, for instance:

A-LAS-N-...-C-1m (= length 1m) + cab-las7/712-fem-male-(...) length max. 4m  
A-LAS-N-...-C-2m (= length 2m) + cab-las7/712-fem-male-(...) length max. 3m



cab-las7/712-fem-male-...  
(length max. 4m in connection with a sensor frontend A-LAS-N-...-C-..., outer jacket: PUR)



**Measuring Principle**
**Measuring principle of the sensors of SPECTRO-1 series:**

The sensors of the SPECTRO-1 series are of single-channel design, i.e. they acquire the analog signal that comes from a receiver and evaluate this signal. Various light sources such as white light, UV light, IR light, or a laser can be used as a transmitter. The receiver is correspondingly matched to the transmitter. The acquired analog signal is provided through a voltage output and a current output. The software can be used to select various evaluation modes for the analog signal. The status of the analog signal is provided through 2 digital outputs in accordance with the selected evaluation mode. A digital input allows external "teaching" of the sensor. An additional input allows the "freezing" of the analog output signal upon a positive input edge.

The SPECTRO-1 sensor allows highly flexible signal acquisition. The sensor, for example, can be operated in alternating-light mode (AC mode), which means the sensor is not influenced by external light, or in constant-light mode (DC mode), which provides outstanding high-speed sensor operation. An OFF function deactivates the sensor's integrated light source and changes to DC mode, which allows the sensor to detect so-called "self-luminous objects". With the stepless adjustment of the integrated light source, the selectable gain of the receiver signal, and an INTEGRAL function the sensor can be adjusted to almost any surface or any "self-luminous object".

A micro-controller performs 12-bit analog/digital conversion of the analog signal, which allows recording and evaluation of the signal. Furthermore the SPECTRO-1 sensor offers various options for intelligent signal processing such as e.g. dirt accumulation compensation.

Parameters and measurement values can be exchanged between PC and sensor either through RS232 or Ethernet (using an Ethernet converter). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.

The PC software facilitates the parameterisation, diagnostics, and adjustment of the sensor system (oscilloscope function). The software furthermore provides a data recorder function that automatically records data and stores them on the hard disk of the PC.

SPECTRO-1 sensors are temperature-compensated over a range of 0°C to 80°C.

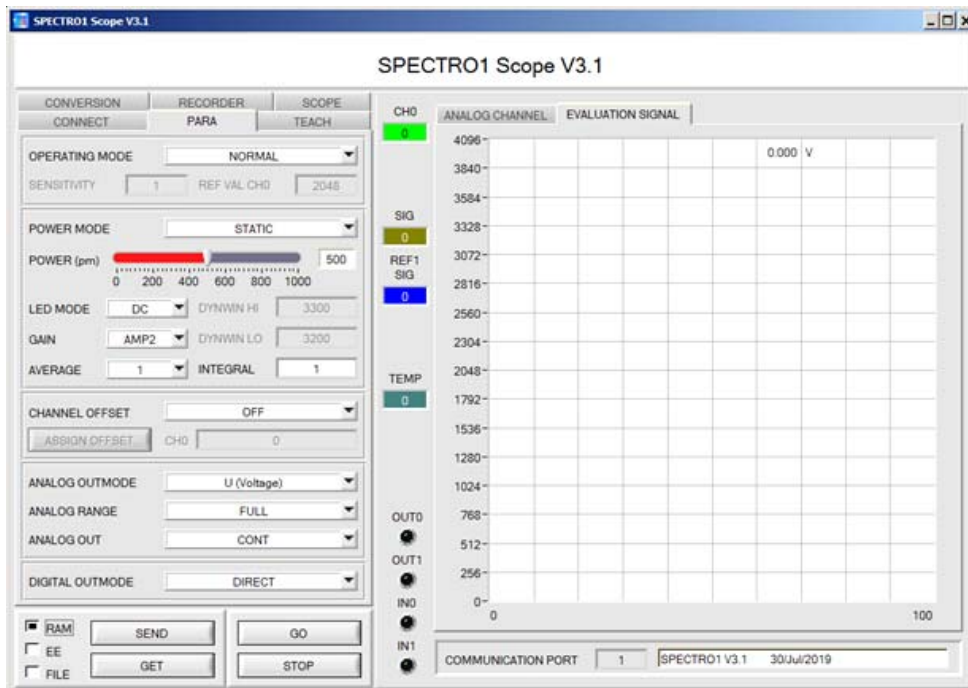
When parameterisation is finished, the sensor continues to operate with the current parameters in STAND-ALONE mode without a PC.



## Parameterization

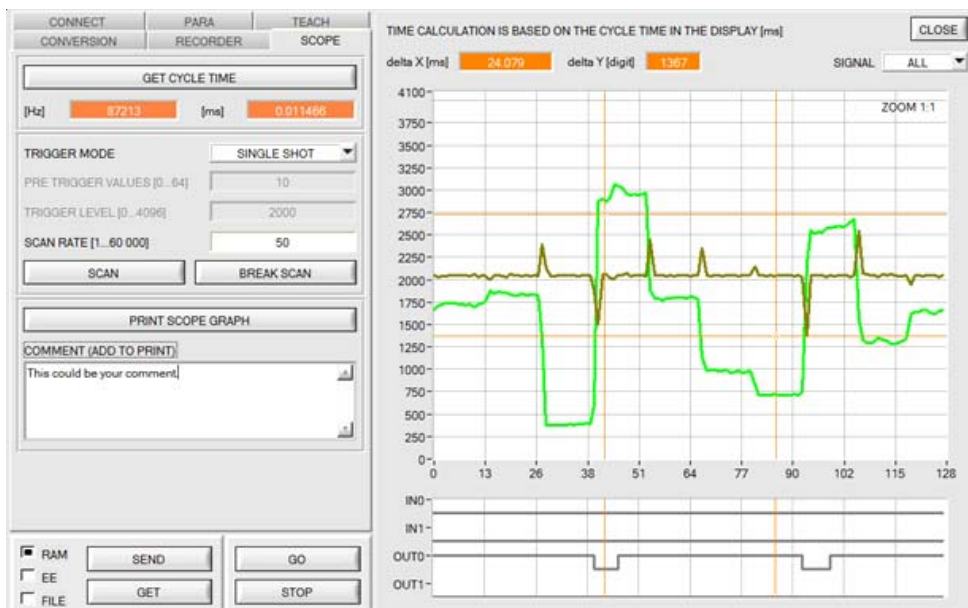
### Windows® user interface:

(The current software version is available for download on our website.)



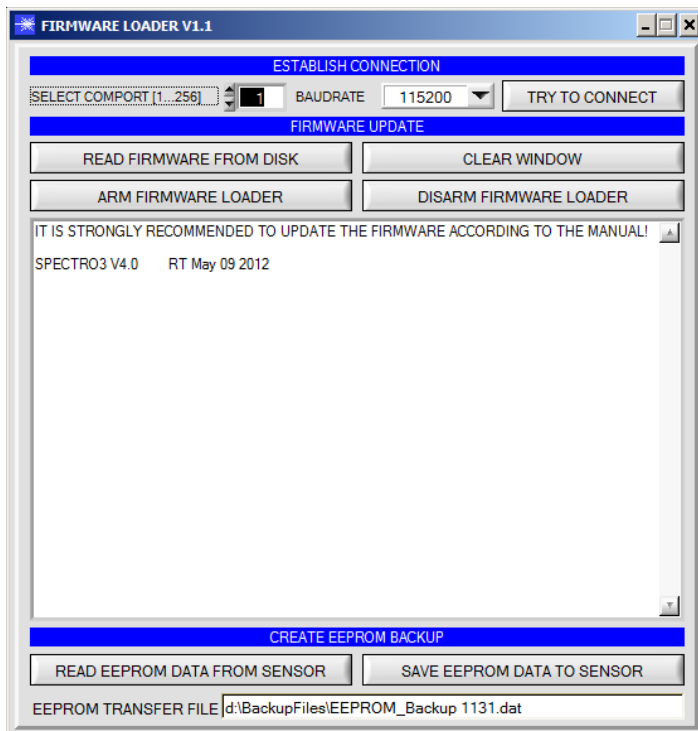
The PC software SPECTRO1-Scope facilitates the parameterization, the diagnosis, and the adjustment of the sensor system (oscilloscope function). Moreover, the software features a data recorder function that allows the automatic recording of recorded data and the saving of those at the hard disk of the PC.

Parameters and measurement values can be exchanged between PC and sensor either through RS232 or Ethernet (using an Ethernet converter). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.



The SCOPE tab visualises an oscilloscope.



**Firmware Update**
**Firmware update by means of the software „FirmwareLoader“:**

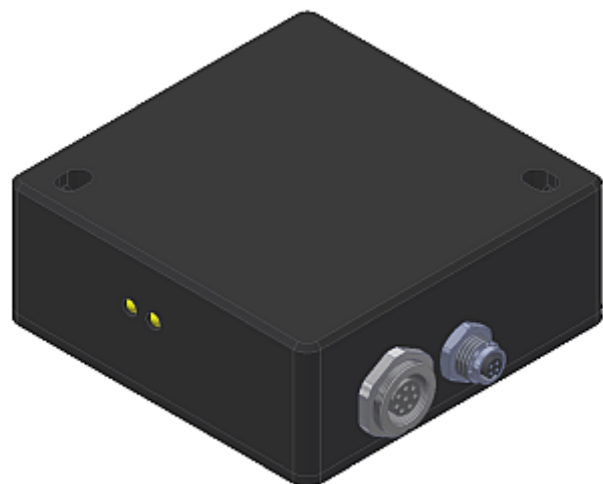
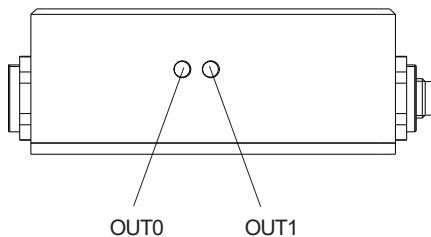
The software „Firmware Loader“ allows the user to perform an automatic firmware update. The update will be carried out through the RS232 interface.

An initialisation file (xxx.ini) and a firmware file (xxx.elf.S) are required for performing a firmware update. These files can be obtained from your supplier. In some cases an additional firmware file for the program memory (xxx.elf.p.S) is also needed, and this file will be automatically provided together with the other two files.



**LED Display**
**LED display:**

By means of the two LEDs the physical state of the two outputs OUT0 and OUT1 is visualized:

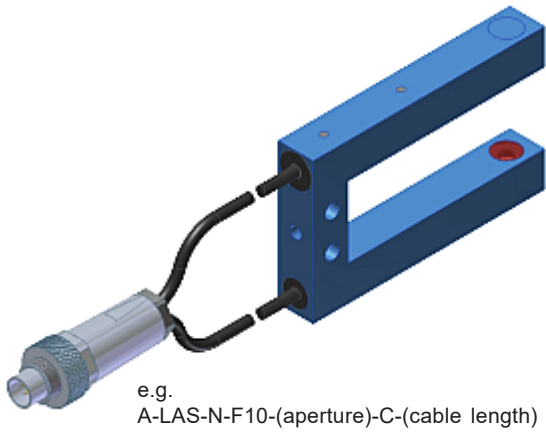




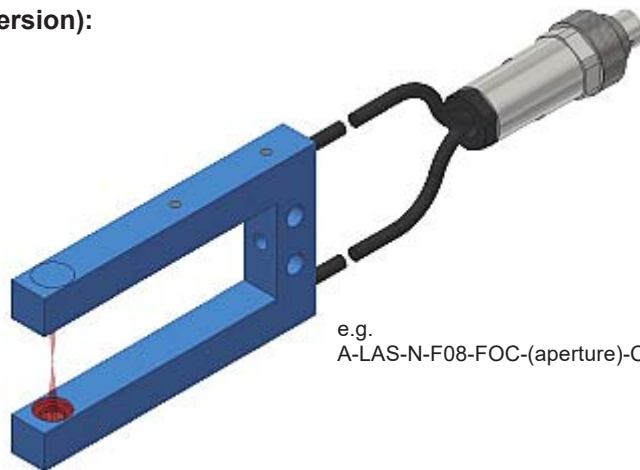


Sensor Frontends

**Sensor Frontends of A-LAS-N -...-C Series (cable version):**  
(please order separately)



e.g.  
A-LAS-N-F10-(aperture)-C-(cable length)

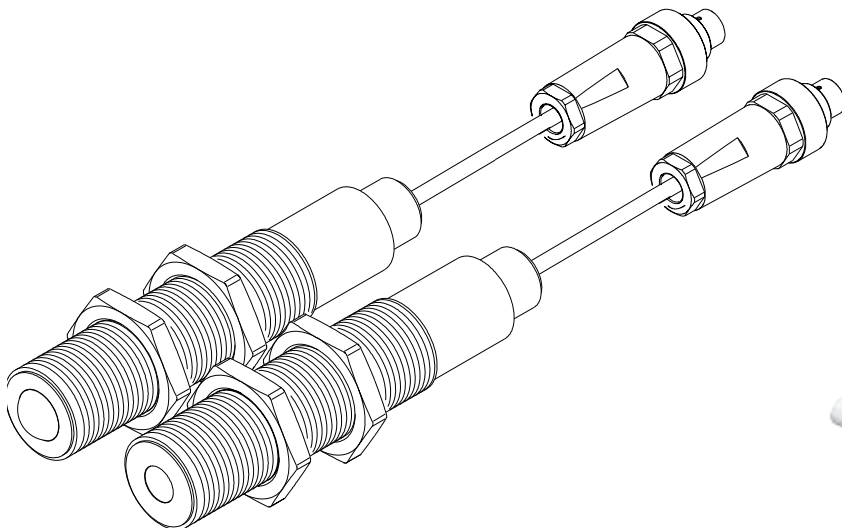


e.g.  
A-LAS-N-F08-FOC-(aperture)-C-(cable length)



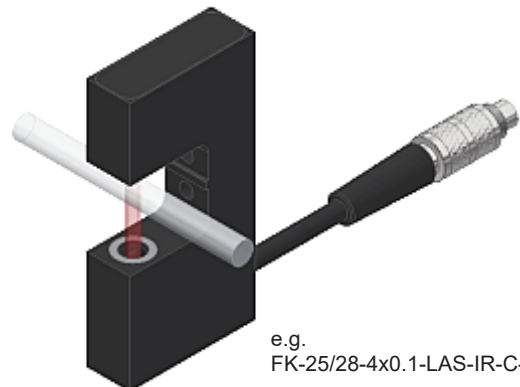
e.g.  
A-LAS-N-M18-7x3-C-(cable length)

**Sensor frontends of A-LAS-N-...-C Series**  
**(cable version, separate transmitter and receiver):**  
(please order separately)



e.g.:  
A-LAS-N-M18-(aperture)-T-C-(cable length) = transmitter  
A-LAS-N-M18-(aperture)-R-C-(cable length) = receiver

**Sensor frontends of FK-...-LAS-IR Series:**  
(please order separately)



e.g.  
FK-25/28-4x0.1-LAS-IR-C-0.2m