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# SPECTRO Series

## SPECTRO-2-CONLAS

- Control electronics for controlling up to two laser sensor frontends of the A-LAS-N-...-C series or the FK-...-LAS-IR series
- Wide range of applications (see page 6)
- Various evaluation modes available:  
Distance measurement (BICONE),  
contrast comparison (NORM),  
2-channel contrast control
- Fast evaluation methods in LED mode DC available (up to 130kHz)
- Insensitive to outside light (in LED mode AC)
- Parameterizable via Windows® software
- RS232 interface (RS232/Ethernet converter and RS232/USB converter available)
- Suitable for use in hazardous areas (fiber optics)
- 1 analog output (0V... +10V or 4mA...20mA)
- 2 digital outputs (0V/+24V)
- External trigger input and teach input
- Linearization by means of an editable linearization curve



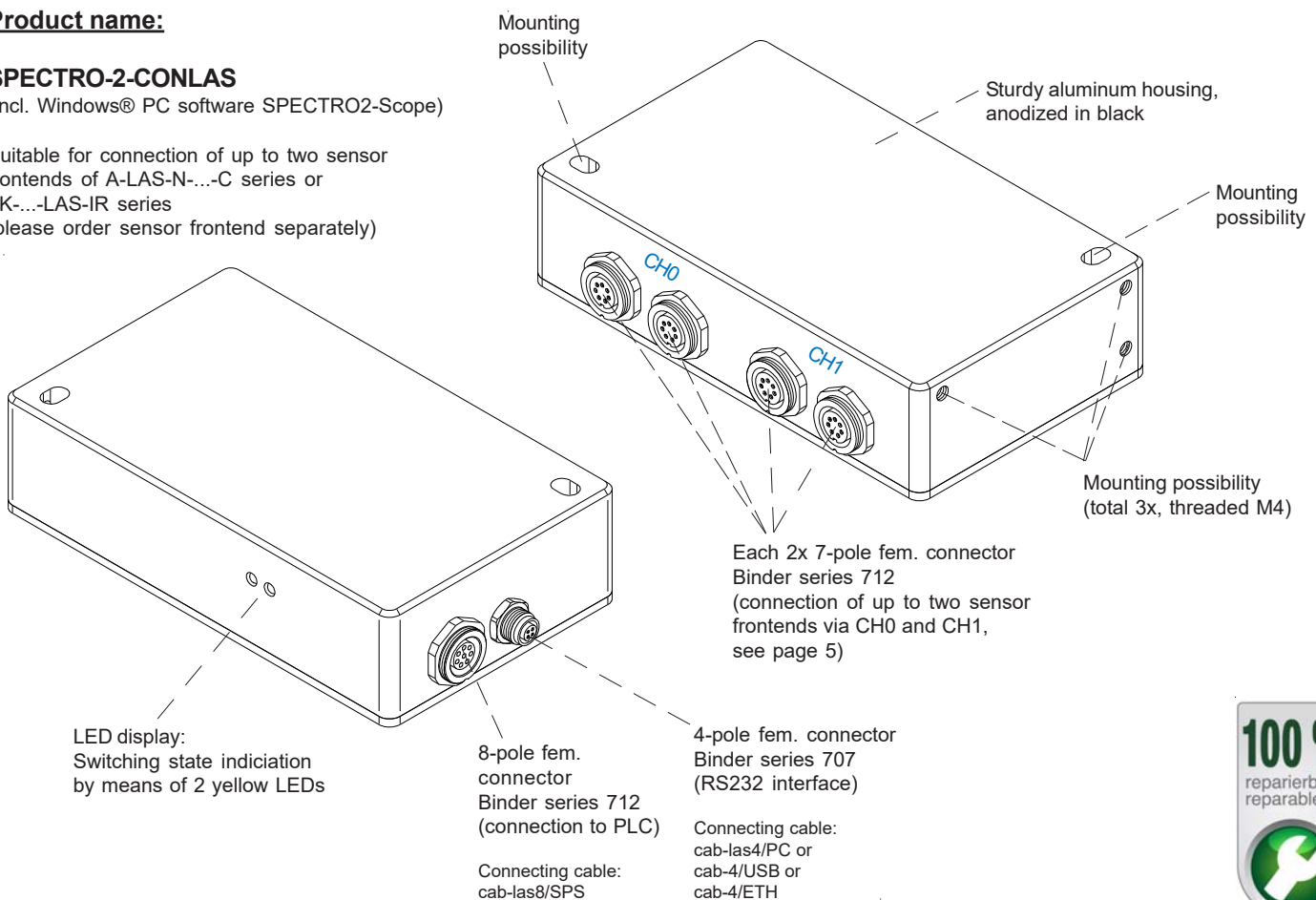
### Design

#### Product name:

#### SPECTRO-2-CONLAS

(incl. Windows® PC software SPECTRO2-Scope)

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

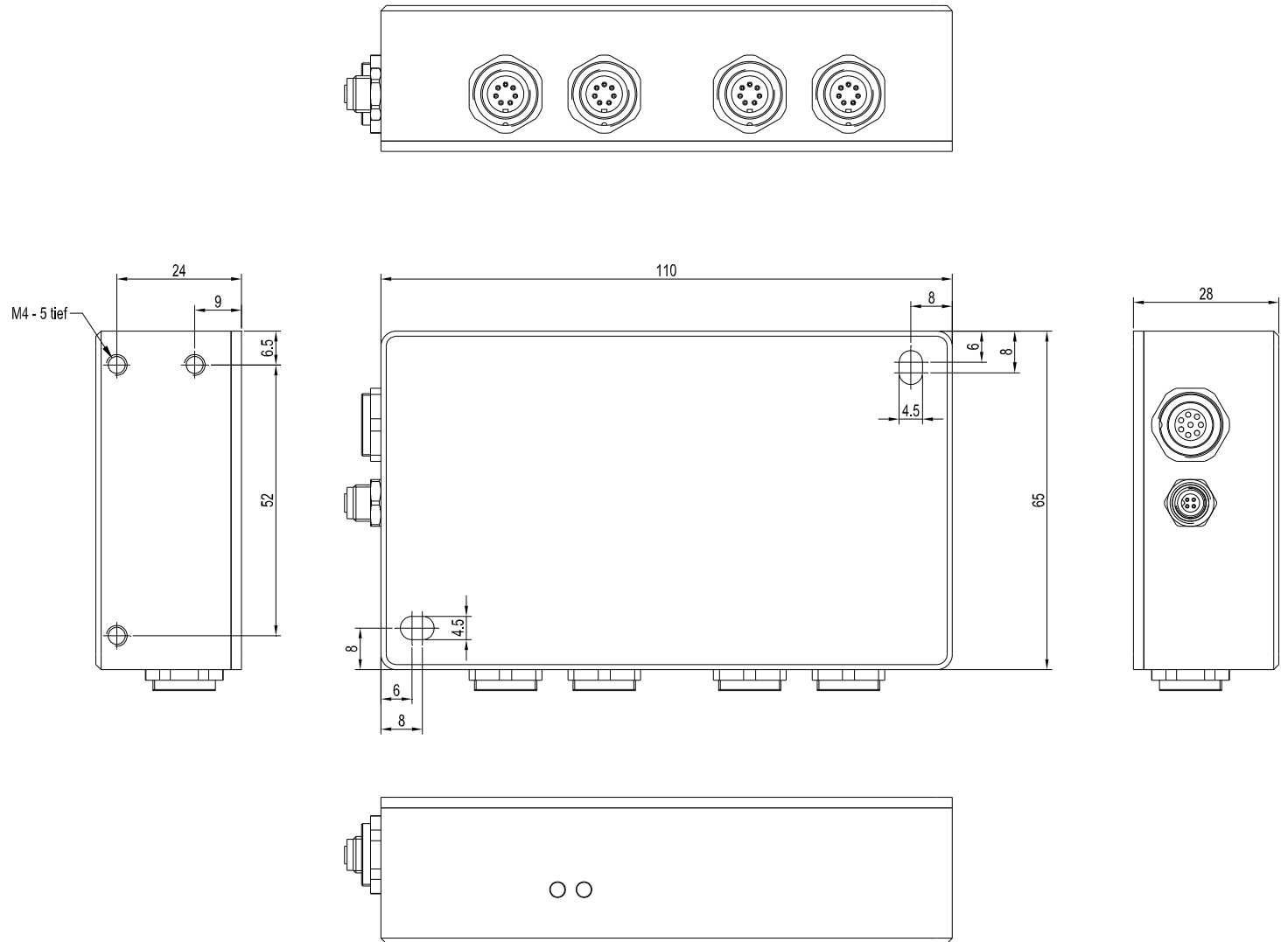




**Technical Data**

Model	SPECTRO-2-CONLAS		
Voltage supply	+24VDC ( $\pm 10\%$ ), 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 7): 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 or DC, can be switched via PC software)	LED mode AC (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.	LED mode DC (depends on parameterization): Frequency [Hz]    Digital outputs    Analog output Max. 130 000    Off    Off Max. 100 000    On    Off Max. 85 000    Off    On Max. 72 500    On    On The frequency is independent of the gain set at the receiver.	
Switching frequency	typ. 60 kHz		
Analog band width	typ. 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)		
Measurement range	depends on the sensor frontend used		
Receiver	via 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. 110 mm x 65 mm x 28 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: 4x 7-pole fem. connector (Binder series 712), for up to two sensor frontends		
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 (for the connection of the sensor frontends no additional connecting cable is required)		
Operating temp. range	-20°C ... +55°C		
Storage temp. range	-20°C ... +85°C		
EMC test acc. to	DIN EN 60947-5-2		

Dimensions



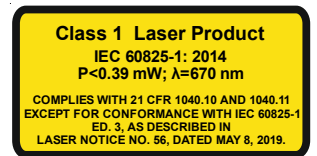
All dimensions in mm

Laser Information

The following applies to the use of laser sensor front ends of the A-LAS-N series and FK-...-LAS-IR series in conjunction with the SPECTRO-2-CONLAS control electronics:

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





**Connector Assignment**
**Connection to PLC:****8-pole fem. connector Binder Series 712**

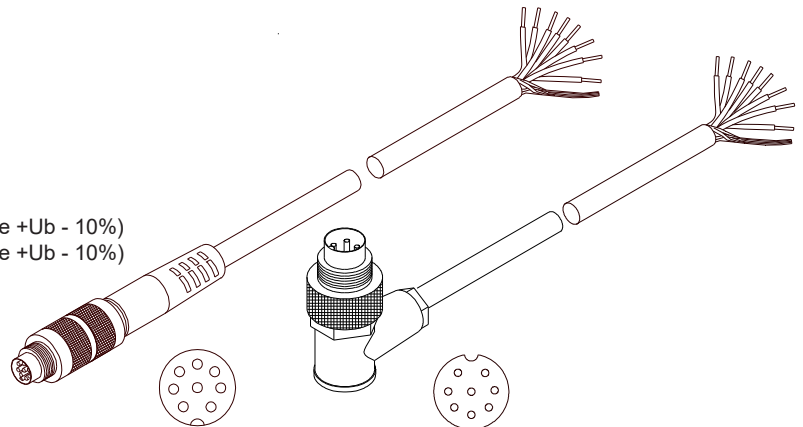
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC ( $\pm 10\%$ )
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
6	pink or black	OUT1 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
7	blue	ANALOG (0 ... +10V or 4 ... 20mA)
8	red	n.c.

**Connecting cable:**

cab-las8/SPS-(length)

cab-las8/SPS-w-(length) (angle type, 90°)

(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:**

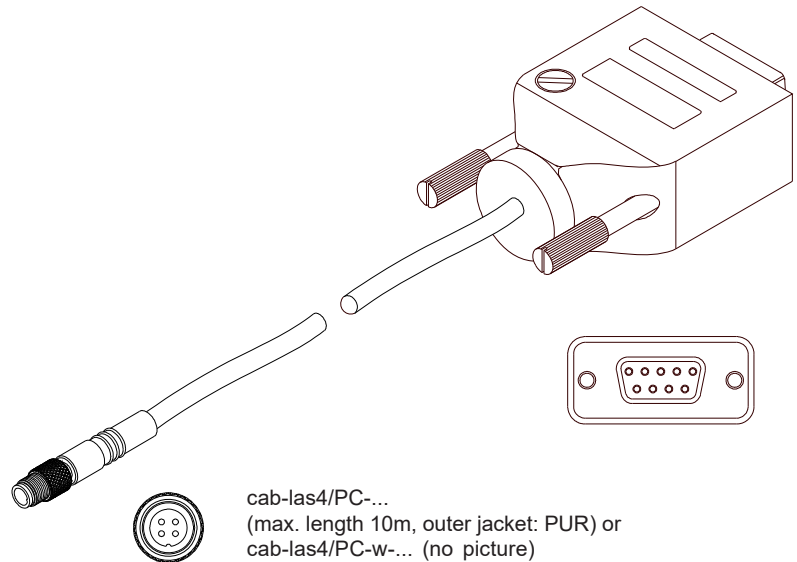
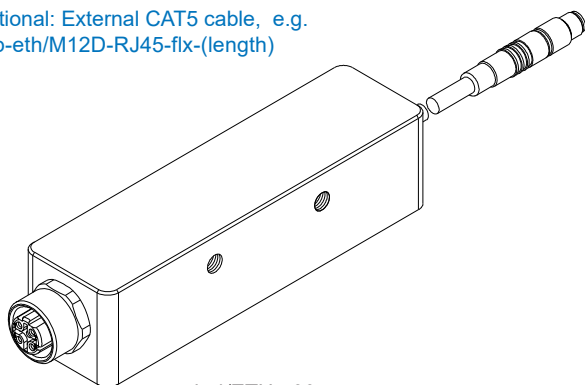
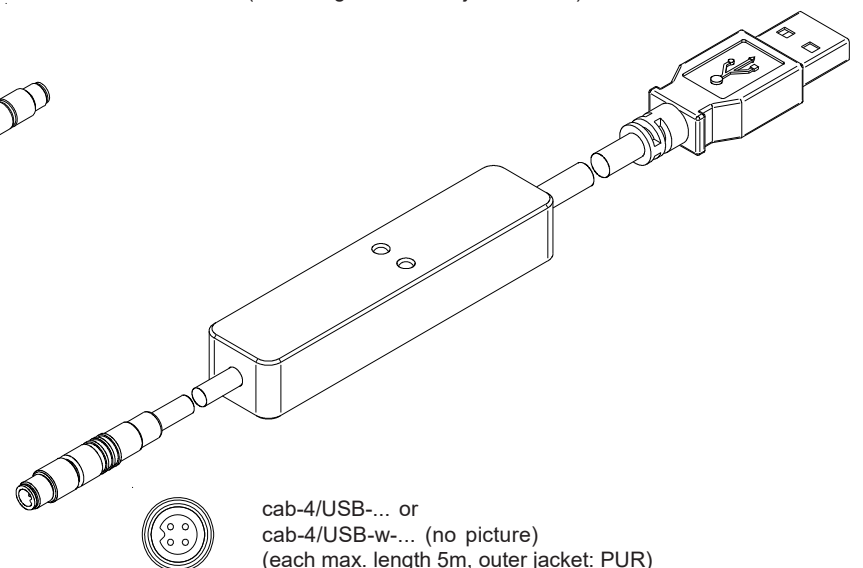
Ethernet converter (incl. software „SensorFinder“):

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)

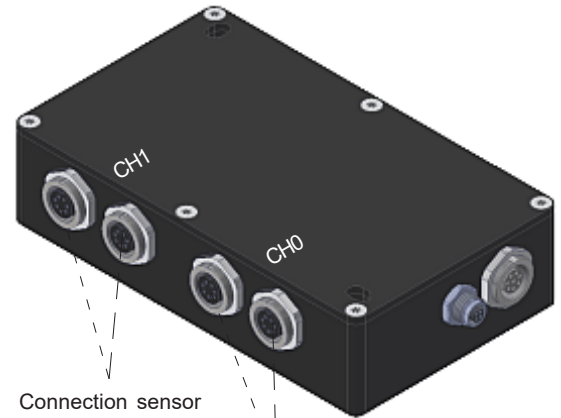
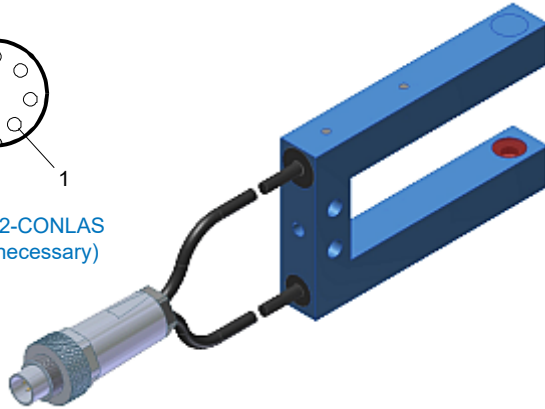
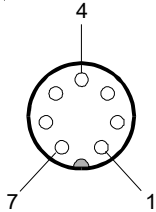


Connector Assignment

Connection SPECTRO-2-CONLAS to sensor frontends of A-LAS-N-...-C series or of 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 sensor frontend 2 (CH1) (one of the two female connectors can be selected by choice for frontend 2)

Connection sensor frontend 1 (CH0) (one of the two female connectors can be selected by choice for frontend 1)

Connection directly to SPECTRO-2-CONLAS (no additional connecting cable necessary)

Optionally available:

Extension cable cab-las7/712-fem-male-... (cable length 1m, 2m, 3m, 4m)

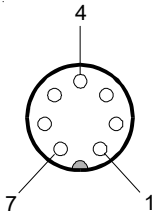
Please note:

Total cable length (A-LAS-N-...-C + extension cable) = max. 5m

Connection SPECTRO-2-CONLAS to split sensor frontends (= separate transmitter and receiver) of A-LAS-N-...-C series:

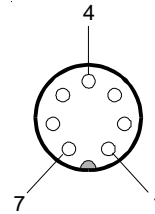
Connection to A-LAS-N-...-T-C-(cable length) (transmitter)

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 the transmitter directly to SPECTRO-2-CONLAS (no additional connecting cable necessary)

Connection of the receiver directly to SPECTRO-2-CONLAS (no additional connecting cable necessary)

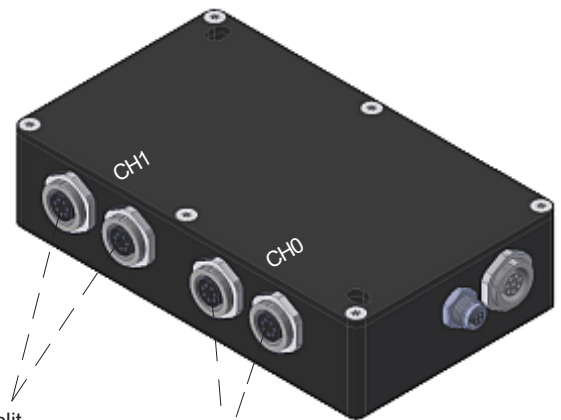
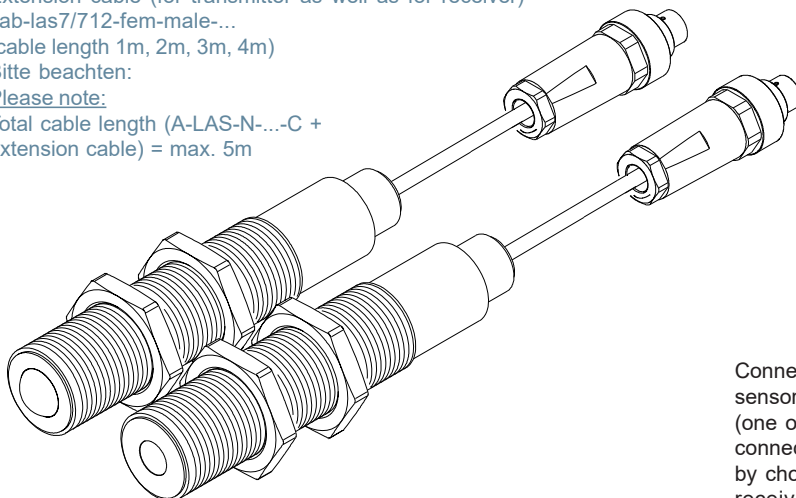
Optionally available:

Extension cable (for transmitter as well as for receiver) cab-las7/712-fem-male-... (cable length 1m, 2m, 3m, 4m)

Bitte beachten:

Please note:

Total cable length (A-LAS-N-...-C + extension cable) = max. 5m



Connection split sensor frontend 2 (CH1) (one of the two female connectors can be selected by choice for transmitter or receiver)

Connection split sensor frontend 1 (CH0) (one of the two female connectors can be selected by choice for transmitter or receiver)





**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	0V (GND)
2	+5V
3	Intensität
4	+5V
5	ANALOG
6	Takt
7	0V (GND)

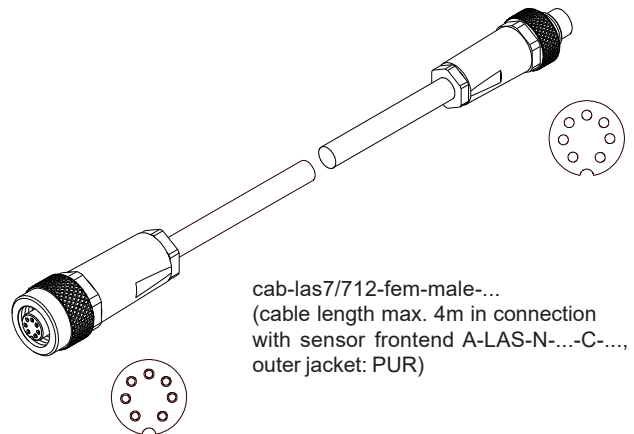
Serves to extend the integrated connecting cable of an existing sensor frontend of type A-LAS-N-...-C series to the SPECTRO-2-CONLAS

\*cable length 1m, 2m, 3m, 4m

Please note:

The total cable length of A-LAS-N-...-C + extension cable must not exceed 5m:

A-LAS-N-...-C-1m (= length 1m) + cab-las7/712-fem-male-(...) with a length of max. 4m  
 A-LAS-N-...-C-2m (= length 2m) + cab-las7/712-fem-male-(...) with a length of max. 3m  
 A-LAS-N-...-C-3m (= length 3m) + cab-las7/712-fem-male-(...) with a length of max. 2m  
 A-LAS-N-...-C-4m (= length 4m) + cab-las7/712-fem-male-(...) with a length of max. 1m  
 A-LAS-N-...-C-5m (= length 5m) // no extension cable is allowed!



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



**Range of Applications**
**Wide range of applications for the SPECTRO-2-CONLAS sensor system:**

The use of two A-LAS-N-...-C sensors in connection with a SPECTRO-2-CONLAS enables thickness monitoring, diameter monitoring of cylindrical objects, but also gap monitoring, for example on connectors or other objects.

By taking the difference between the two signals (from both A-LAS-N sensors), the deviation from a defined thickness, diameter or gap can be determined.

In addition, wires protruding from a stranded wire can be detected or indentations or bulges on an insulated cable or a fibre optic cable including coating can be detected.

An edge control (web guidance) of components can also be realised by using the two component edges monitored.

Wherever high speed is involved and wherever control can be carried out using transmitted light, this control principle is suitable.

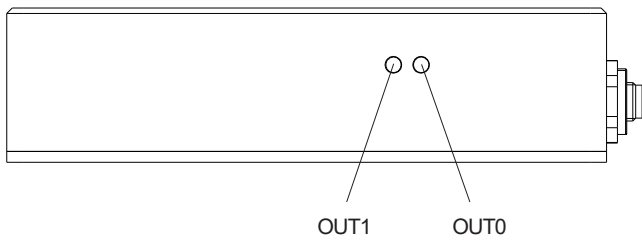




## LED Display

### LED display:

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



## Measuring Principle

### Measuring principle of the sensors of SPECTRO-2 series:

The sensors of the SPECTRO-2 series feature a two-channel design, which means they acquire the analog signals of two receivers and evaluate these signals. They also have two independently adjustable transmitter sources. Various light sources such as e.g. white light, UV light, or IR light, are available as transmitters. The receiver is correspondingly matched to the transmitter.

The acquired analog signal is provided through a voltage output or a current output.

The software can be used to select various evaluation modes for the analog signal.

The status of the output 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-2 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-2 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-2 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.

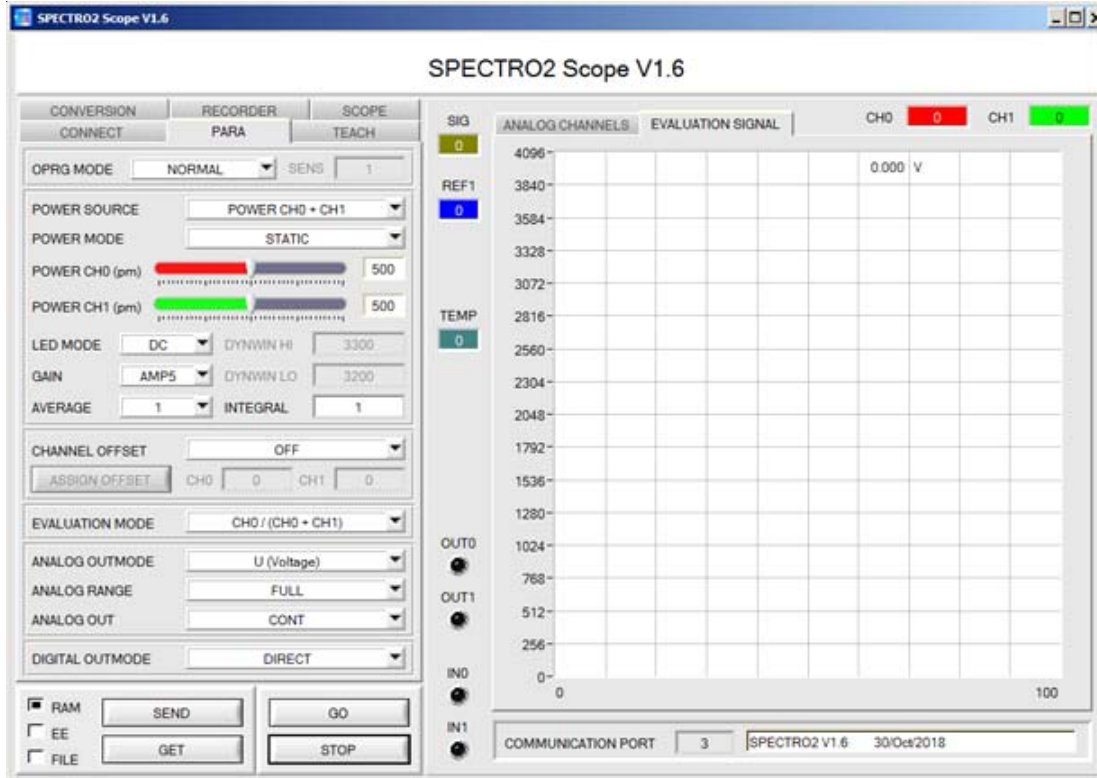


Parameterization

**Windows® user interface:**

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

The PC software SPECTRO2-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 the Ethernet converter cab-4/ETH-500). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.



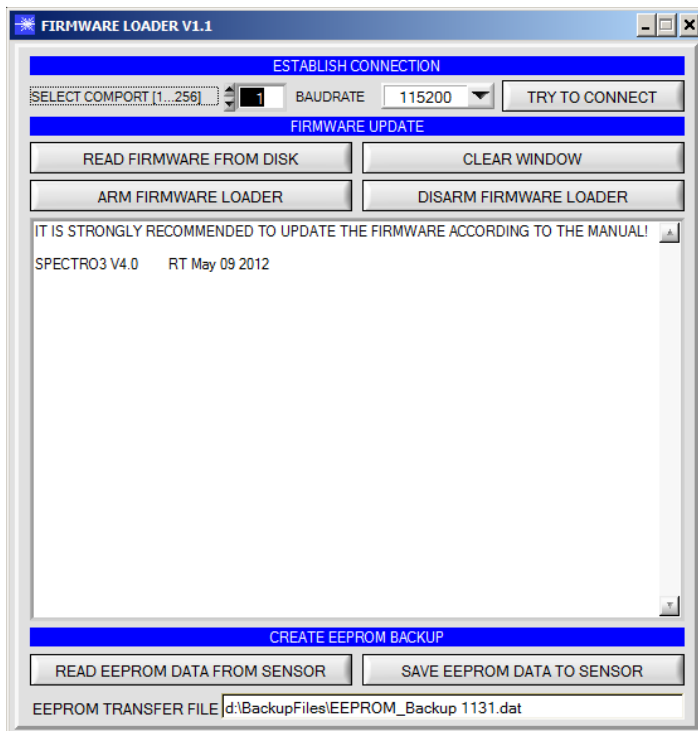
The SCOPE tab visualizes an oscilloscope.





## 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.