

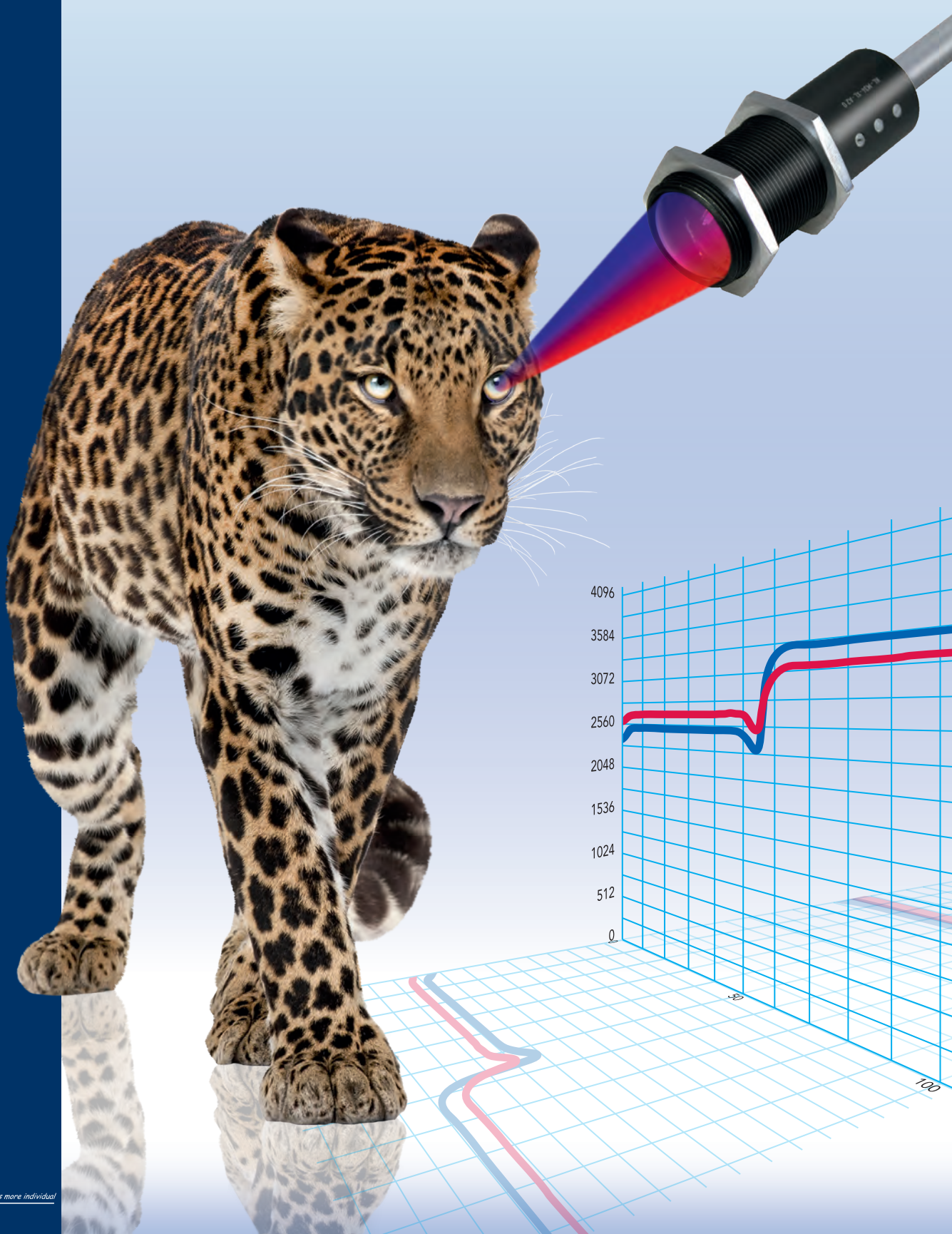
Fast, Precise, and Unerring.

Normed Comparison of Two Wavelength Ranges From UV-C to IR-B.

Color Control and Color Measurement

SPECTRO-2 Series

2-Channel Sensor Systems



SPECTRO Series

► SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)

- Distance measurement with BICONE fiber optics, normed contrast measurement, 2-channel contrast measurement
- Transmitter channel 0: VIS (white-light) / Receiver channel 0: VIS (400nm ... 1000nm)
Transmitter channel 1: VIS (white-light) / Receiver channel 1: VIS (400nm ... 1000nm)
- Various evaluation modes available (in combination with corresponding fiber optics):
Distance measurement (BICONE), contrast comparison (NORM), 2-channel contrast measurement, ...
- Fast evaluation methods in DC-operation available (up to 100kHz)
- Insensitive to outside light (in AC-operation)
- Parameterizable via Windows® software
- RS232 interface (RS232/Ethernet adapter and RS232/USB adapter available)
- Suitable for use in hazardous areas (fiber optics)
- Two analog outputs (0V... +10V and 4mA...20mA)
- Two digital outputs (0V/+24V)
- External trigger input and teach input
- Linearization by means of an editable linearization curve



Design

Product name:

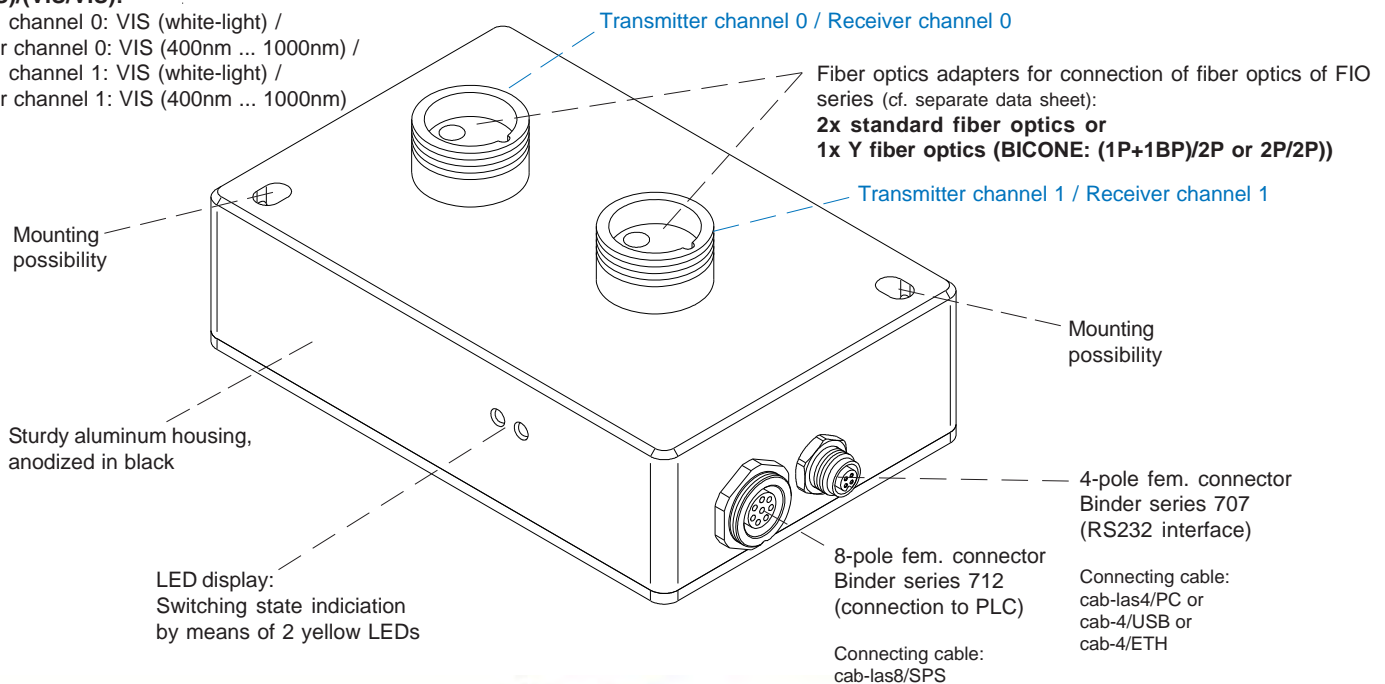
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)*
(incl. Windows® PC software SPECTRO2-Scope)

* 2-channel system:
(Transmitter channel 0/Receiver channel 0)/
(Transmitter channel 1/Receiver channel 1)
(VIS/VIS)/(VIS/VIS):

Transm. channel 0: VIS (white-light) /
Receiver channel 0: VIS (400nm ... 1000nm) /
Transm. channel 1: VIS (white-light) /
Receiver channel 1: VIS (400nm ... 1000nm)

Accessories: (p. 10-23)

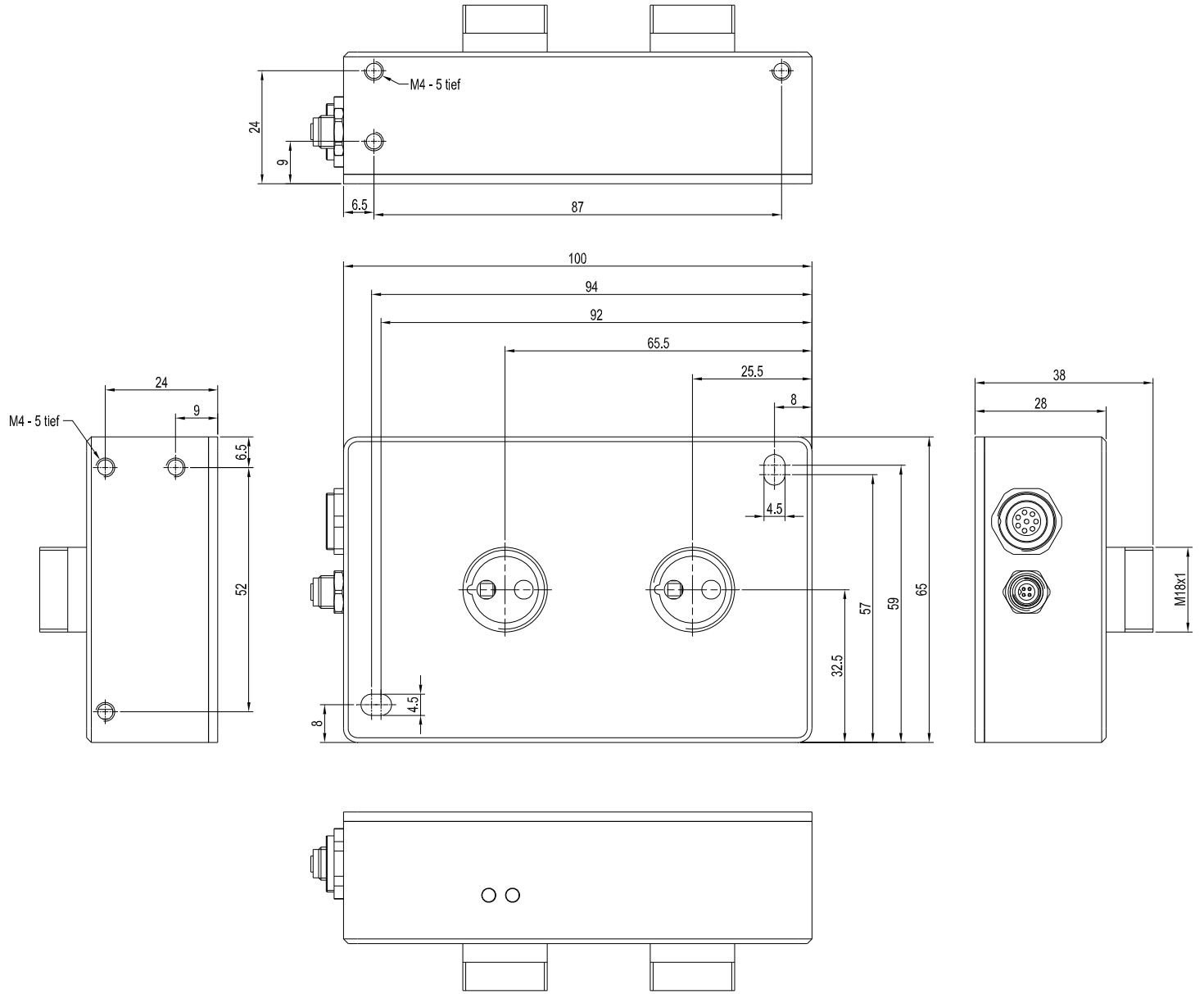
Standard fiber optics
BICONE fiber optics
Special fiber optics
Optical frontends
Fiber optics fixtures




Technical Data

Model	SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
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
Inputs digital (2x)	IN0 and IN1 (Pin 3 and 4): digital (0V/+24V)
Outputs digital (2x)	OUT0 and OUT1 (Pin 5 and 6): digital (0V/+24V), npn/pnp-able (bright-/dark-switching, can be switched)
Outputs analog (1x)	ANALOG voltage 0 ... +10V or ANALOG current 4 ... 20mA (Pin 7)
Interface	RS232
Pulse lengthening	0 ... 100 ms, einstellbar über PC-Software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency	LED operation, can be switched via PC software: AC operation: max. 85 kHz (depends on parameterization) DC and OFF operation: max. 200 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Analog band width	typ. 90 kHz (-3 dB)
Transmitter (light source)	Transmitter channel 0: White-light LED Transmitter channel 1: White-light LED
Receiver	Receiver channel 0: Photo diode (400 nm ... 1000 nm) Receiver channel 1: Photo diode (400 nm ... 1000 nm)
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF)
Object distance (measurement range)	with reflected light fiber optics: typ. 1 mm ... 500 mm (depends on fiber optics and attachment optics) with transmitted light fiber optics: typ. 10 mm ... 500 mm (depends on fiber optics and attachment optics)
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Size of light spot	depends on fiber optics and attachment optics (cf. catalog FIO series)
Reproducibility	2 digits at 12-bit A/D conversion (equates 1/2048)
Housing dimensions	LxWxH approx. 100 mm x 65 mm x 38 mm (incl. fiber optics connector M18x1, without connectors)
Housing material	aluminum, anodized in black
Enclosure rating	IP64
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
Type of connector	connection to PLC: 8-pole fem. connector (Binder 712) connection to PC: 4-pole fem. connector (Binder 707)
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

Connector Assignment

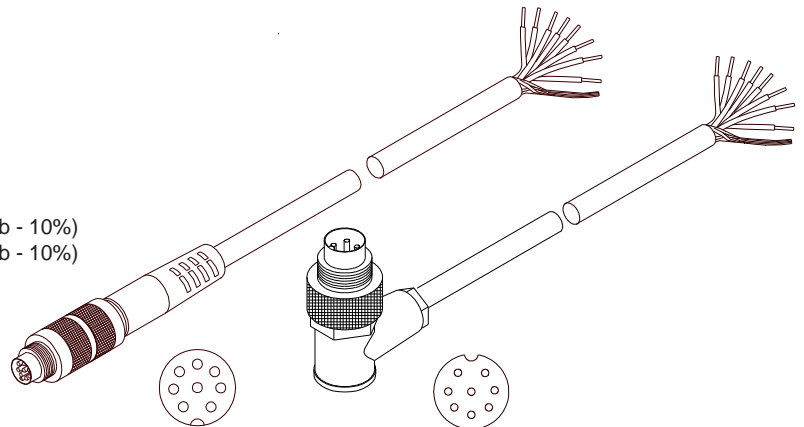
Connection to PLC:

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	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:

Connecting cable (incl. driver software):
 cab-4/USB-(length)
 cab-4/USB-w-(length) (angle type 90°)
 (standard length 2m)

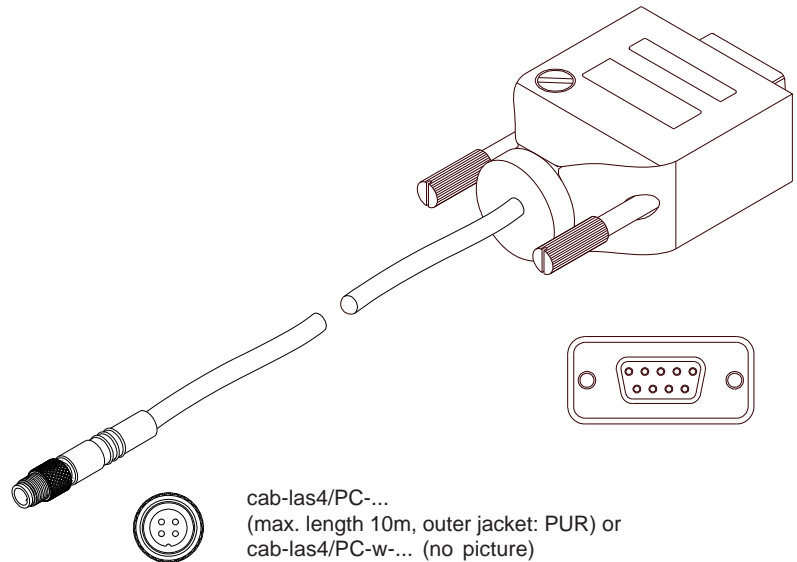
alternative:

Connection to local network via Ethernet bus:

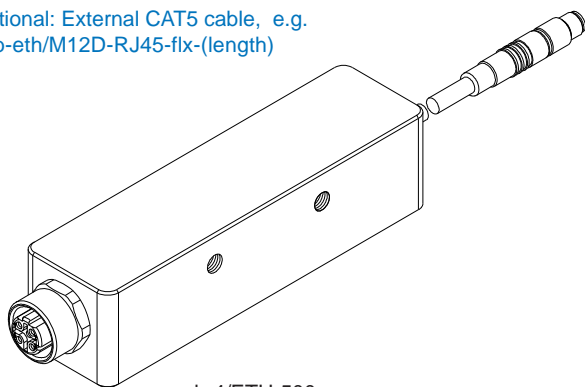
Adapter (incl. software „SensorFinder“):
 cab-4/ETH-500
 (standard length 0.5m)

Optional: External CAT5 cable, e.g.

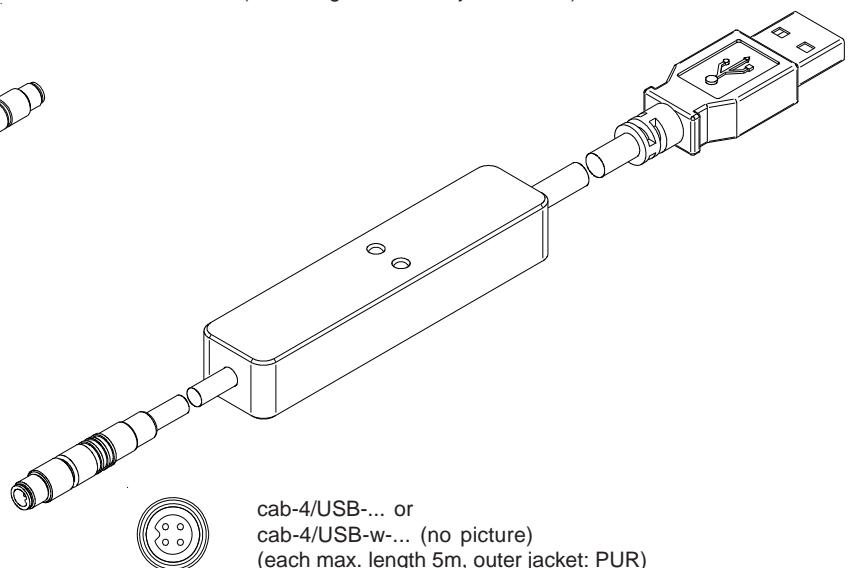
cab-eth/M12D-RJ45-flx-(length)



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)



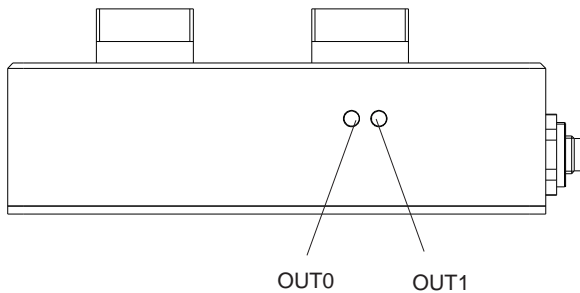
cab-4/USB-... or
 cab-4/USB-w-... (no picture)
 (each max. length 5m, outer jacket: PUR)



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 SPECTRO-2-FIO sensor is a 2-channel system, which means it features two fiber optics connections that (initially) are independent of each other. All the fiber optics of the FIO series (through-beam fiber optics type D-... and reflective fiber optics type R-... as well as fiber optics with two sensor heads type X-...) can be used with this sensor.

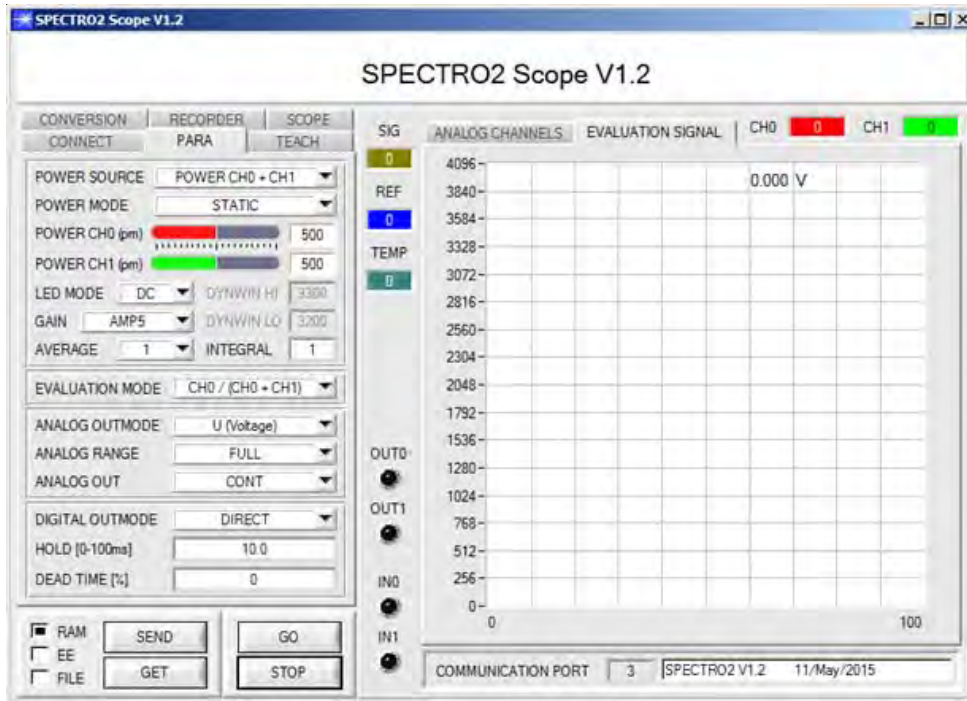
The desired operating mode can be set with the SPECTRO2-Scope Windows® software:

- Separate evaluation (every channel operates independently, typ. 2-channel system)
- Normed evaluation (the relation of the two channels is determined by way of norming)
- Summation (the two channels are added)
- Subtraction (the difference of the two channels is calculated)
- Differentiation (calculation of the first derivative of the two channels)

To prevent mutual influencing of the two channels, different optical filters (depending on the respective type) or a timing offset of the respective LED can be used.

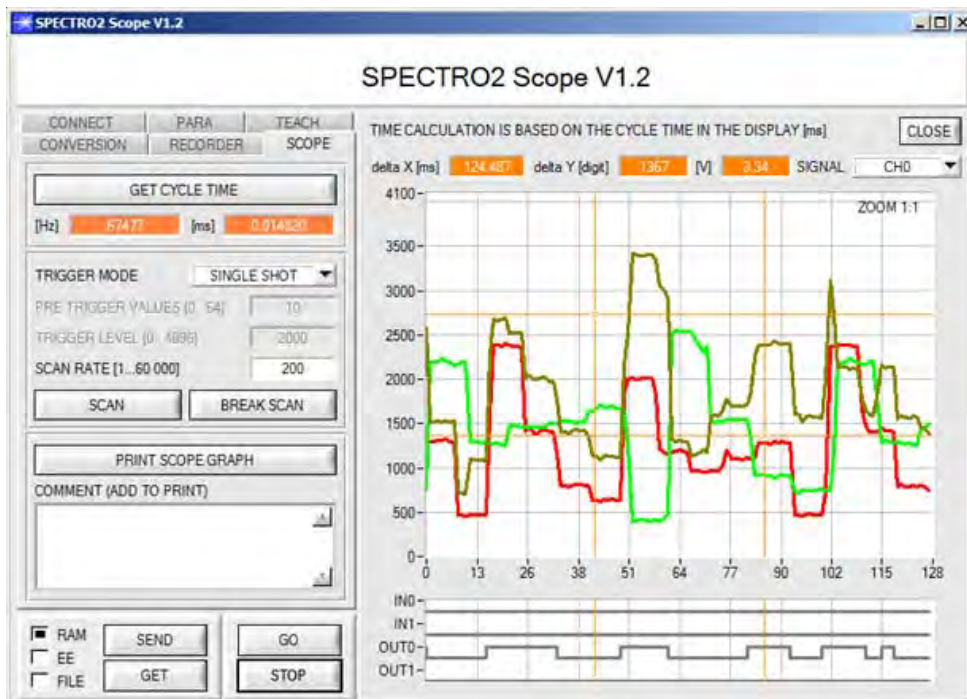
Parameterization

Windows® user interface:



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 an Ethernet adaptor, e.g. SI-RS232/Ethernet-4-...). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.

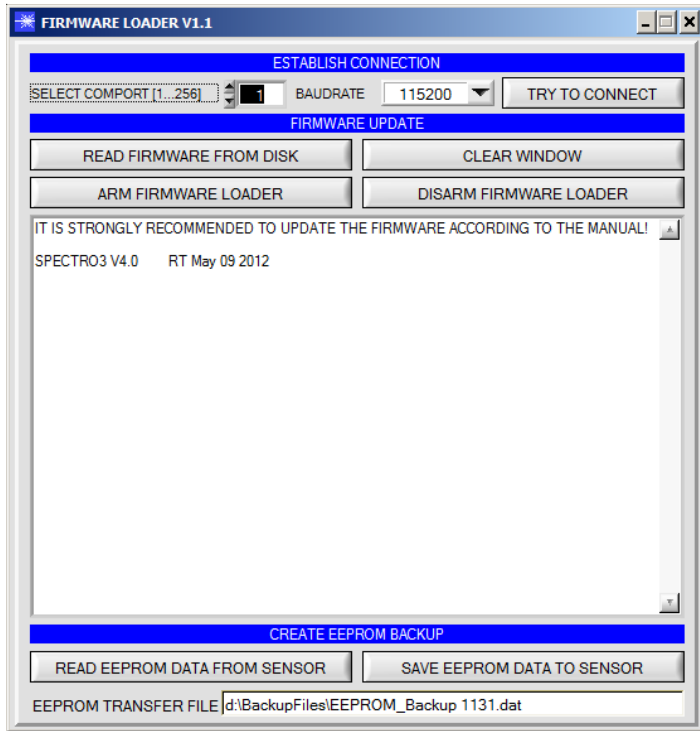


The SCOPE tab visualizes an oscilloscope.



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.

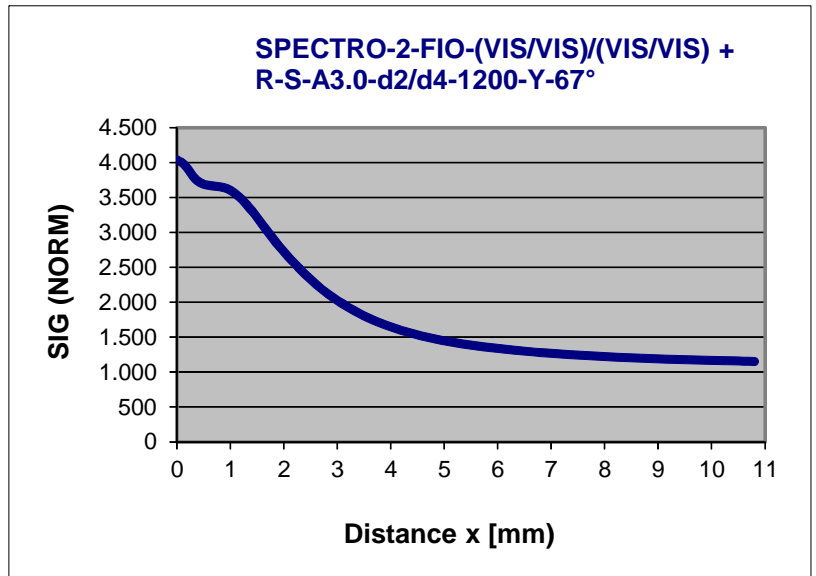
An initialisation file (xxx.ini) and a firmware file (xxx.elf.S) are required for performing a firmware update. These files can be obtained from your supplier. In some cases an additional firmware file for the program memory (xxx.elf.p.S) is also needed, and this file will be automatically provided together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



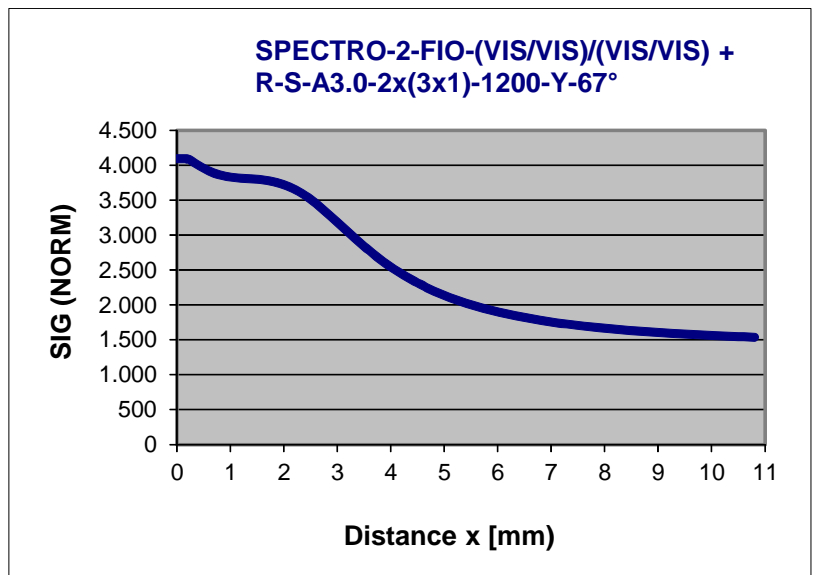
Diagrams

Diagrams: Standardized value NORM depending on the distance of the object (white paper) to the fiber optics head

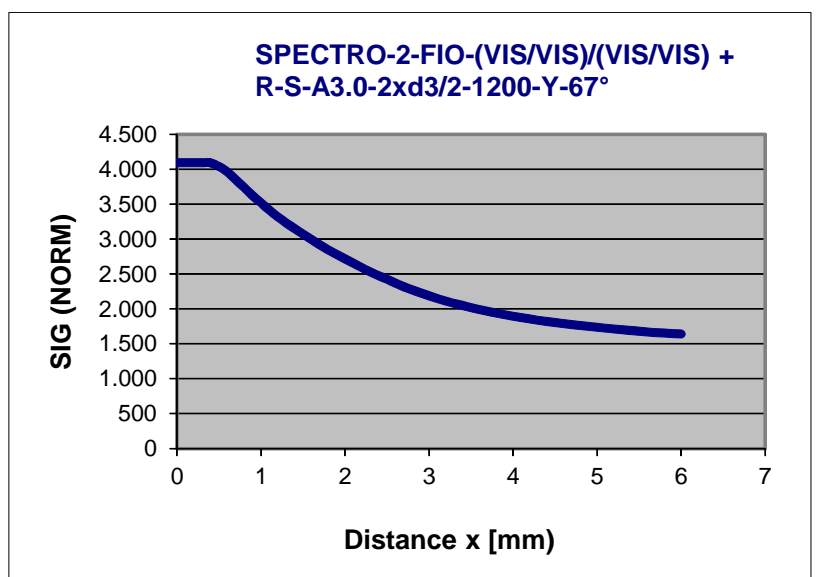
Standardized value NORM
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
with fiber optics R-S-A3.0-d2/d4-1200-Y-67°



Standardized value NORM
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
with fiber optics R-S-A3.0-2x(3x1)-1200-Y-67°



Standardized value NORM
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
with fiber optics R-S-A3.0-2xd3/2-1200-Y-67°

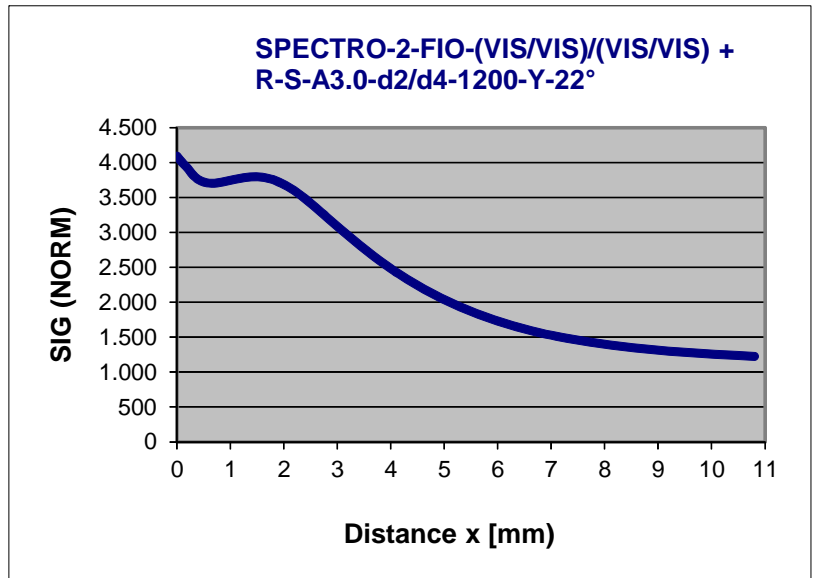




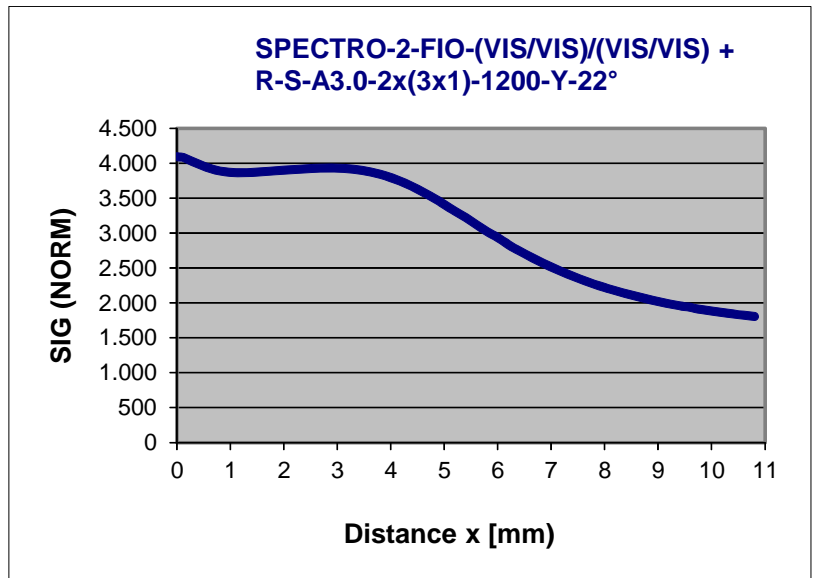
Diagrams

Diagrams: Standardized value NORM depending on the distance of the object (white paper) to the fiber optics head

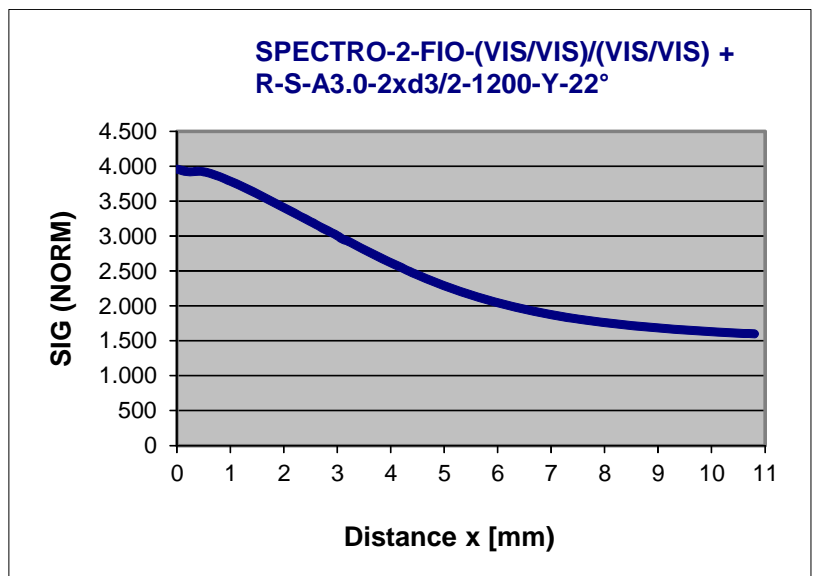
Standardized value NORM
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
with fiber optics R-S-A3.0-d2/d4-1200-Y-22°



Standardized value NORM
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
with fiber optics R-S-A3.0-2x(3x1)-1200-Y-22°



Standardized value NORM
SPECTRO-2-FIO-(VIS/VIS)/(VIS/VIS)
with fiber optics R-S-A3.0-2xd3/2-1200-Y-22°





Fiber Optics

Field of use:

Optical fibers offer solutions for difficult tasks in optoelectronics. They can be used universally and allow flexible applications.

Advantages:

- Highest quality
- Selection from different fiber types
- Thermal stability
- Great variety of available standard sensor heads
- Special designs
- Various attachment optics available



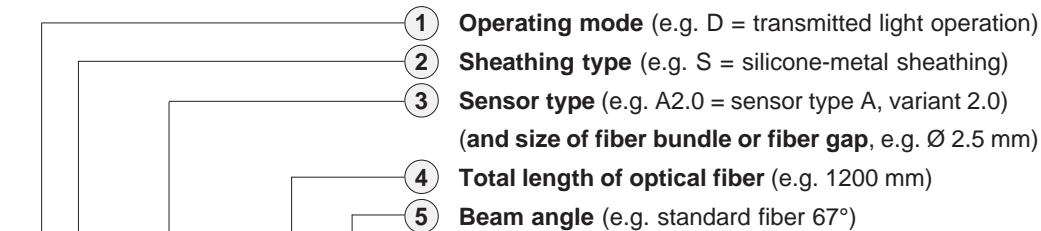
Characteristics:

Light-conducting glass fibers are optical components that allow the transmission of light through any curved path based on the principle of total reflection.

The individual fiber is composed of high-break core glass and low-break cladding glass. The light beams entering the core glass within the critical angle are guided through the fiber by way of reflection at the core/cladding contact surfaces (step index fiber).

The highly flexible optical fibers are made of bundled individual glass fibers. The ends are each glued into a sensor head and a connector. The faces are optically polished. For protection against mechanical, chemical, or thermal destruction the optical fibers are provided with a corresponding protective sheath.

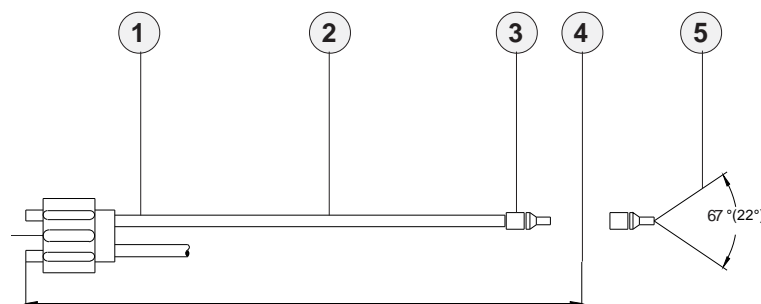
Order Code:



D-S-A2.0-(2.5)-1200-67°

Order code for optical fiber

(For detailed description of the various types of fiber optics, please cf. catalog „FIO Series“)



Dimensions of adapter

Attachment optics (e.g. focus lens, reflex optics, prismn optics)

Fiber optics for reflex light operation

Fiber optics for transmitted light operation

Mounting hints

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

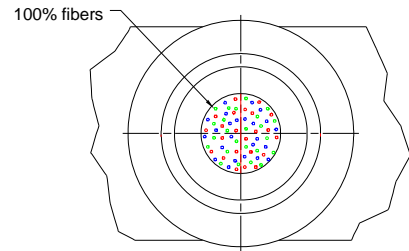
cf. catalog FIO Series



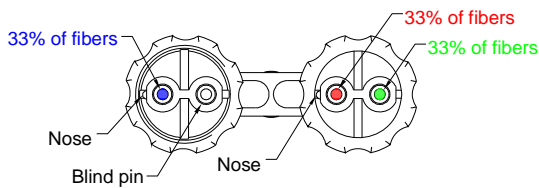
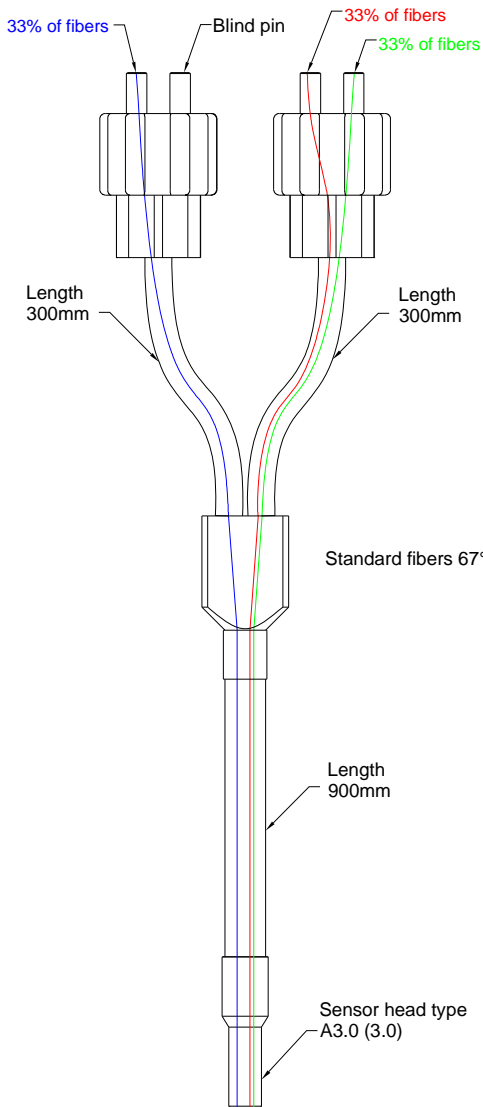
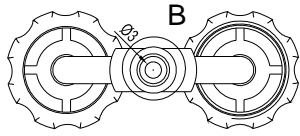
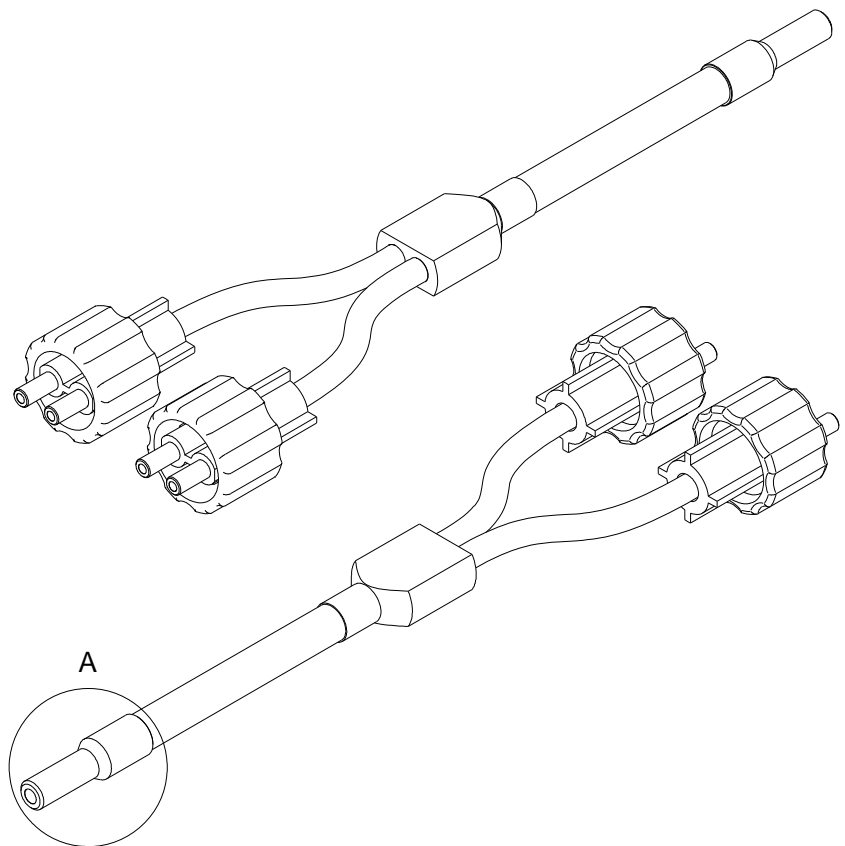
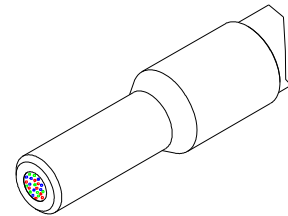
BICONE-Lichtleiter

R-S-A3.0-(3.0)-1200-Y-67°-(1P+1BP)/2P

Detail B



Detail A



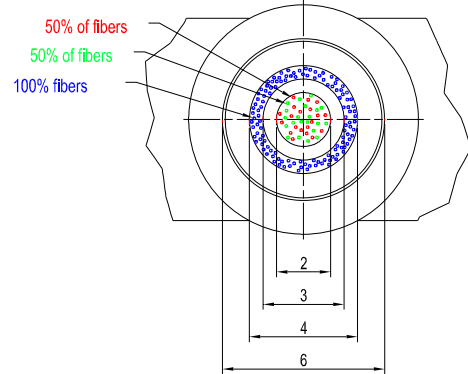
Alle Abmessungen in mm

BICONE Fiber Optics

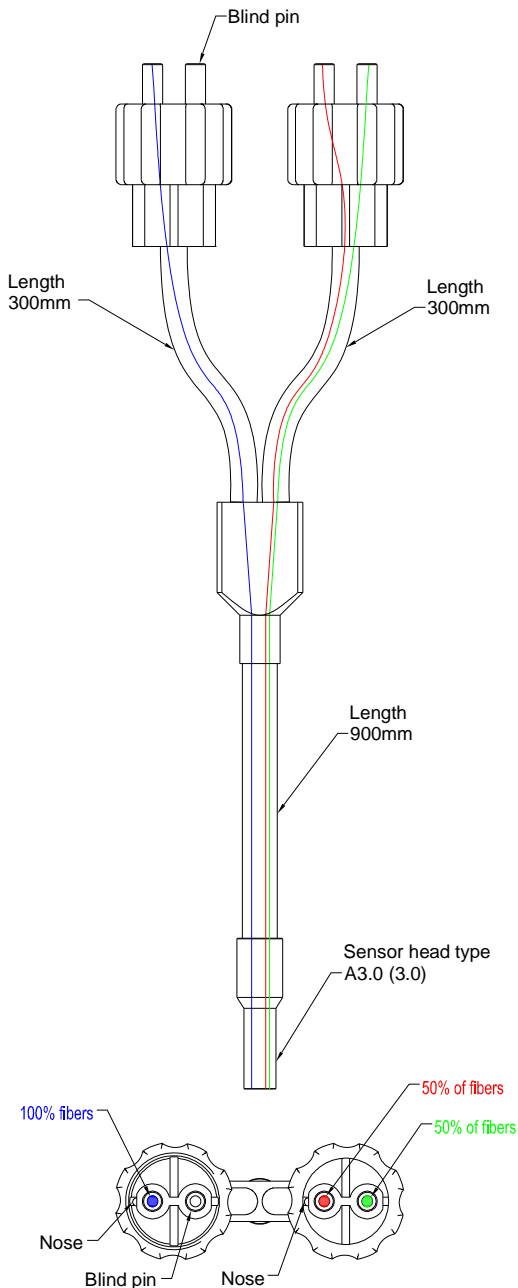
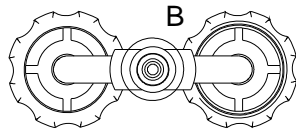
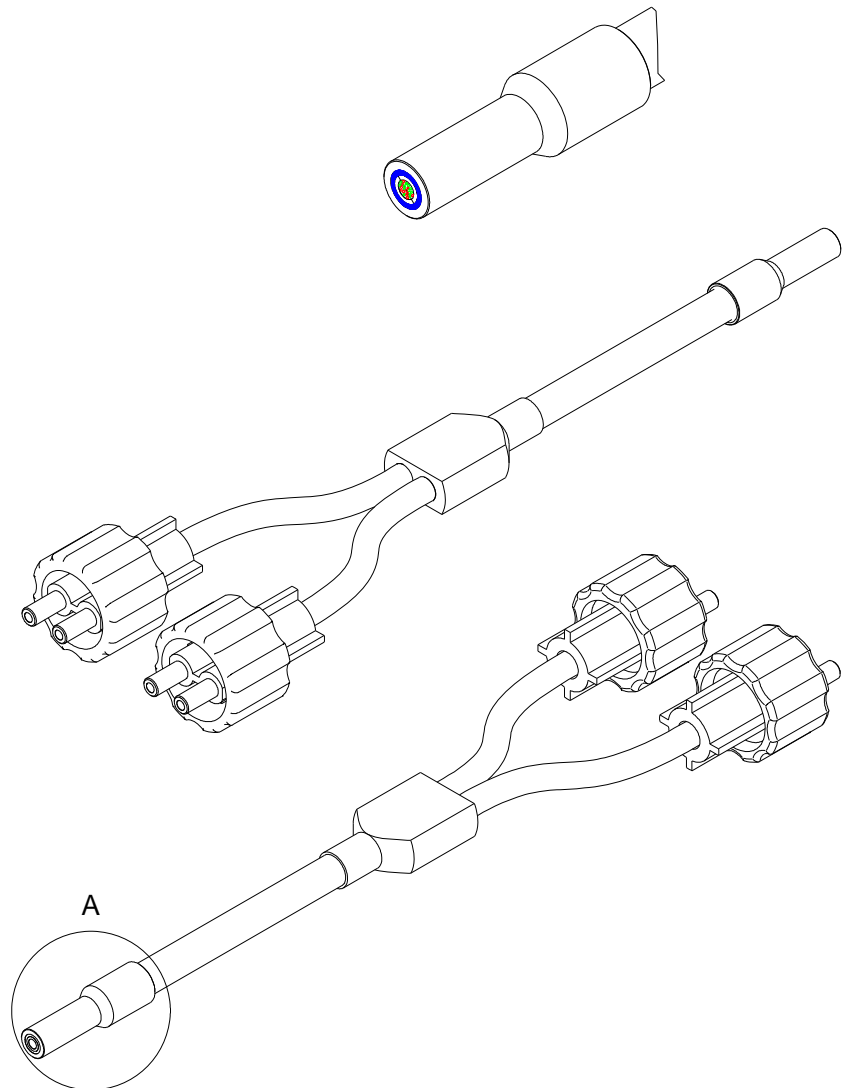
R-S-A3.0-(d2/d4)-1200-Y-22°-(1P+1BP)/2P

R-S-A3.0-(d2/d4)-1200-Y-67°-(1P+1BP)/2P

Detail B



Detail A



All dimensions in mm

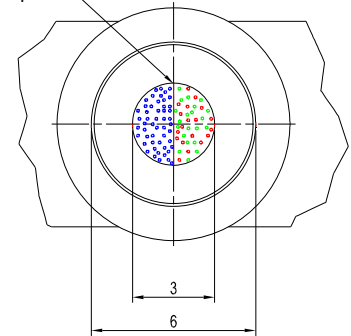
BICONE Fiber Optics

R-S-A3.0-(2xd3/2)-1200-Y-22°-(1P+1BP)/2P

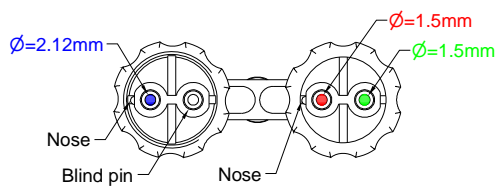
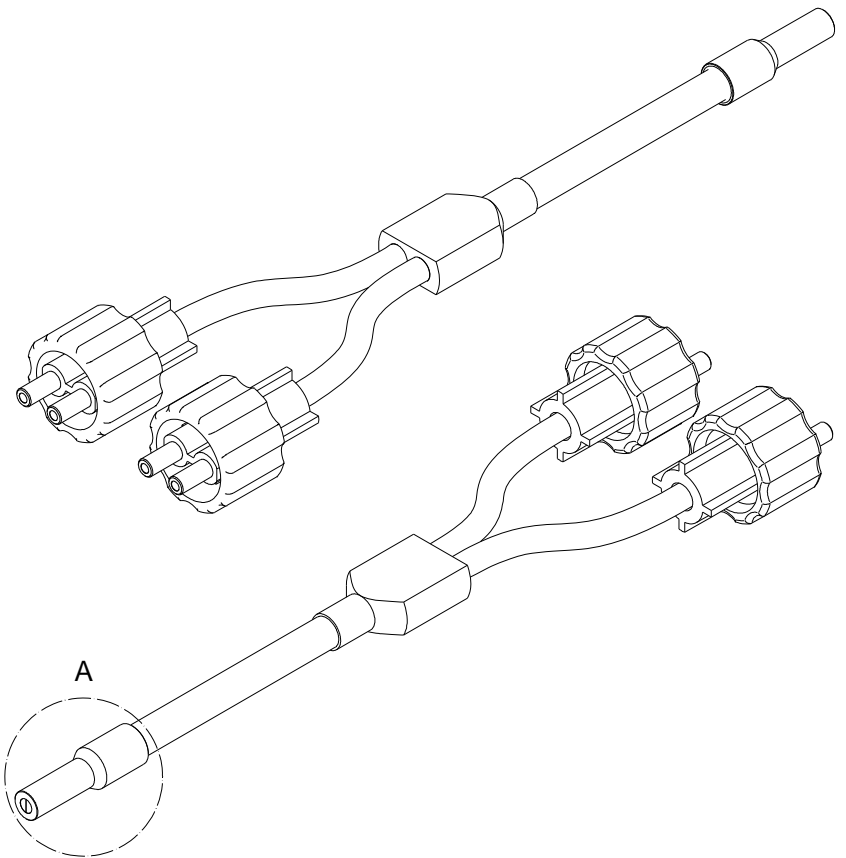
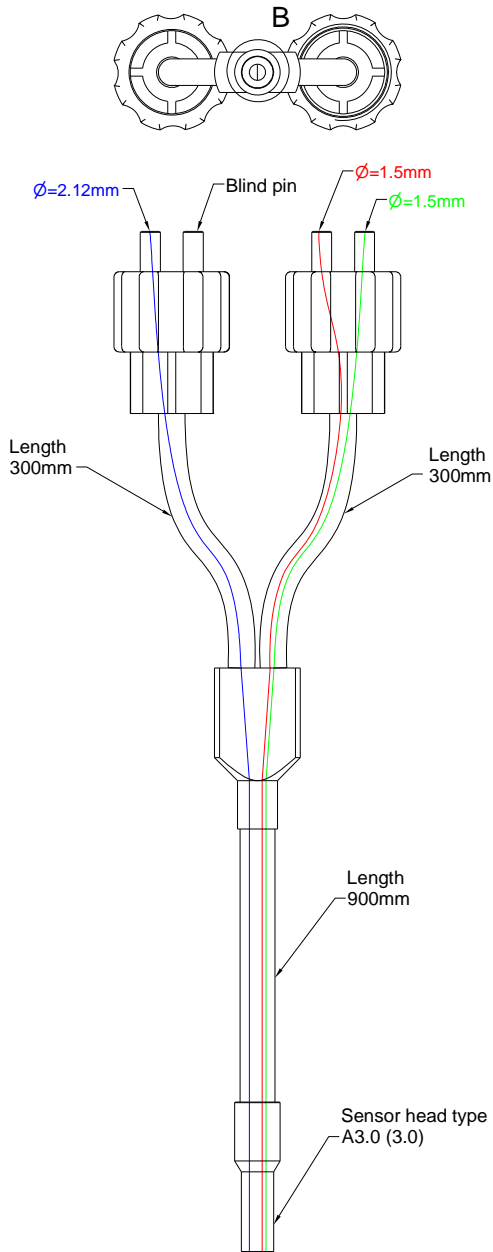
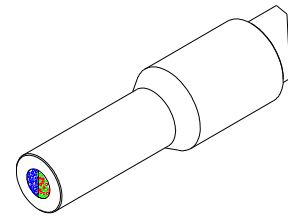
R-S-A3.0-(2xd3/2)-1200-Y-67°-(1P+1BP)/2P

No separating layer between, but fiber optics are divided into two sectors!

Detail B



Detail A

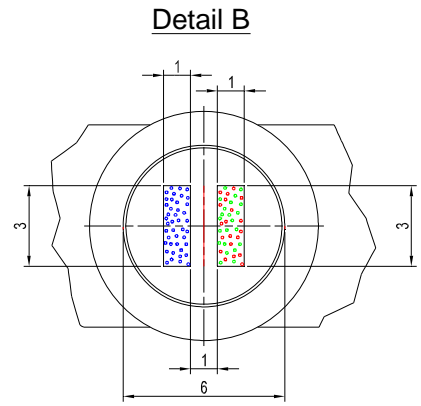


All dimensions in mm

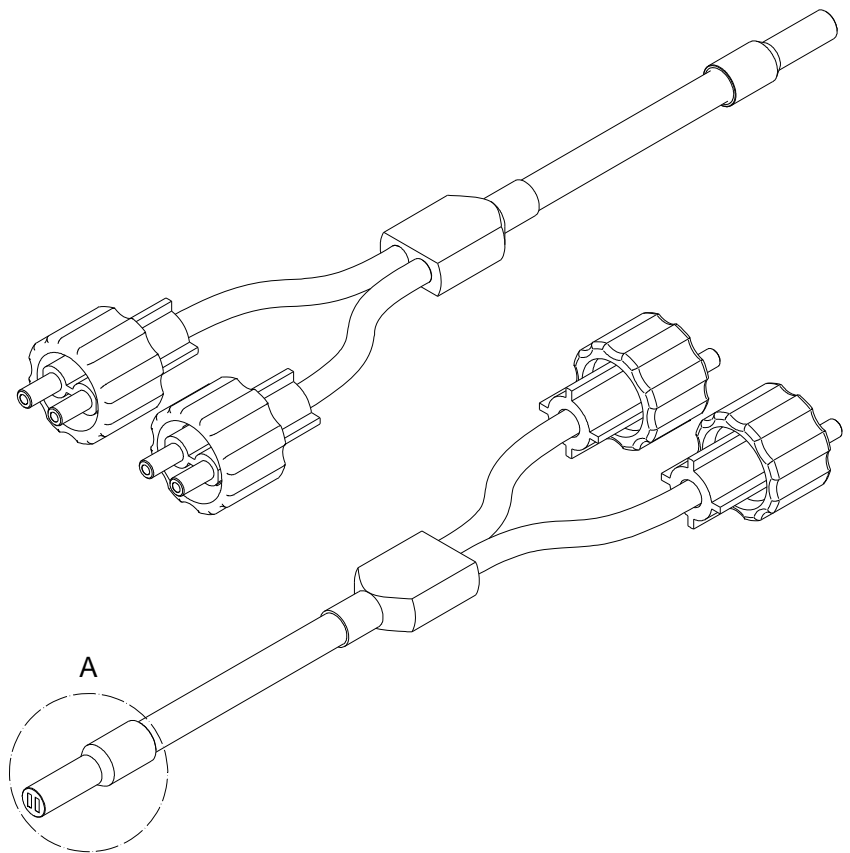
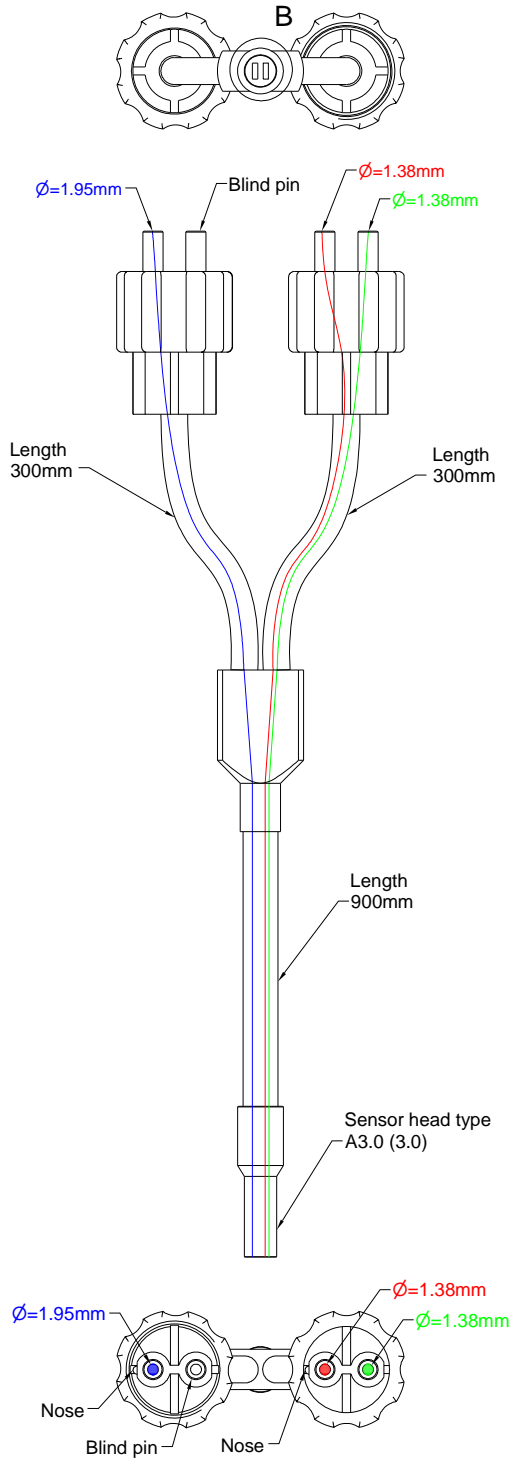
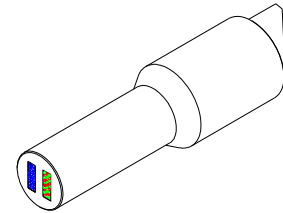
BICONE Fiber Optics

R-S-A3.0-2x(3x1)-1200-Y-22°-(1P+1BP)/2P

R-S-A3.0-2x(3x1)-1200-Y-67°-(1P+1BP)/2P



Detail A



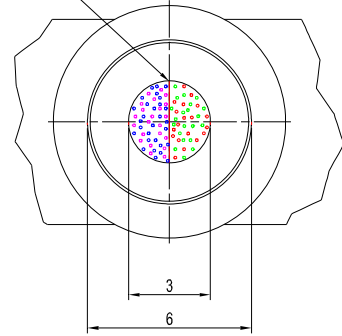
All dimensions in mm

Special Fiber Optics

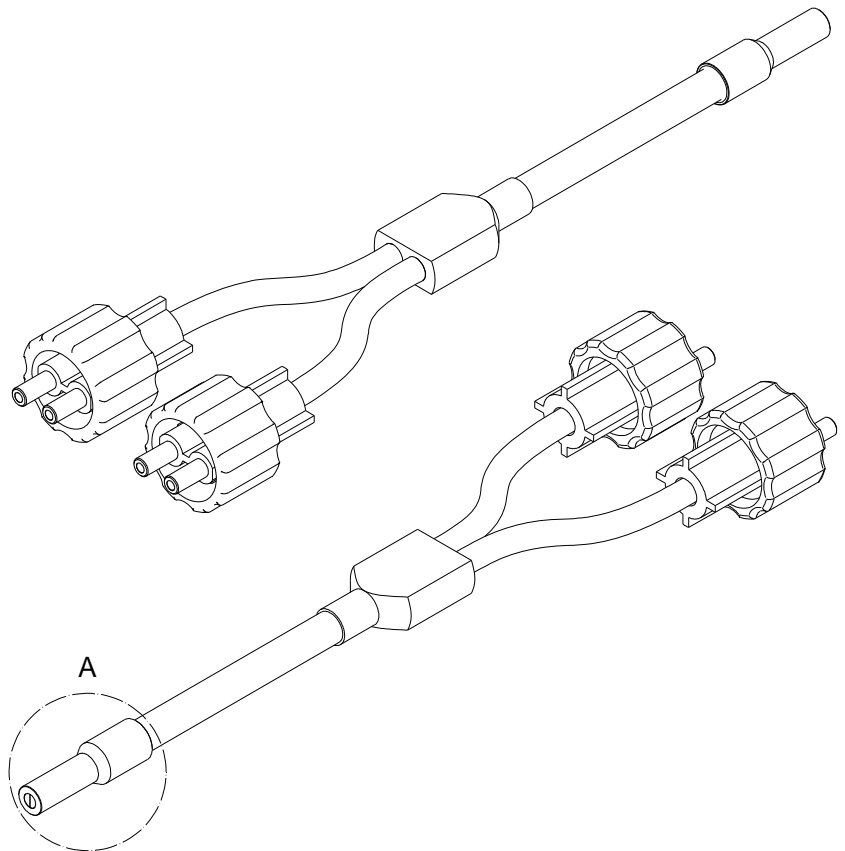
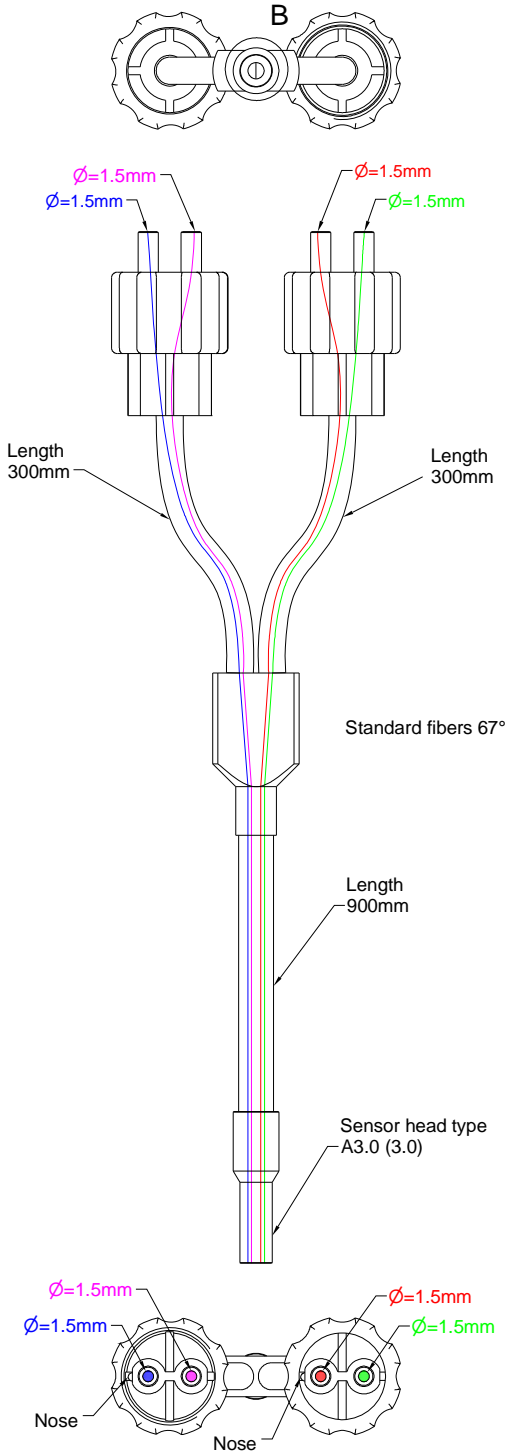
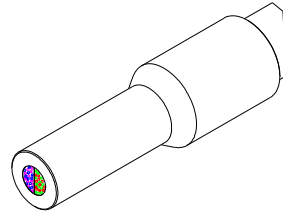
R-S-A3.0-(2xd3/2)-1200-Y-67°-2P/2P

Detail B

No separating layer between, but fiber optics are divided into two sectors!



Detail A

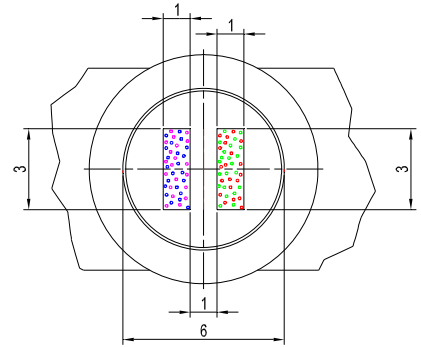


All dimensions in mm

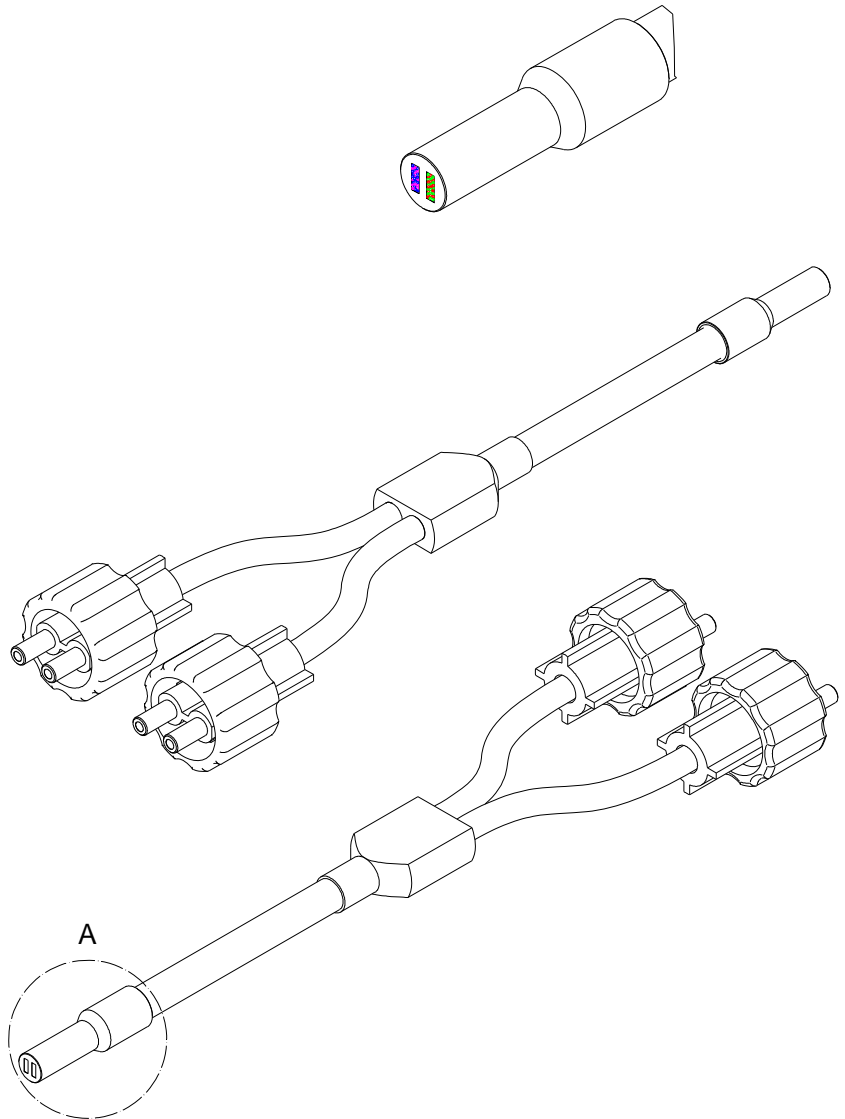
Special Fiber Optics

R-S-A3.0-2x(3x1)-1200-Y-67°-2P/2P

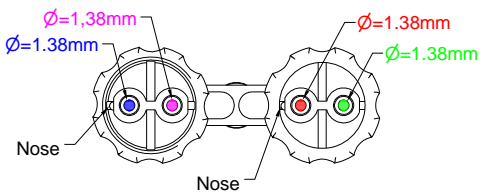
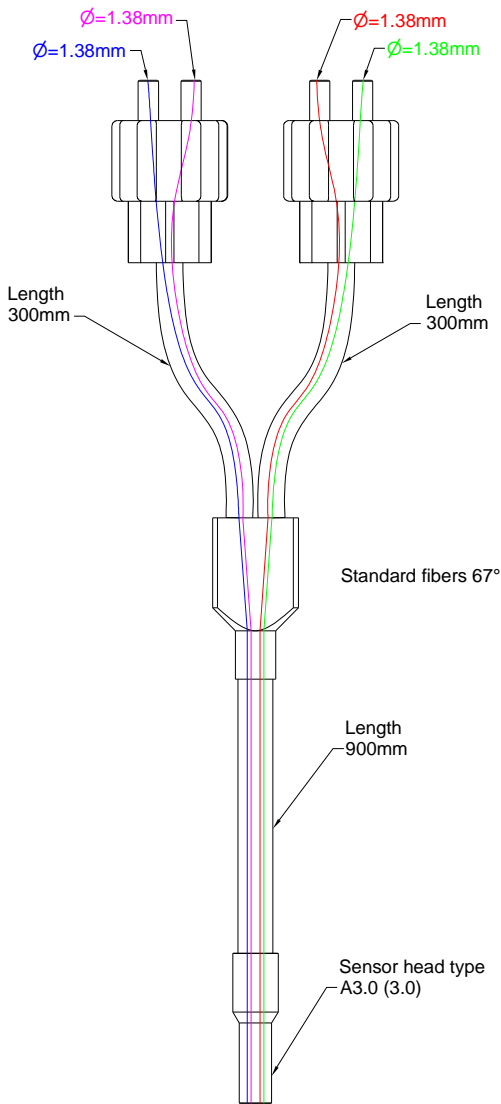
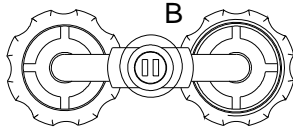
Detail B



Detail A

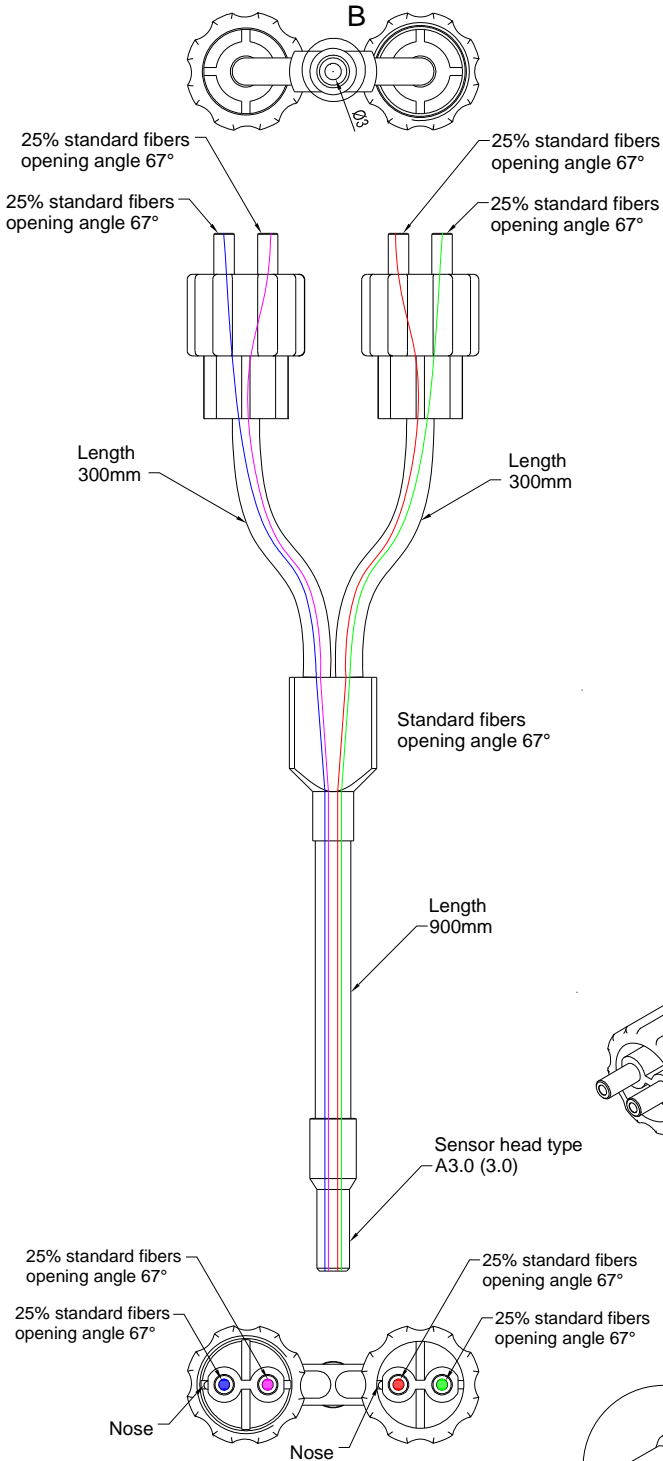


All dimensions in mm



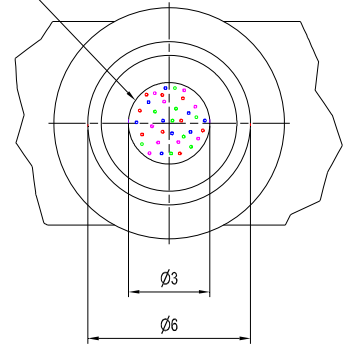
Special Fiber Optics

R-S-A3.0-(3.0)-1200-Y-67°-2P/2P

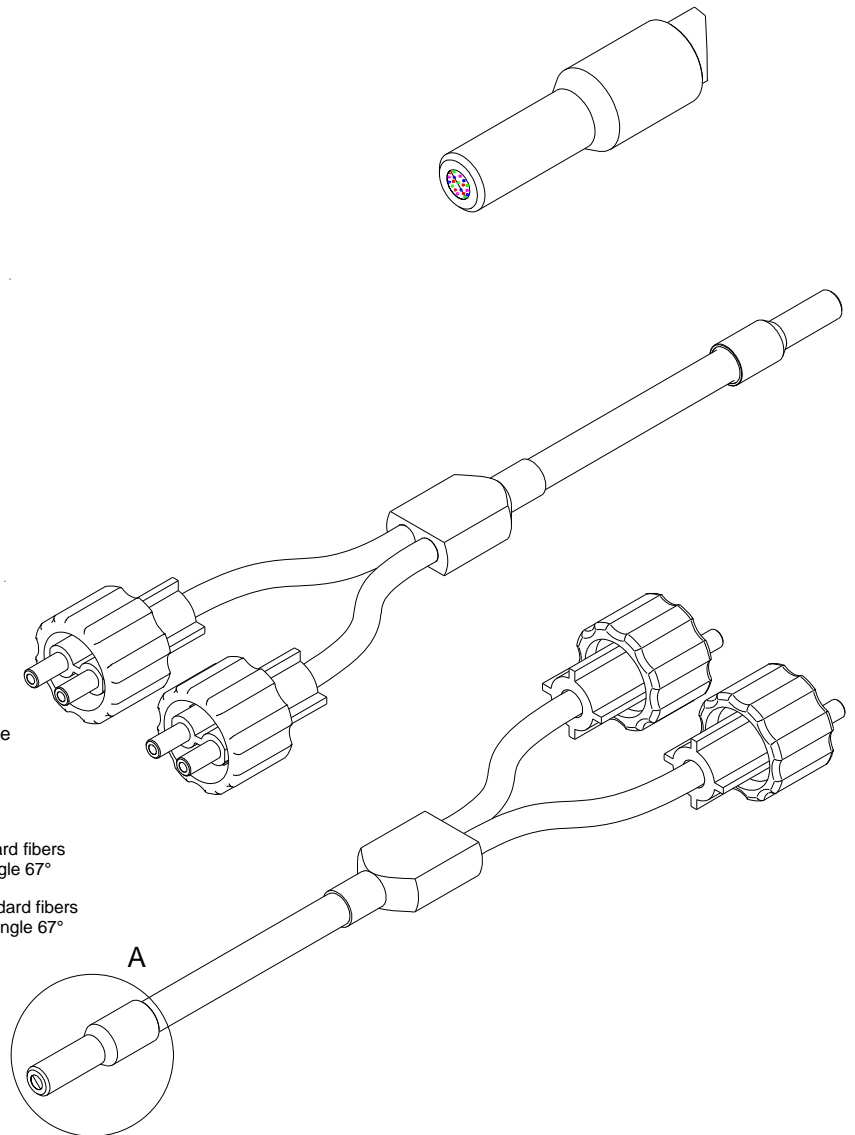


Detail B

Statistically mixed fibers!



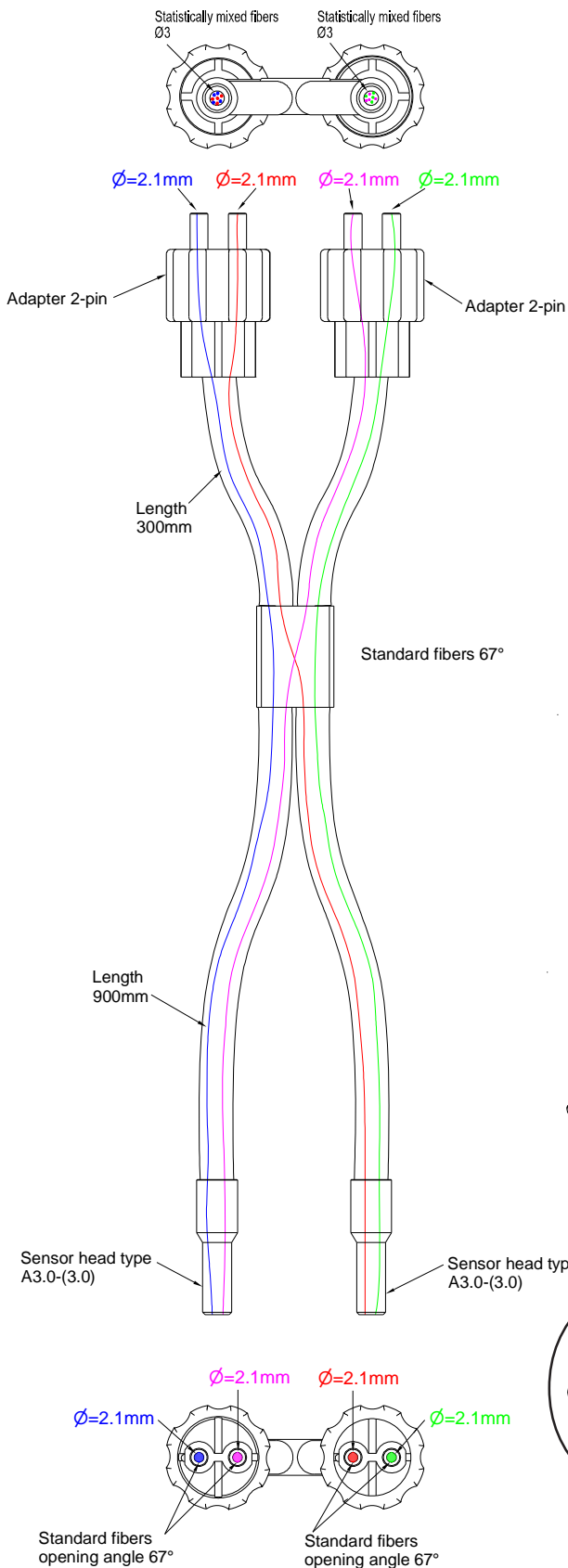
Detail A



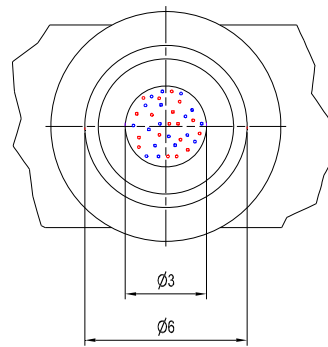
All dimensions in mm

Special Fiber Optics

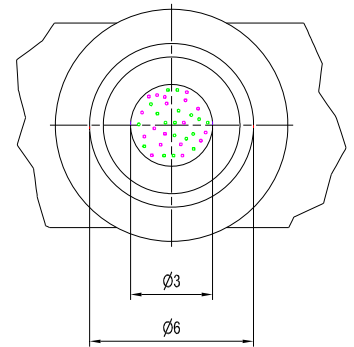
D-S-A3.0-(3.0)-1200-Y-67°-2P/2P



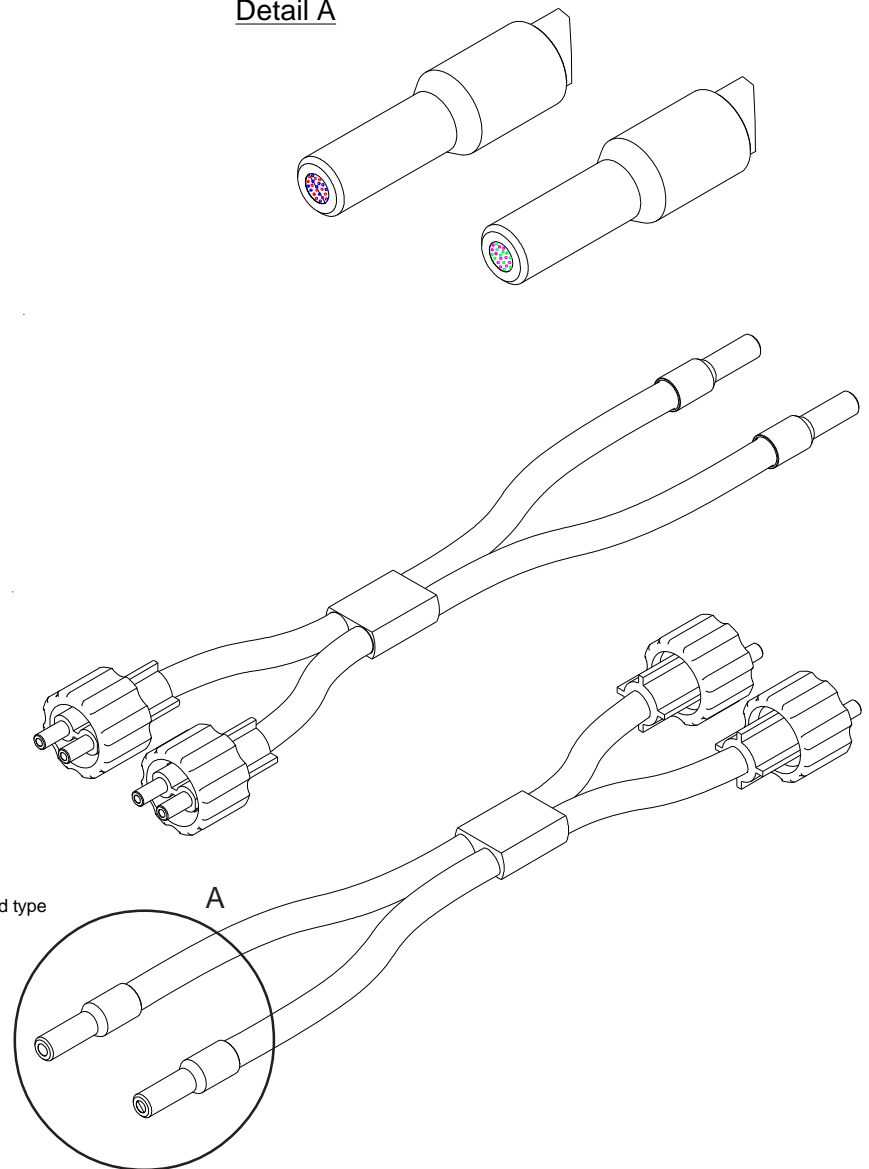
Detail



Detail



Detail A



All dimensions in mm



Optical Frontends

Overview: Optical frontends for fiber optics





Optical Frontends

Optical frontends for reflected light or transmitted light fiber optics:

Part number:	Suitable for fiber optics type: (R, T = reflected light, D= transmitted light)	Characteristics:
KL-1-A2.0 (2 pcs. necessary)	D-S-A2.0-(2.5)-...-67° or 22°	Transmitter/receiver distance typ. 50 mm ... 200 mm
KL-2-A2.0	R-S-A2.0-(2.5)-...-67° or 22°	Transmitter/receiver distance max. 300 mm, beam divergency ± 7,5°
KL-2-A2.0 (2 pcs. necessary)	D-S-A2.0-(2.5)-...-67° or 22°	Transmitter/receiver distance max. 300 mm, beam divergency ± 7,5°
KL-3-A2.0	R-S-A2.0-(2.5)-...-67° or 22°	Working distance typ. 10 mm ... 20 mm
KL-D-3/30-R/D-A2.0	R/D-S-A2.0-(2.5)-1200-67° <i>Special version*</i>	Working distance typ. 30 mm
KL-4-A1.1	R-S-A1.1-(0.6)-...-67° or 22°	Working distance typ. 10 mm ... 15 mm
KL-4-A1.1	R-S-A1.1-(1.1)-...-67° or 22°	Working distance typ. 10 mm ... 15 mm
KL-4-A1.1	R-S-A1.1-(1.5)-...-67° or 22°	Working distance typ. 10 mm ... 15 mm
KL-5-R1.1	R-S-R1.1-(3x0.5)-...-67° or 22°	Working distance typ. 8 mm ... 20 mm
KL-8-R2.1	R-S-R2.1-(6x1)-...-67° or 22°	Working distance typ. 8 mm ... 25 mm
KL-8-N-R2.1	R-S-R2.1-(6x1)-...-67° or 22°	Working distance typ. 8 mm ... 25 mm <i>with guide slot (adjustment aid)</i>
KL-8/90°-R2.1	R-S-R2.1-(6x1)-...-67° oder 22°	Working distance typ. 8 mm ... 25 mm
KL-9-A3.0	R-S-A3.0-(3.0)-...-67° or 22°	Working distance typ. 8 mm ... 25 mm
KL-90-A2.0 (2 pcs. necessary)	D-S-A2.0-(2.5)-...-67° or 22°	Working distance typ. 20 mm ... 100 mm - <i>prismatic optics</i>
KL-52-XL-A3.0	R-S-A3.0-(3.0)-...-67°	Optics diameter 52 mm
KL-M8-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 8 mm ... 20 mm
KL-M12-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-XL-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M12-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M12/90°-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M12-XL-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M18-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 20 mm ... 60 mm
KL-M18-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 20 mm ... 60 mm
KL-M18-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 20 mm ... 60 mm
KL-M18-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-XL-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL--0°/(17°-60°)-30-M5.0	2x T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Angle between the two fiber optics is adjustable from 17° to 60°

*Special version:

Version is different to the standard version (e.g. no standard fiber adapter) and therefore is suitable only for certain sensors or applications



Optical Frontends

Optical frontends for reflected light or transmitted light fiber optics:

Part number:	Suitable for fiber optics type: (R, T = reflected light, D= transmitted light)	Characteristics:
KL-M34-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 100 mm ... 250 mm
KL-M34-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 100 mm ... 250 mm
KL-M34-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 100 mm ... 250 mm
KL-M34-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-XL-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-(M25x1.5)-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	as above but with cable screw fitting M25x1.5
KL-M34-XL-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34/62-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-D-0°/2.5°-300-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 100 mm ... 500 mm
KL-D-0°/40°-9-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-0°/42°-9-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-0°/45°-30-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-0°/45°-30-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-5°-85-POL-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-5°-85-POL-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-6°-200-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 100 mm ... 230 mm
KL-D-14°-84-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 60 mm ... 120 mm
KL-D-14°-84-A2.0-T400	D-S-A2.0-(2.5)-1200-67°-T400	Working distance typ. 60 mm ... 120 mm <i>thermally stable up to 400°C</i>
KL-D-17°-49-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 30 mm ... 80 mm
KL-D-20°-31-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 50 mm
KL-D-28°-26-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 50 mm
KL-D-28°-26-KG2-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 50 mm
KL-D-30°-23-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 30 mm
KL-D-30°-23-KG2-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 30 mm
KL-D-40°-13-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 15 mm ... 25 mm
KL-D-40°-23-5/DIF-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-40°-23-5/DIF-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-45°-14-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-M12-0°/30°-9-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-M12-0°/30°-9-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-M12-XL-0°/30°-30-A2.0	D-S-A2.0-30°/30-A2.0 <i>Special version*</i>	Working distance typ. 10 mm ... 100 mm

*Special version:

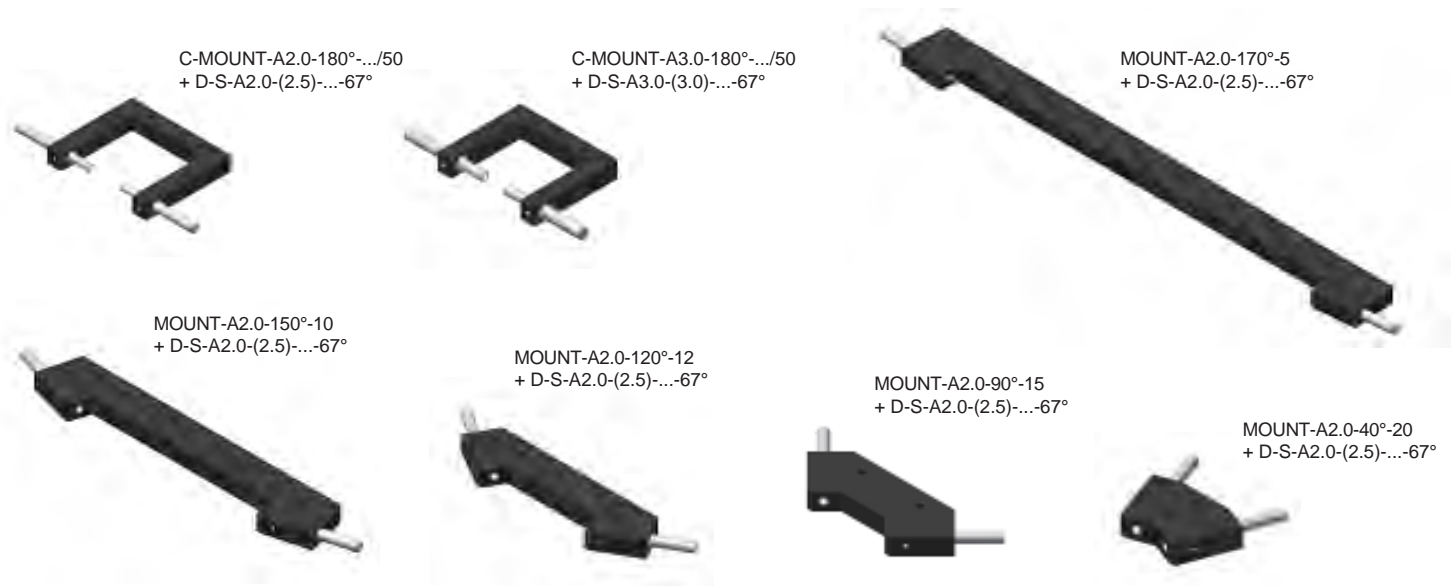
Version is different to the standard version (e.g. no standard fiber adapter) and therefore is suitable only for certain sensors or applications



Fiber Optics Fixtures

Mounting brackets (fixtures) for transmitted light fiber optics with sensor head type „A2.0“, „A3.0“, or „R2.1“:

Part number:	Suitable for fiber optics type: (D= transmitted light)	Characteristics:
C-MOUNT-A2.0-180°-22/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 22 mm, fork width/depth: 50/50 mm
C-MOUNT-A2.0-180°-60/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 60/50 mm
C-MOUNT-A2.0-180°-100/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
C-MOUNT-A3.0-180°-16/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 16 mm, fork width/depth: 50/50 mm
C-MOUNT-A3.0-180°-60/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 94/50 mm
C-MOUNT-A3.0-180°-100/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
MOUNT-A2.0-170°-5	D-S-A2.0-(2.5)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A3.0-170°-5	D-S-A3.0-(3.0)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A2.0-150°-10	D-S-A2.0-(2.5)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A3.0-150°-10	D-S-A3.0-(3.0)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A2.0-120°-12	D-S-A2.0-(2.5)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A3.0-120°-12	D-S-A3.0-(3.0)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-R1.1-120°-12	D-S-R1.1-(3x0.5)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-R2.1-120°-12	D-S-R2.1-(6x1)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A2.0-90°-15	D-S-A2.0-(2.5)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A3.0-90°-15	D-S-A3.0-(3.0)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A2.0-40°-20	D-S-A2.0-(2.5)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces
MOUNT-A3.0-40°-20	D-S-A3.0-(3.0)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces





Fiber Optics Fixtures

Mounting brackets (fixtures) for transmitted light fiber optics with sensor head type „Q....“ (cross-section converter):

Part number:	Suitable for fiber optics type:	Characteristics:
	(D= transmitted light)	
C-MOUNT-Q1-180°-50/50	D-S-Q1-(5x0.5)-...-67°	Width of measuring range: 5 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q2-180°-50/50	D-S-Q2-(10x0.3)-...-67°	Width of measuring range: 10 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q3-180°-50/50	D-S-Q3-(18x0.3)-...-67°	Width of measuring range: 18 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q4-180°-50/50	D-S-Q4-(28x0.2)-...-67°	Width of measuring range: 28 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q5-180°-50/50	D-S-Q5-(38x0.15)-...-67°	Width of measuring range: 38 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q6-180°-50/50	D-S-Q6-(48x0.15)-...-67°	Width of measuring range: 48 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm



C-MOUNT-Q1-180°-50/50
+ D-S-Q1-(5x0.5)-...-67°



C-MOUNT-Q2-180°-50/50
+ D-S-Q2-(10x0.3)-...-67°



C-MOUNT-Q3-180°-50/50
+ D-S-Q3-(18x0.3)-...-67°



C-MOUNT-Q4-180°-50/50
+ D-S-Q4-(28x0.2)-...-67°



C-MOUNT-Q5-180°-50/50
+ D-S-Q5-(38x0.15)-...-67°



C-MOUNT-Q6-180°-50/50
+ D-S-Q6-(48x0.15)-...-67°

Mounting brackets (fixtures) for BICONE fiber optics or special fiber optics with sensor head type „A3.0“:

Part number:	Suitable for fiber optics type:	Characteristics:
	(BICONE or special fiber optics)	
MOUNT-A3.0/A3.0-0°/0°-9	R-S-A3.0-(3.0)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(d2/d4)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-(d2/d4)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-2x(3x1)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-2x(3x1)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-67°-2P/2P R-S-A3.0-2x(3x1)-1200-Y-67°-2P/2P R-S-A3.0-(3.0)-1200-Y-67°-2P/2P D-S-A3.0-(3.0)-1200-Y-67°-2P/2P	Parallel alignment of the fiber optics, distance of the fiber optics bundles (centers) to each other = 9 mm



SPECTRO Series

► SPECTRO-2-FIO-(UVC/UV)/(UVC/UV)

- Distance measurement of optically transparent objects (in the visible spectral range) such as glass, Plexiglas, various liquids
- Transmitter channel 0: UV LED (280nm) / Receiver channel 0: UV (190nm ... 400nm)
Transmitter channel 1: UV LED (280nm) / Receiver channel 1: UV (190nm ... 400nm)
- Various evaluation modes available (in combination with corresponding fiber optics):
Distance measurement (BICONE),
contrast comparison (NORM),
2-channel contrast measurement, ...
- Fast evaluation methods in DC-operation available (up to 100kHz)
- Insensitive to outside light (in AC-operation)
- Parameterizable via Windows® software
- RS232 interface (RS232/Ethernet adapter and RS232/USB adapter available)
- Suitable for use in hazardous areas (fiber optics)
- Two analog outputs (0V... +10V and 4mA...20mA)
- Two digital outputs (0V/+24V)
- External trigger input and teach input
- Linearization by means of an editable linearization curve



Design

Product name:

SPECTRO-2-FIO-(UVC/UV)/(UVC/UV)*

(incl. Windows® PC software SPECTRO2-Scope)

* 2-channel system:

(Transmitter channel 0/Receiver channel 0)/

(Transmitter channel 1/Receiver channel 1)

(UVC/UV)/(UVC/UV):

Transm. channel 0: UV LED (280nm) /

Receiver channel 0: UV (190nm ... 400nm) /

Transm. channel 1: UV LED (280nm) /

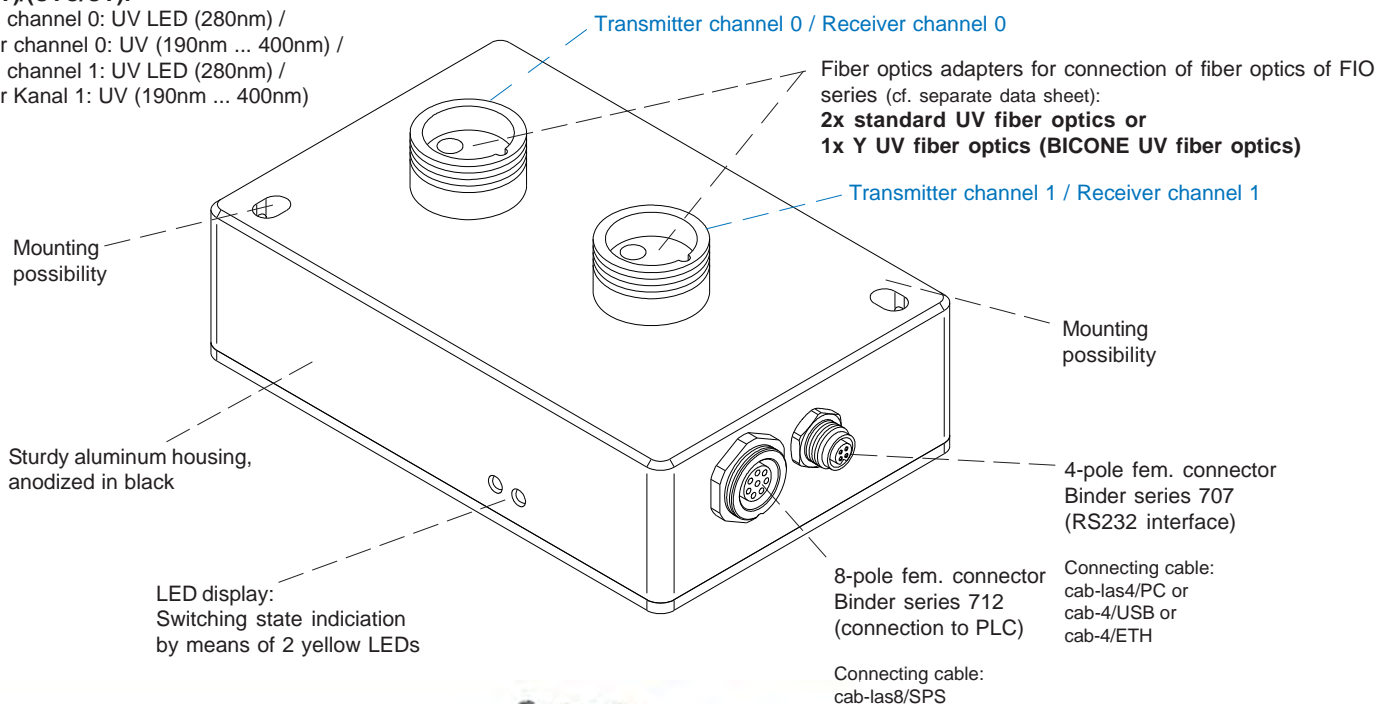
Receiver Kanal 1: UV (190nm ... 400nm)

Accessories: (p. 8-13)

UV fiber optics

BICONE UV fiber optics

Fiber optics fixtures

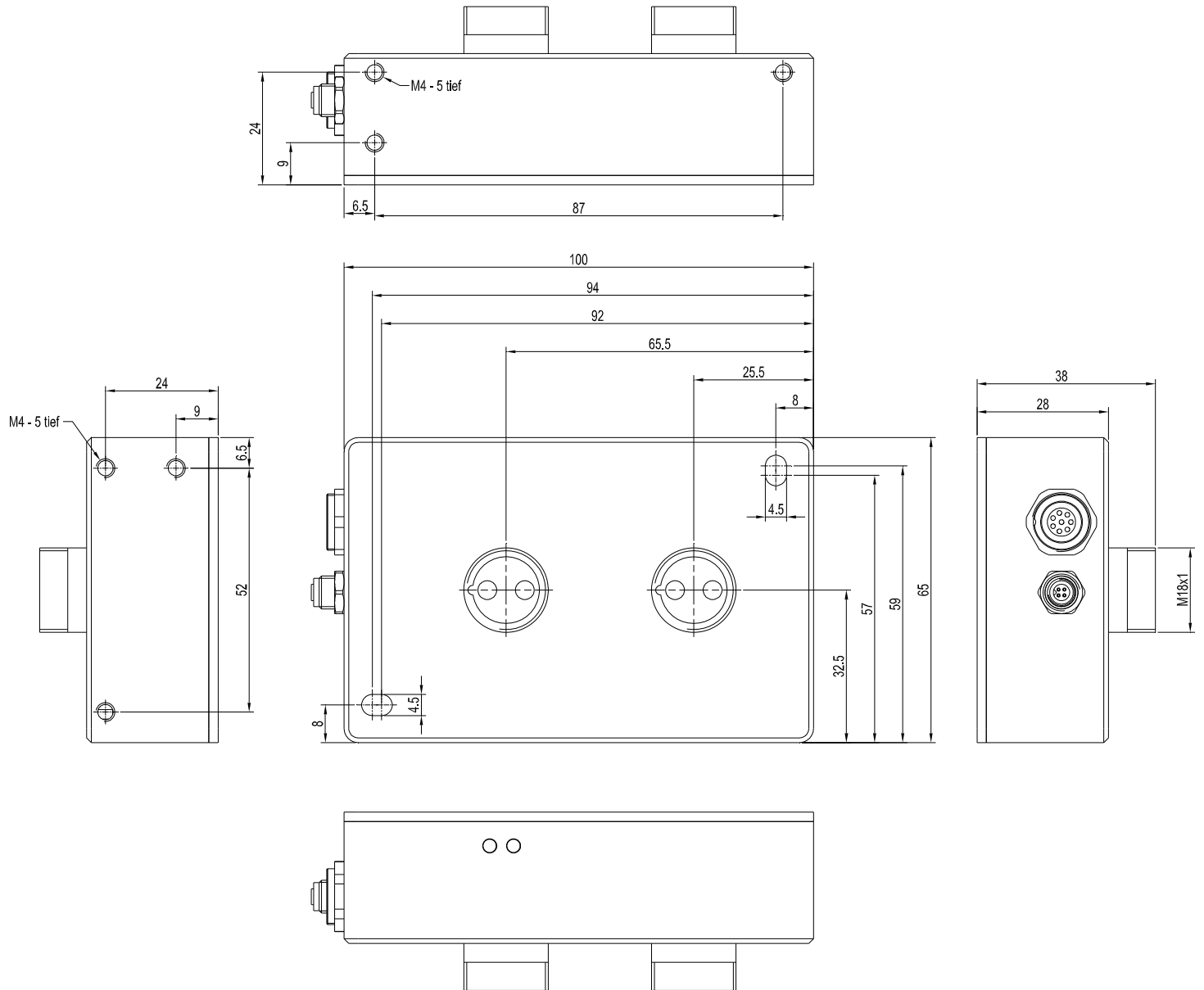




Technical Data

Model	SPECTRO-2-FIO(UVC/UV)/(UVC/UV)
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
Inputs digital (2x)	IN0 and IN1 (Pin 3 and 4): digital (0V/+24V)
Outputs digital (2x)	OUT0 and OUT1 (Pin 5 and 6): digital (0V/+24V), npn/pnp-able (bright-/dark-switching, can be switched)
Outputs analog (1x)	ANALOG voltage 0 ... +10V or ANALOG current 4 ... 20mA (Pin 7)
Interface	RS232
Pulse lengthening	0 ... 100 ms, einstellbar über PC-Software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency	LED operation, can be switched via PC software: AC operation: max. 85 kHz (depends on parameterization) DC and OFF operation: max. 200 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Analog band width	typ. 90 kHz (-3 dB)
Transmitter (light source)	Transmitter channel 0: UV-LED (280 nm) Transmitter channel 1: UV-LED (280 nm)
Receiver	Receiver channel 0: Photo diode with black glass filter (190 nm ... 400 nm) Receiver channel 1: Photo diode with black glass filter (190 nm ... 400 nm)
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF)
Object distance (measurement range)	with reflected light fiber optics: typ. 1 mm ... 50 mm (depends on fiber optics and attachment optics) with transmitted light fiber optics: typ. 10 mm ... 200 mm (depends on fiber optics and attachment optics)
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Size of light spot	depends on fiber optics and attachment optics (cf. catalog FIO series)
Reproducibility	2 digits at 12-bit A/D conversion (equates 1/2048)
Housing dimensions	LxWxH approx. 100 mm x 65 mm x 38 mm (incl. fiber optics connector M18x1, without connectors)
Housing material	aluminum, anodized in black
Enclosure rating	IP64
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-las4/USB or cab-las4/USB-w to PC/Ethernet interface: SI-RS232/Ethernet-4
Type of connector	connection to PLC: 8-pole fem. connector (Binder 712) connection to PC: 4-pole fem. connector (Binder 707)
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



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

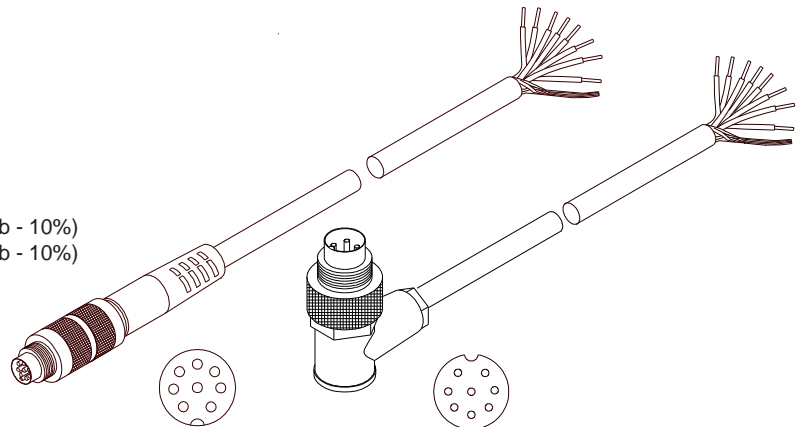
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC ($\pm 10\%$)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
6	pink	OUT1 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
7	blue	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:****Connecting cable (incl. driver software):**

cab-4/USB-(length)

cab-4/USB-w-(length) (angle type 90°)

(standard length 2m)

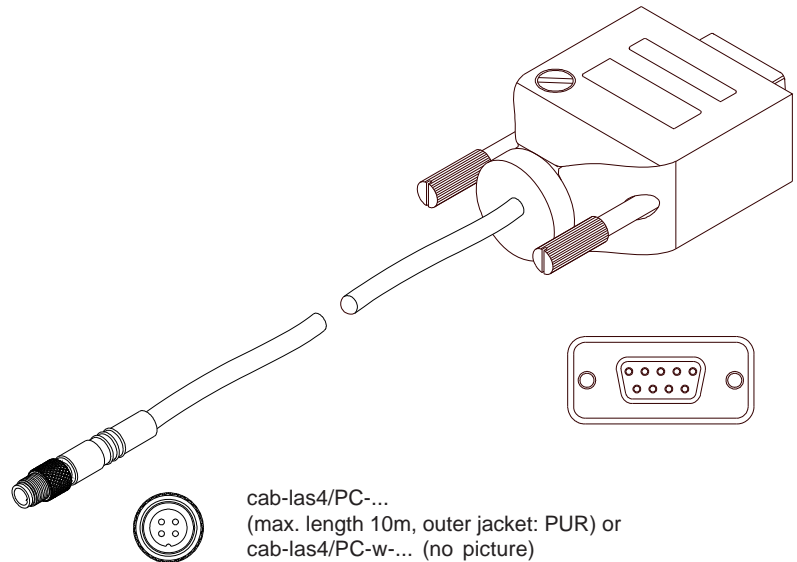
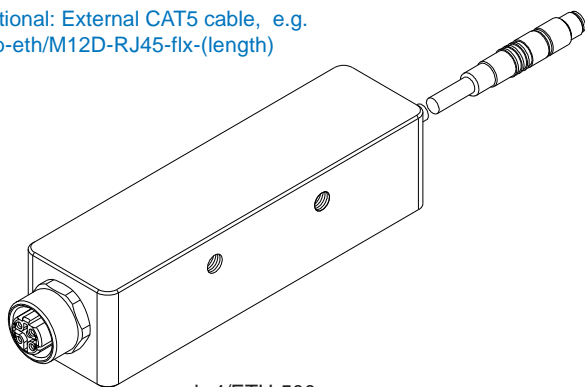
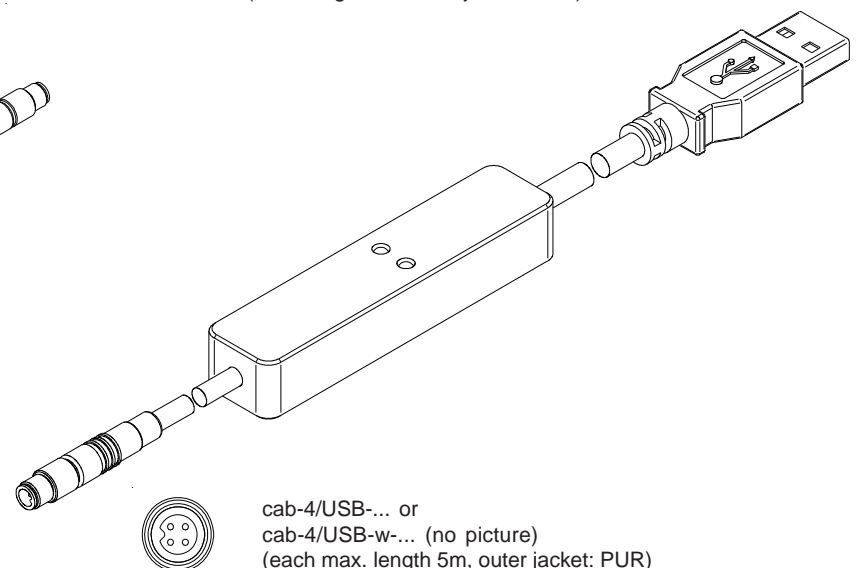
alternative:**Connection to local network via Ethernet bus:****Adapter (incl. software „SensorFinder“):**

cab-4/ETH-500

(standard length 0.5m)

Optional: External CAT5 cable, e.g.

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

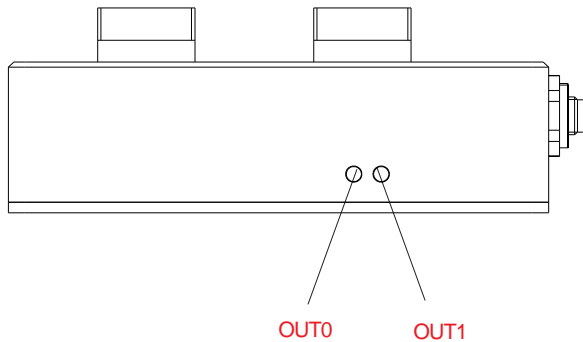
cab-las4/PC-...
(max. length 10m, outer jacket: PUR) or
cab-las4/PC-w-... (no picture)
(max. length 5m, outer jacket: PUR)cab-4/ETH-500
(length 0.5m, outer jacket: PUR)
4-pole M12 fem. conn. (D-coded)
for connection of an external
CAT5 cable, e.g.
cab-eth/M12D-RJ45-flx-(length)cab-4/USB-... or
cab-4/USB-w-... (no picture)
(each max. length 5m, outer jacket: PUR)



LED Display

LED display:

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



Measuring Principle

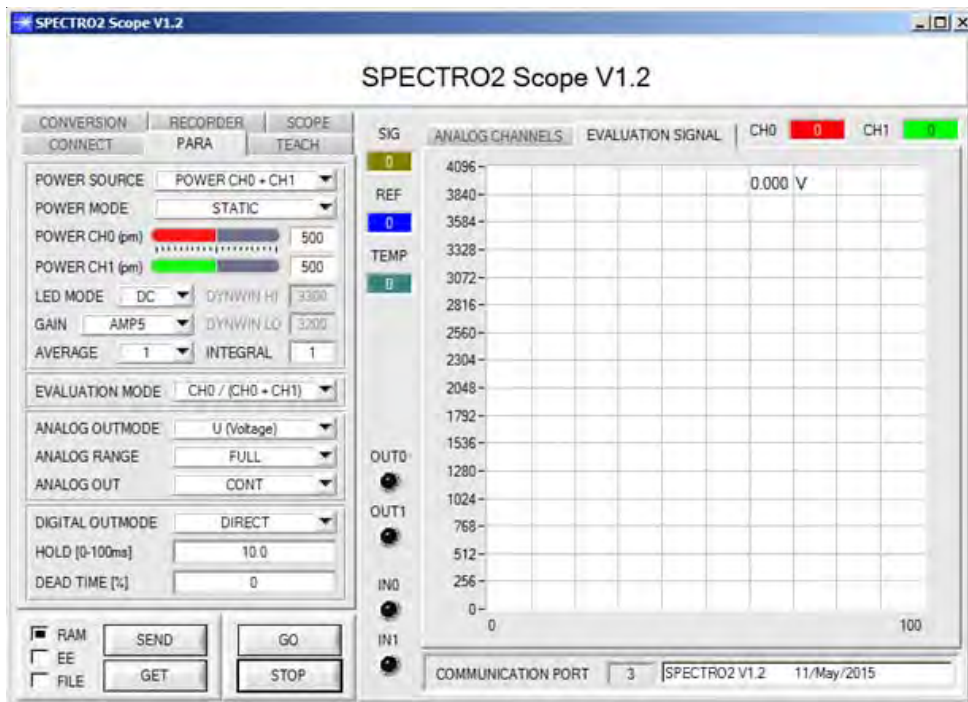
Measuring principle of the sensors of SPECTRO-2 series:

The SPECTRO-2-FIO sensor is a 2-channel system, which means it features two fiber optics connections that (initially) are independent of each other. All the fiber optics of the FIO series (through-beam fiber optics type D-... and reflective fiber optics type R-... as well as fiber optics with two sensor heads type X-...) can be used with this sensor.

The desired operating mode can be set with the SPECTRO2-Scope Windows® software:

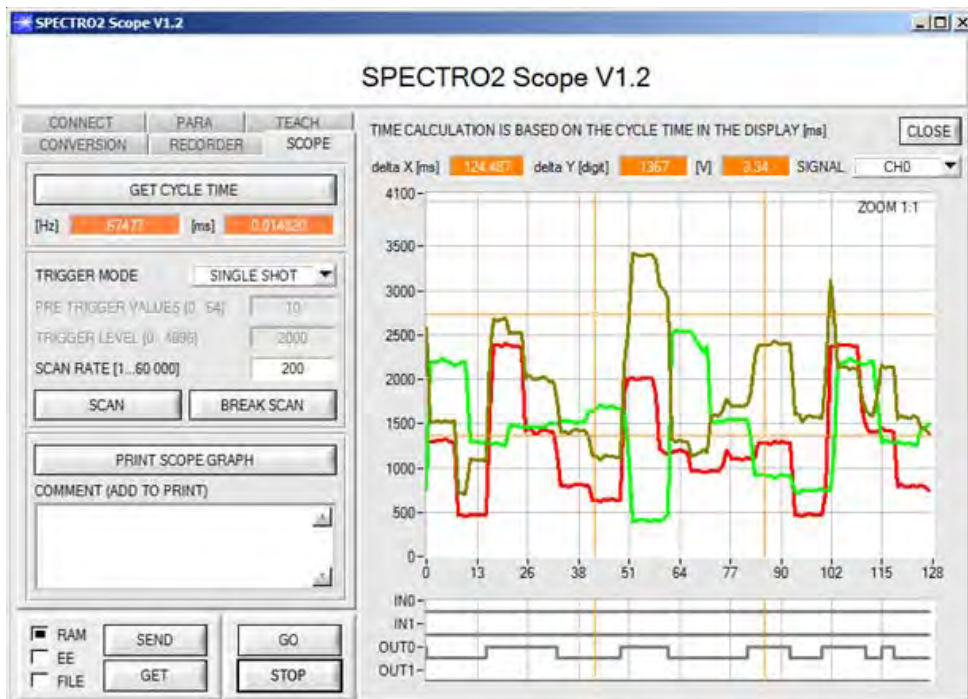
- Separate evaluation (every channel operates independently, typ. 2-channel system)
- Normed evaluation (the relation of the two channels is determined by way of norming)
- Summation (the two channels are added)
- Subtraction (the difference of the two channels is calculated)
- Differentiation (calculation of the first derivative of the two channels)

To prevent mutual influencing of the two channels, different optical filters (depending on the respective type) or a timing offset of the respective LED can be used.


Windows® user interface:

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 an Ethernet adaptor, e.g. SI-RS232/Ethernet-4-...). 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.



UV Fiber Optics

Available standard UV fiber optics:

- R-S-A3.0-(3.0)-600-22°-UV
- R-S-A3.0-(3.0)-1200-22°-UV
- R-S-R2.1-(6x1)-600-22°-UV
- R-S-R2.1-(6x1)-1200-22°-UV
- D-S-A2.0-(2.5)-600-22°-UV
- D-S-A2.0-(2.5)-1200-22°-UV
- D-S-A3.0-(3.0)-600-22°-UV
- D-S-A3.0-(3.0)-1200-22°-UV
- D-S-R2.1-(6x1)-600-22°-UV
- D-S-R2.1-(6x1)-1200-22°-UV



Available BICONE UV fiber optics:

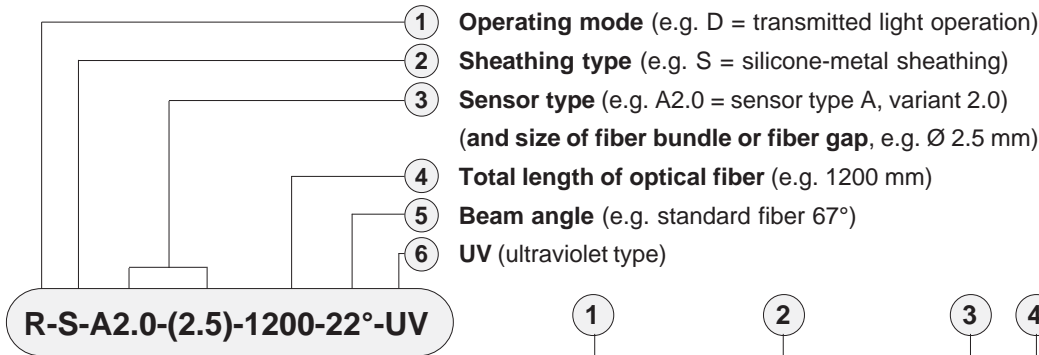
- R-S-A3.0-(d2/d4)-1200-Y-22°-UV-(1P+1BP)/2P
- R-S-A3.0-(2xd3/2)-1200-Y-22°-UV-(1P+1BP)/2P
- R-S-A3.0-2x(3x1)-1200-Y-22°-UV-(1P+1BP)/2P

(weitere Lichtleiter-Typen auf Anfrage erhältlich)

Characteristics:

Light-conducting glass fibers are optical components that allow the transmission of light through any curved path based on the principle of total reflection. The individual fiber is composed of high-break core glass and low-break cladding glass. The light beams entering the core glass within the critical angle are guided through the fiber by way of reflection at the core/cladding contact surfaces (step index fiber). The highly flexible optical fibers are made of bundled individual glass fibers. The ends are each glued into a sensor head and a connector. The faces are optically polished. For protection against mechanical, chemical, or thermal destruction the optical fibers are provided with a corresponding protective sheath.

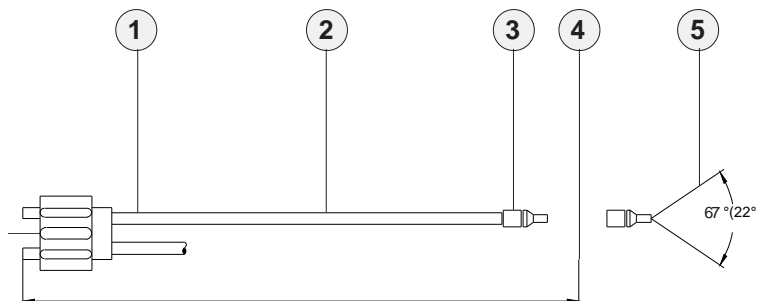
Order code:



R-S-A2.0-(2.5)-1200-22°-UV

Order code for optical fiber

(For detailed description of the various types of fiber optics, please cf. catalog „FIO Series“)



Dimensions of adapter

Attachment optics (e.g. focus lens, reflex optics, prism optics)

Fiber optics for reflex light operation

Fiber optics for transmitted light operation

Mounting hints

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

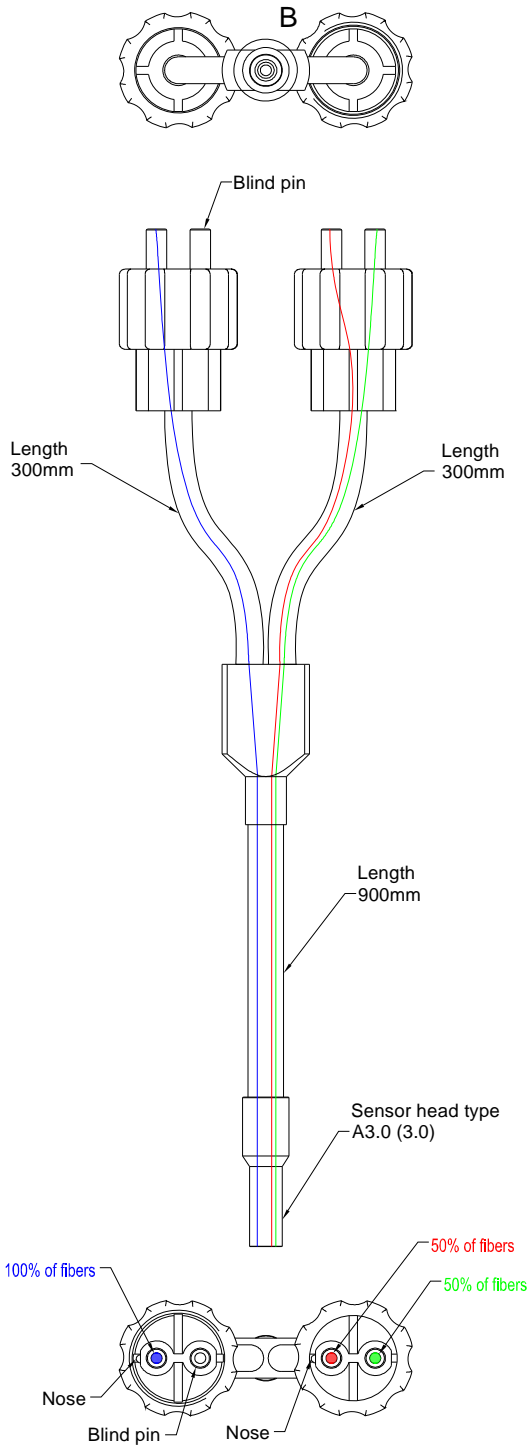
cf. catalog FIO Series



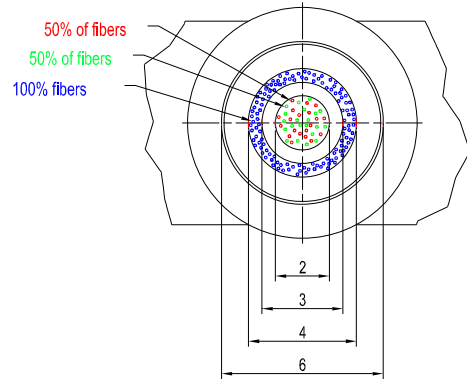


BICONE UV Fiber Optics

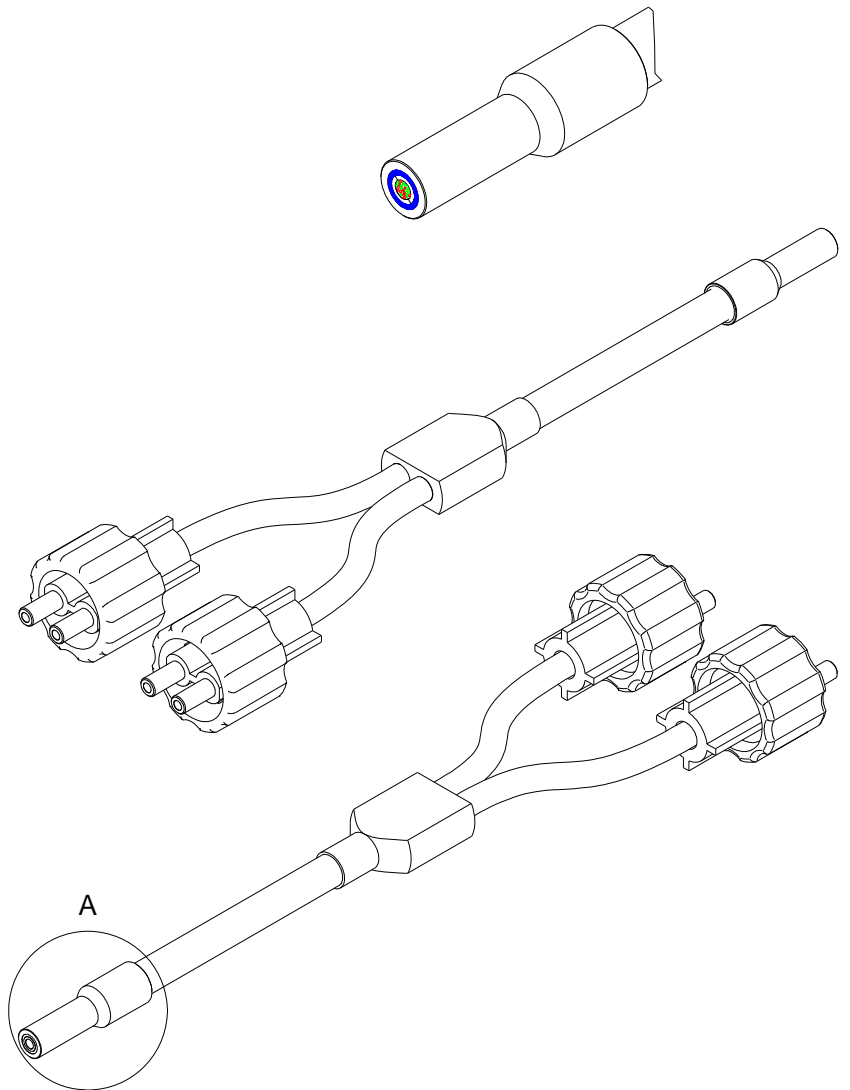
R-S-A3.0-(d2/d4)-1200-Y-22°-UV-(1P+1BP)/2P



Detail B



Detail A



All dimensions in mm

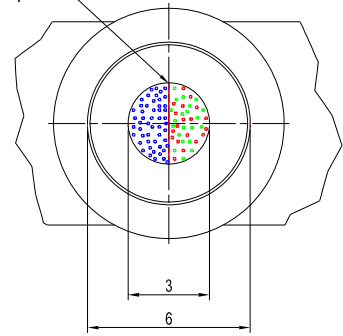


BICONE UV Fiber Optics

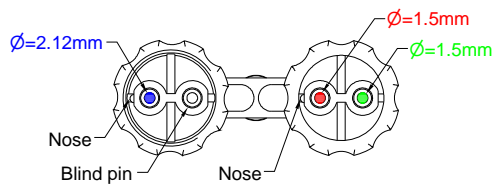
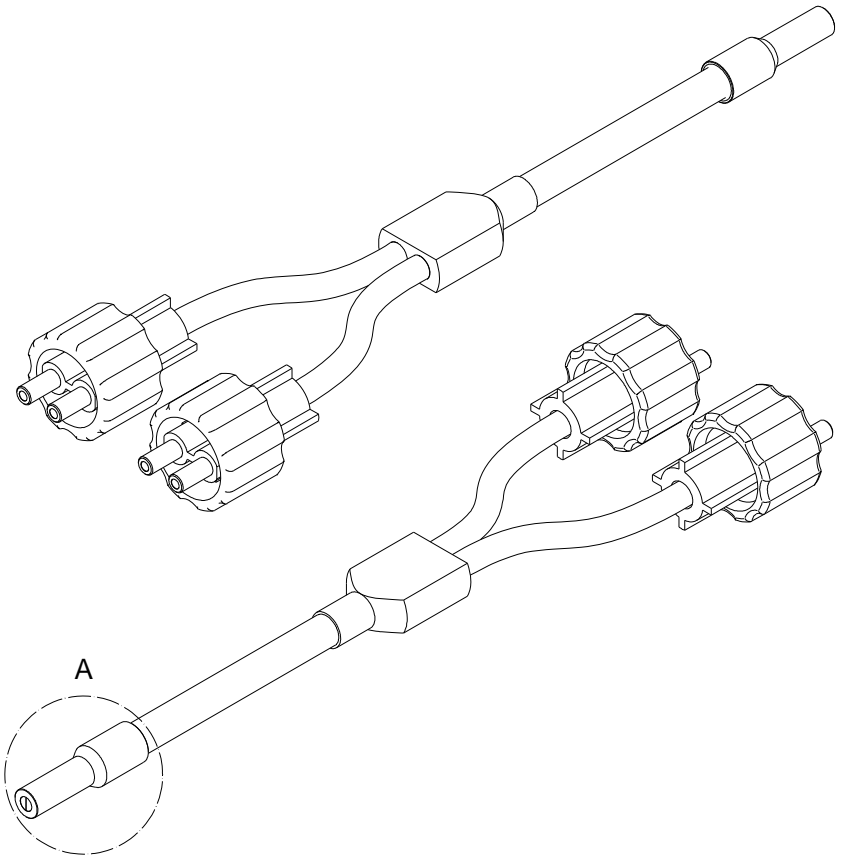
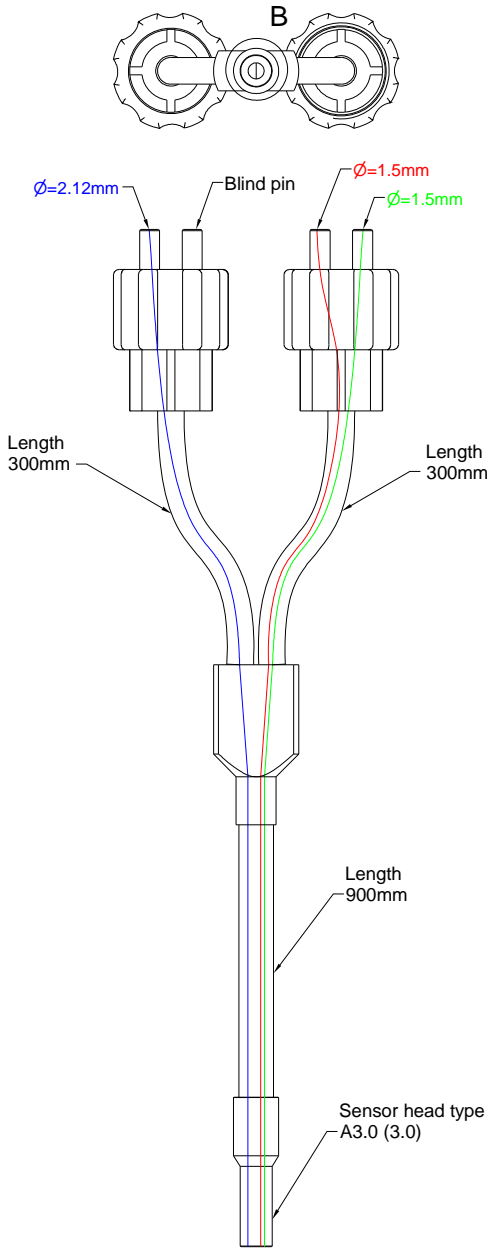
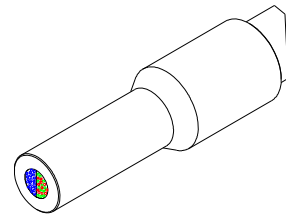
R-S-A3.0-(2xd3/2)-1200-Y-22°-UV-(1P+1BP)/2P

No separating layer between, but fiber optics are divided into two sectors!

Detail B



Detail A

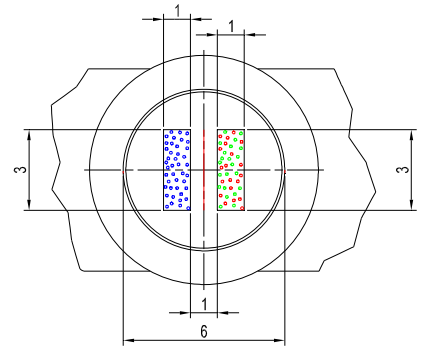


All dimensions in mm

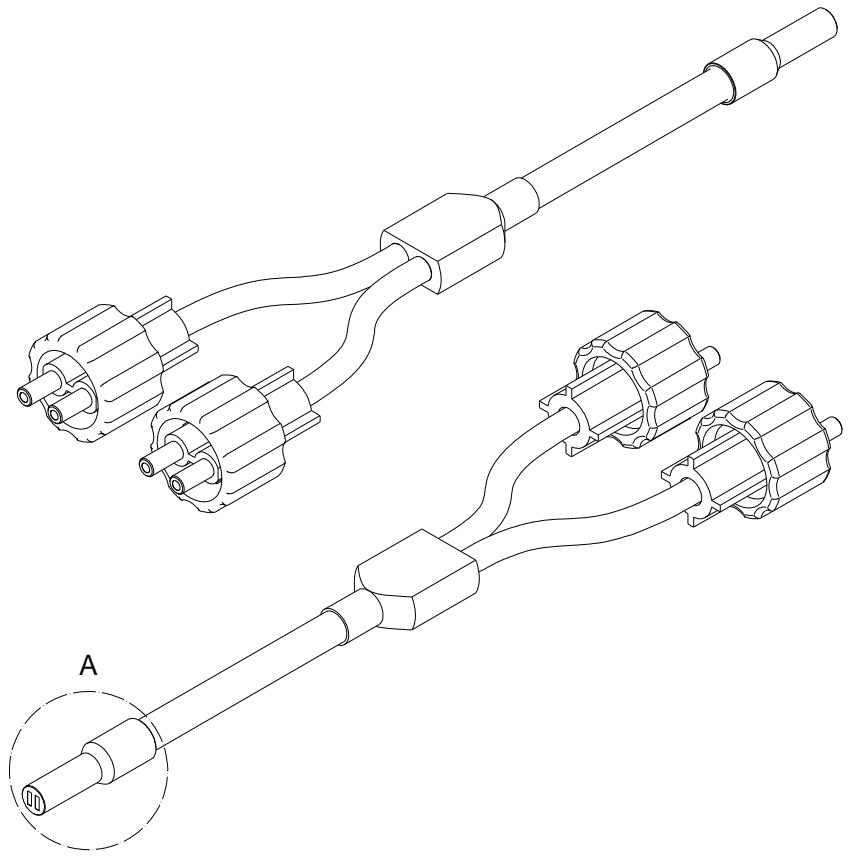
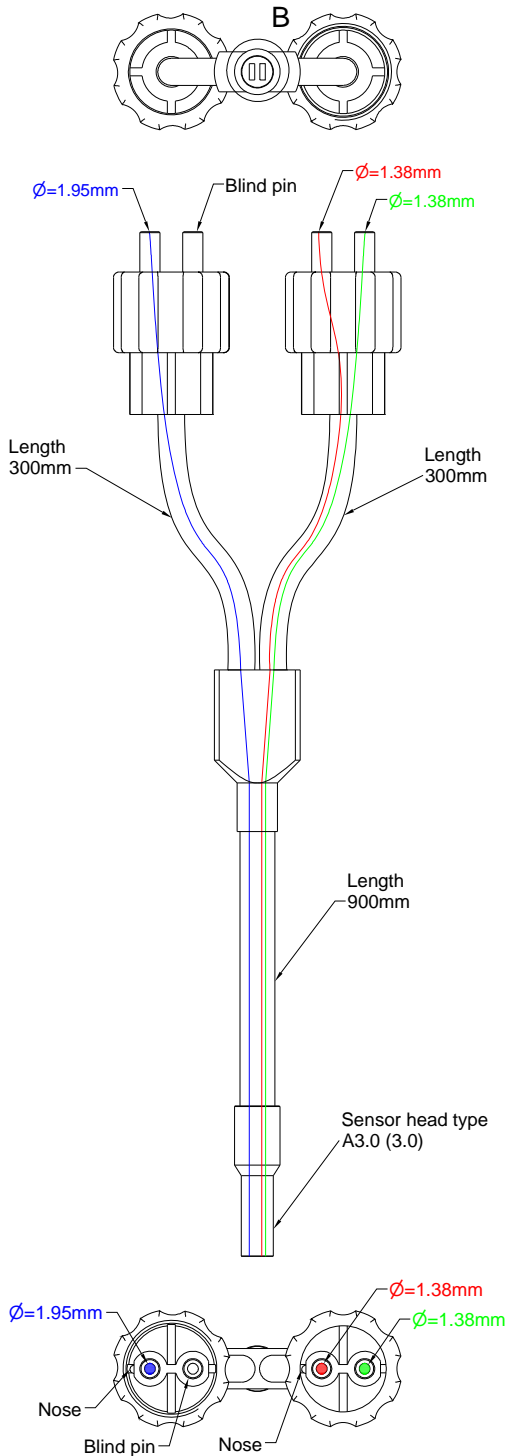
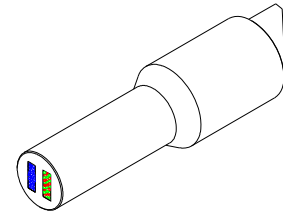
BICONE UV Fiber Optics

R-S-A3.0-2x(3x1)-1200-Y-22°-UV-(1P+1BP)/2P

Detail B



Detail A



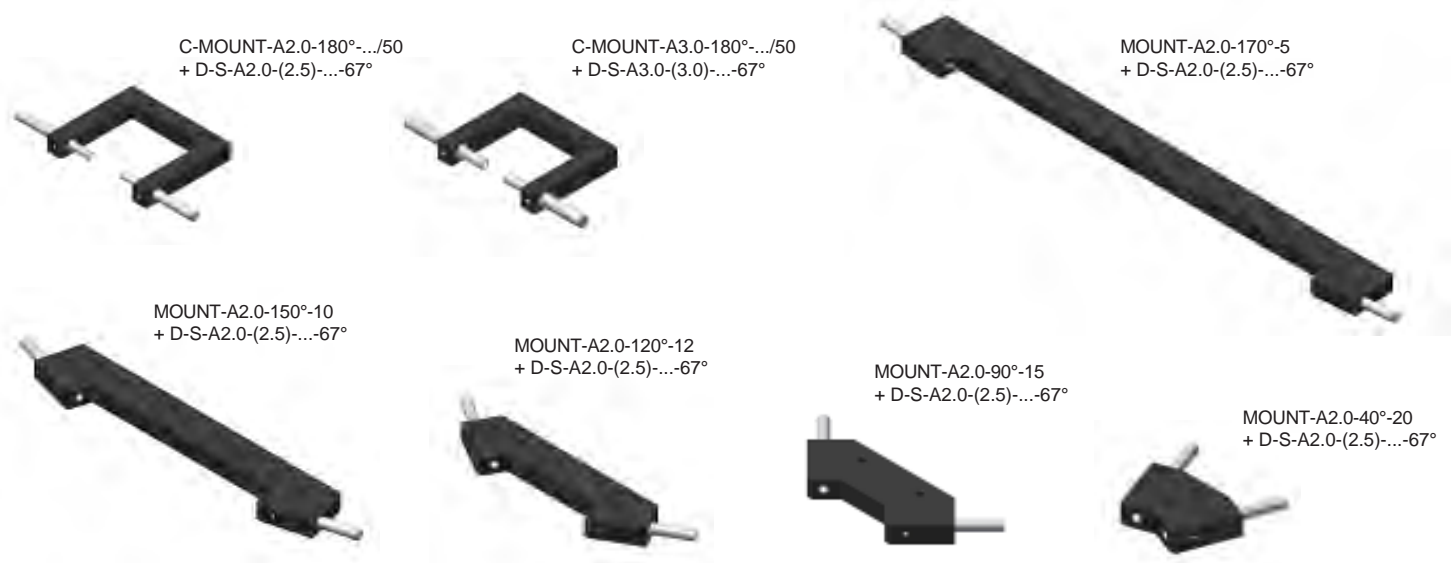
All dimensions in mm



Fiber Optics Fixtures

Mounting brackets (fixtures) for transmitted light fiber optics with sensor head type „A2.0“, „A3.0“, or „R2.1“:


Part number:	Suitable for fiber optics type: (D= transmitted light)	Characteristics:
C-MOUNT-A2.0-180°-22/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 22 mm, fork width/depth: 50/50 mm
C-MOUNT-A2.0-180°-60/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 60/50 mm
C-MOUNT-A2.0-180°-100/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
C-MOUNT-A3.0-180°-16/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 16 mm, fork width/depth: 50/50 mm
C-MOUNT-A3.0-180°-60/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 94/50 mm
C-MOUNT-A3.0-180°-100/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
MOUNT-A2.0-170°-5	D-S-A2.0-(2.5)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A3.0-170°-5	D-S-A3.0-(3.0)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A2.0-150°-10	D-S-A2.0-(2.5)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A3.0-150°-10	D-S-A3.0-(3.0)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A2.0-120°-12	D-S-A2.0-(2.5)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A3.0-120°-12	D-S-A3.0-(3.0)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-R1.1-120°-12	D-S-R1.1-(3x0.5)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-R2.1-120°-12	D-S-R2.1-(6x1)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A2.0-90°-15	D-S-A2.0-(2.5)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A3.0-90°-15	D-S-A3.0-(3.0)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A2.0-40°-20	D-S-A2.0-(2.5)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces
MOUNT-A3.0-40°-20	D-S-A3.0-(3.0)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces





Fiber Optics Fixtures

Mounting brackets (fixtures) for BICONE fiber optics or special fiber optics with sensor head type „A3.0“:

Part number:	Suitable for fiber optics type: (BICONE or special fiber optics)	Characteristics:
MOUNT-A3.0/A3.0-0°/0°-9 	R-S-A3.0-(3.0)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(d2/d4)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-(d2/d4)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-2x(3x1)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-2x(3x1)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-67°-2P/2P R-S-A3.0-2x(3x1)-1200-Y-67°-2P/2P R-S-A3.0-(3.0)-1200-Y-67°-2P/2P D-S-A3.0-(3.0)-1200-Y-67°-2P/2P	Parallel alignment of the fiber optics, distance of the fiber optics bundles (centers) to each other = 9 mm

SPECTRO Series

► SPECTRO-2-FIO-(UV/VIS)/(UV/VIS)

- Suitable for the detection of fluorescent materials
- Transmitter channel 0: UV LED (375nm) / Receiver channel 0: VIS (475nm ... 1000nm)
Transmitter channel 1: UV LED (375nm) / Receiver channel 1: VIS (475nm ... 1000nm)
- Various evaluation modes available (in combination with corresponding fiber optics):
Contrast comparison (NORM),
2-channel contrast measurement, ...
- Fast evaluation methods in DC-operation available (up to 100kHz)
- Insensitive to outside light (in AC-operation)
- Parameterizable via Windows® software
- RS232 interface (RS232/Ethernet adapter and RS232/USB adapter available)
- Suitable for use in hazardous areas (fiber optics)
- Two analog outputs (0V... +10V and 4mA...20mA)
- Two digital outputs (0V/+24V)
- External trigger input and teach input
- Linearization by means of an editable linearization curve



Design

Product name:

SPECTRO-2-FIO-(UV/VIS)/(UV/VIS)*

(incl. Windows® PC software SPECTRO2-Scope)

*2-channel system

(Transmitter channel 0/Receiver channel 0)/

(Transmitter channel 1/Receiver channel 1)

(UV/VIS)/(UV/VIS):

Transm. channel 0: UV LED (375nm) /

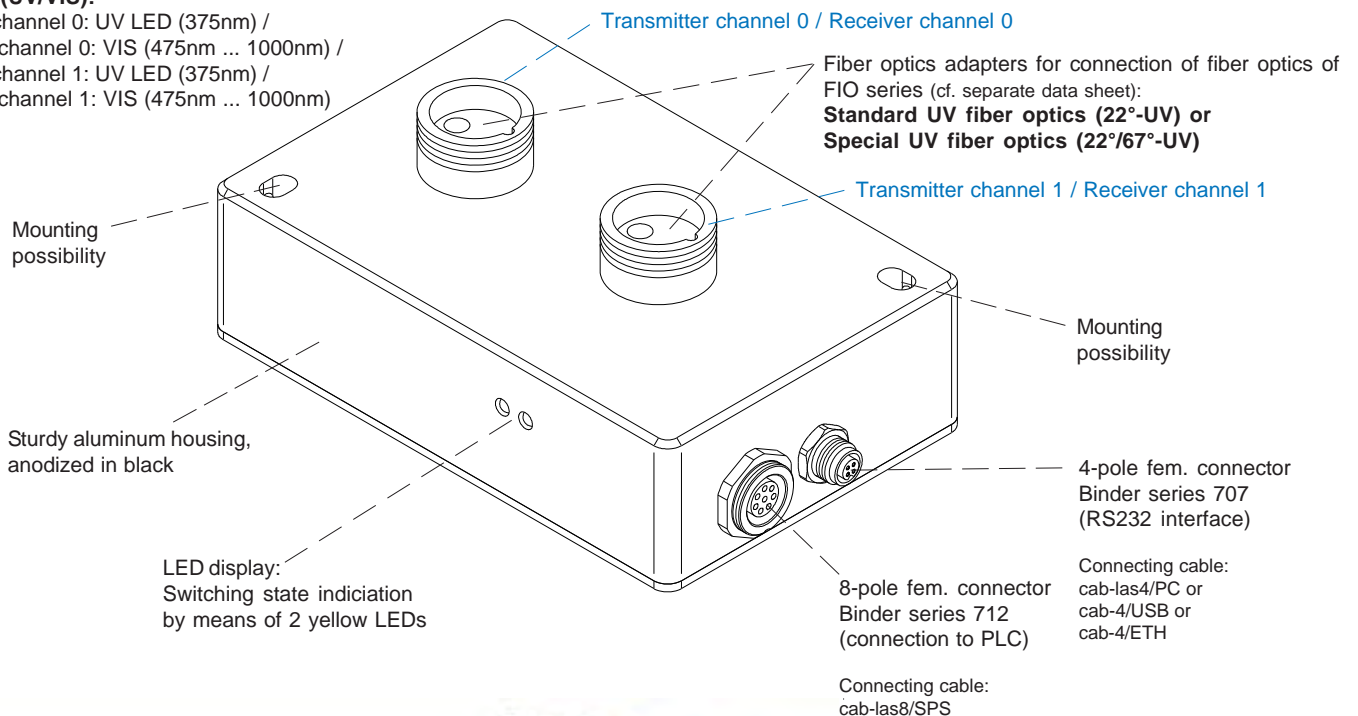
Receiver channel 0: VIS (475nm ... 1000nm) /

Transm. channel 1: UV LED (375nm) /

Receiver channel 1: VIS (475nm ... 1000nm)

Accessories: (p. 8-13)

Standard UV fiber optics
Special UV fiber optics
Optical frontends

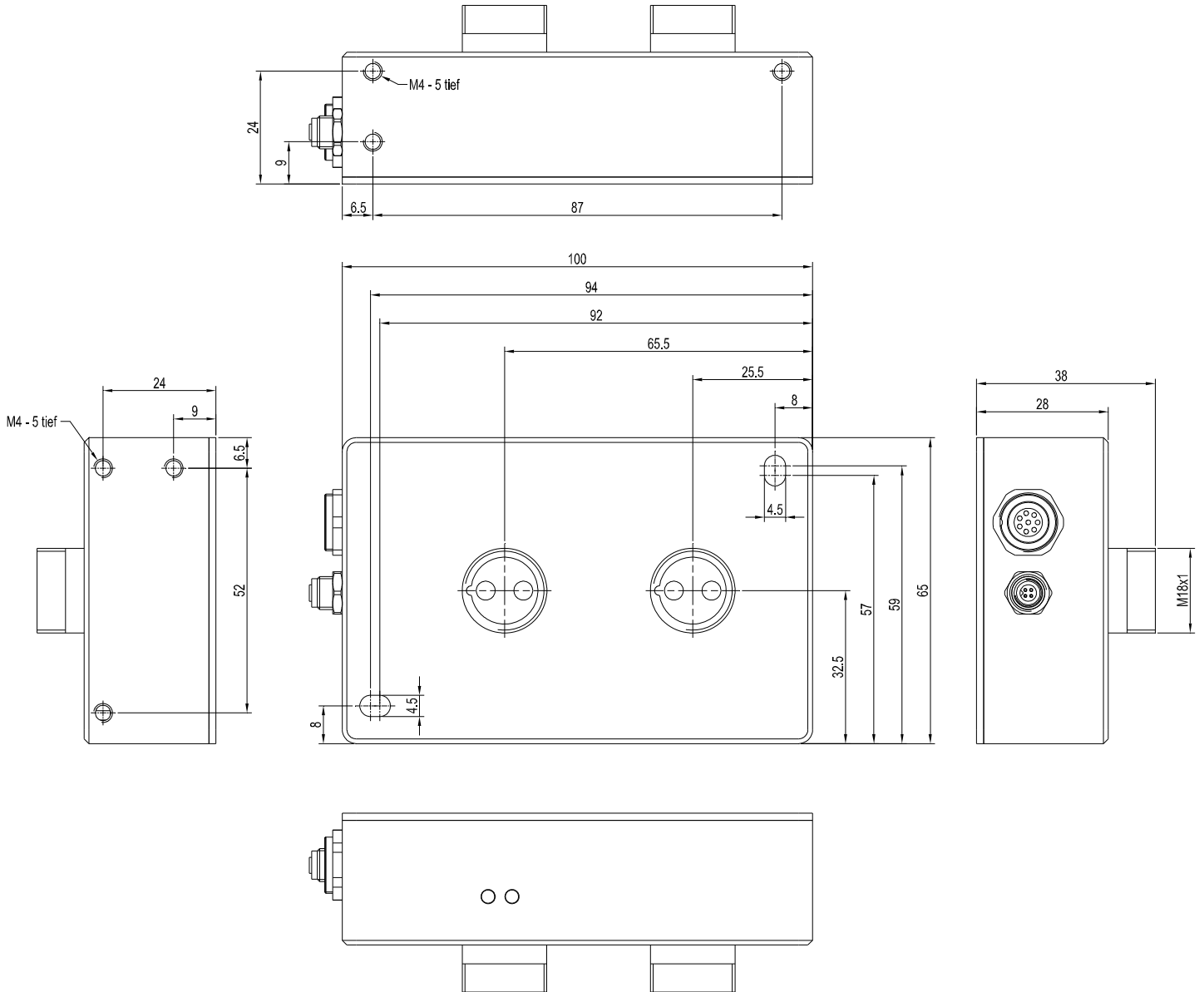



Technical Data

Model	SPECTRO-2-FIO-(UV/VIS)/(UV/VIS)
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
Inputs digital (2x)	IN0 and IN1 (Pin 3 and 4): digital (0V/+24V)
Outputs digital (2x)	OUT0 and OUT1 (Pin 5 and 6): digital (0V/+24V), npn/pnp-able (bright-/dark-switching, can be switched)
Outputs analog (1x)	ANALOG voltage 0 ... +10V or ANALOG current 4 ... 20mA (Pin 7)
Interface	RS232
Pulse lengthening	0 ... 100 ms, einstellbar über PC-Software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency	LED operation, can be switched via PC software: AC operation: max. 85 kHz (depends on parameterization) DC and OFF operation: max. 200 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Analog band width	typ. 90 kHz (-3 dB)
Transmitter (light source)	Transmitter channel 0: UV-LED (375 nm) Transmitter channel 1: UV-LED (375 nm)
Receiver	Receiver channel 0: Photo diode with IR filter (475 nm ... 1000 nm) Receiver channel 1: Photo diode with IR filter (475 nm ... 1000 nm)
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF)
Object distance (measurement range)	with reflected light fiber optics: typ. 1 mm ... 100 mm (depends on fiber optics and attachment optics) with transmitted light fiber optics: typ. 10 mm ... 200 mm (depends on fiber optics and attachment optics)
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Size of light spot	depends on fiber optics and attachment optics (cf. catalog FIO series)
Reproducibility	2 digits at 12-bit A/D conversion (equates 1/2048)
Housing dimensions	LxWxH approx. 100 mm x 65 mm x 38 mm (incl. fiber optics connector M18x1, without connectors)
Housing material	aluminum, anodized in black
Enclosure rating	IP64
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
Type of connector	connection to PLC: 8-pole fem. connector (Binder 712) connection to PC: 4-pole fem. connector (Binder 707)
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



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

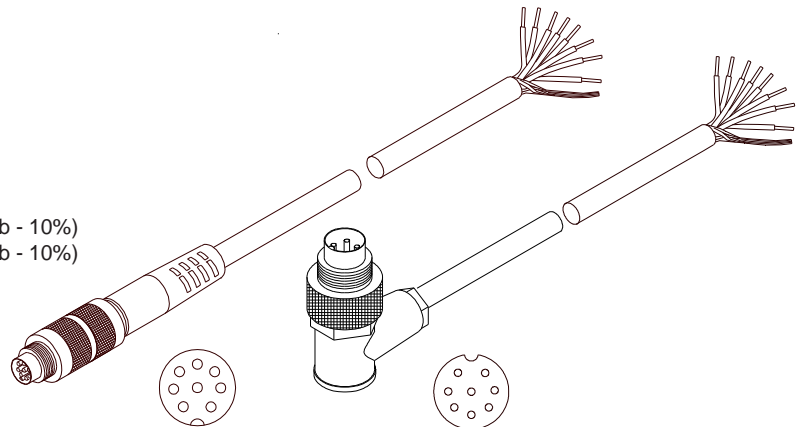
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC ($\pm 10\%$)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
6	pink	OUT1 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub - 10%)
7	blue	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:****Connecting cable (incl. driver software):**

cab-4/USB-(length)

cab-4/USB-w-(length) (angle type 90°)

(standard length 2m)

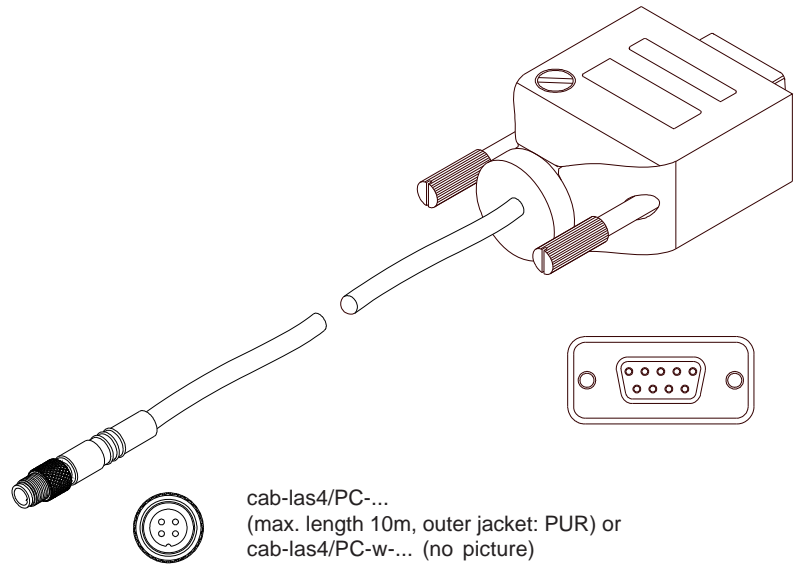
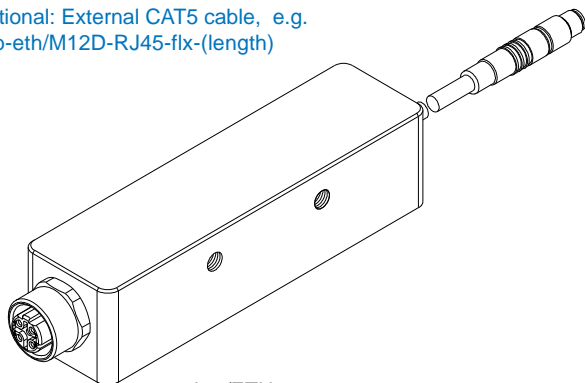
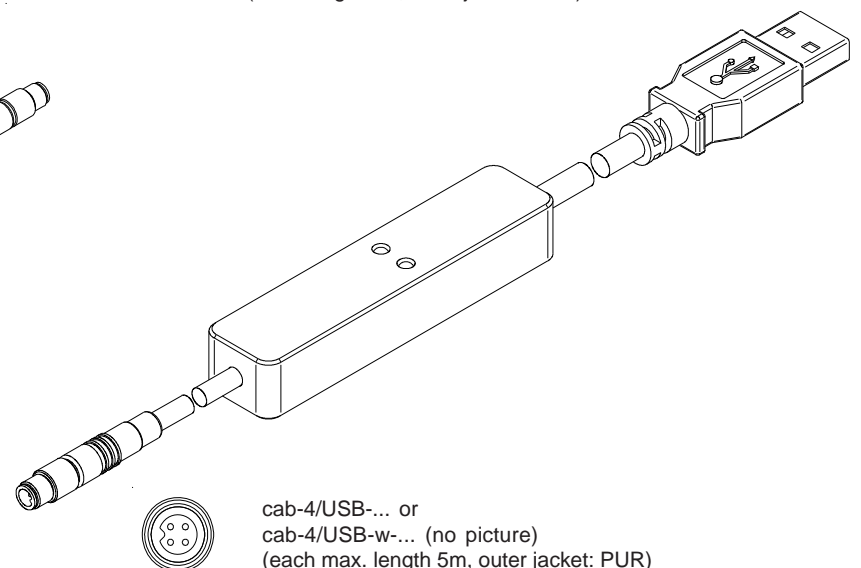
alternative:**Connection to local network via Ethernet bus:****Adapter (incl. software „SensorFinder“):**

cab-4/ETH-500

(standard length 0.5m)

Optional: External CAT5 cable, e.g.

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

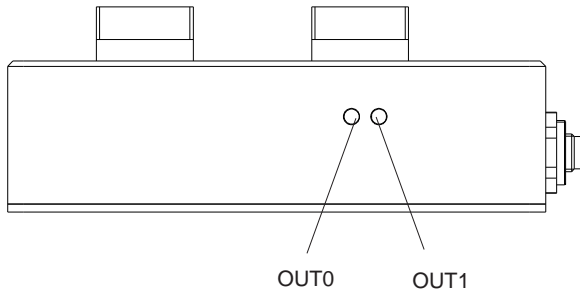
cab-las4/PC-...
(max. length 10m, outer jacket: PUR) or
cab-las4/PC-w-... (no picture)
(max. length 5m, outer jacket: PUR)cab-4/ETH-500
(length 0.5m, outer jacket: PUR)
4-pole M12 fem. conn. (D-coded)
for connection of an external
CAT5 cable, e.g.
cab-eth/M12D-RJ45-flx-(length)cab-4/USB-... or
cab-4/USB-w-... (no picture)
(each max. length 5m, outer jacket: PUR)



LED Display

LED display:

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



Measuring Principle

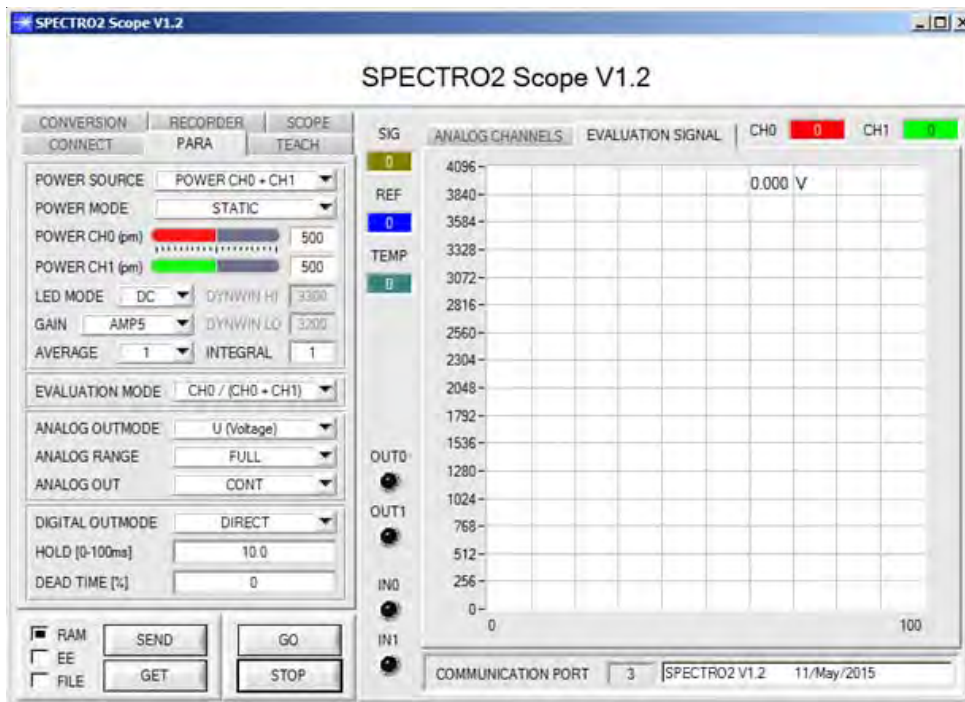
Measuring principle of the sensors of SPECTRO-2 series:

The SPECTRO-2-FIO sensor is a 2-channel system, which means it features two fiber optics connections that (initially) are independent of each other. All the fiber optics of the FIO series (through-beam fiber optics type D-... and reflective fiber optics type R-... as well as fiber optics with two sensor heads type X-...) can be used with this sensor.

The desired operating mode can be set with the SPECTRO2-Scope Windows® software:

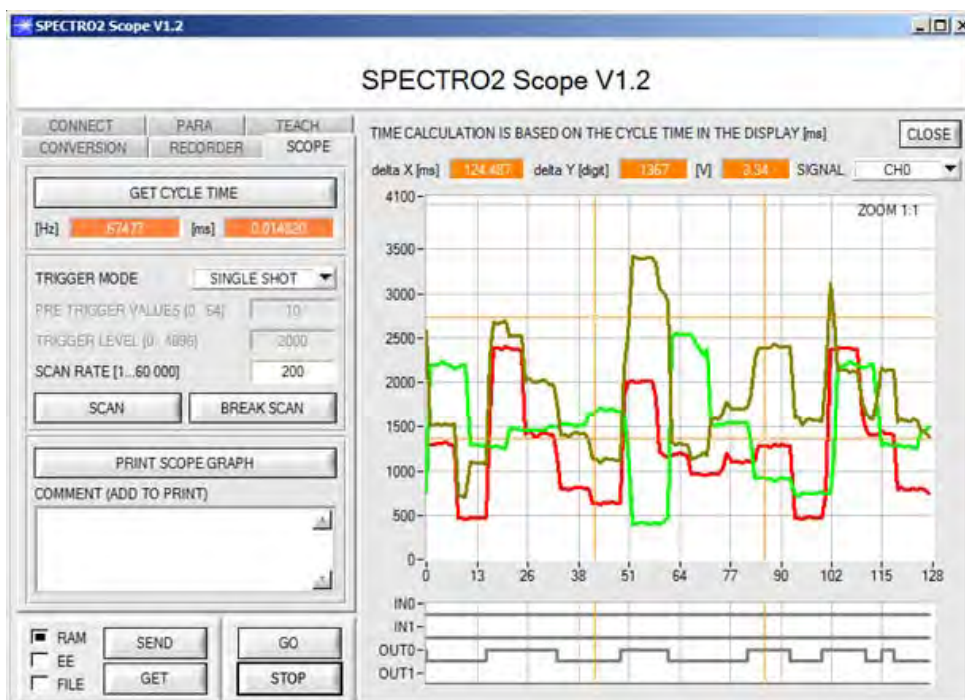
- Separate evaluation (every channel operates independently, typ. 2-channel system)
- Normed evaluation (the relation of the two channels is determined by way of norming)
- Summation (the two channels are added)
- Subtraction (the difference of the two channels is calculated)
- Differentiation (calculation of the first derivative of the two channels)

To prevent mutual influencing of the two channels, different optical filters (depending on the respective type) or a timing offset of the respective LED can be used.


Parameterization
Windows® user interface:

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 an Ethernet adaptor, e.g. SI-RS232/Ethernet-4-...). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.

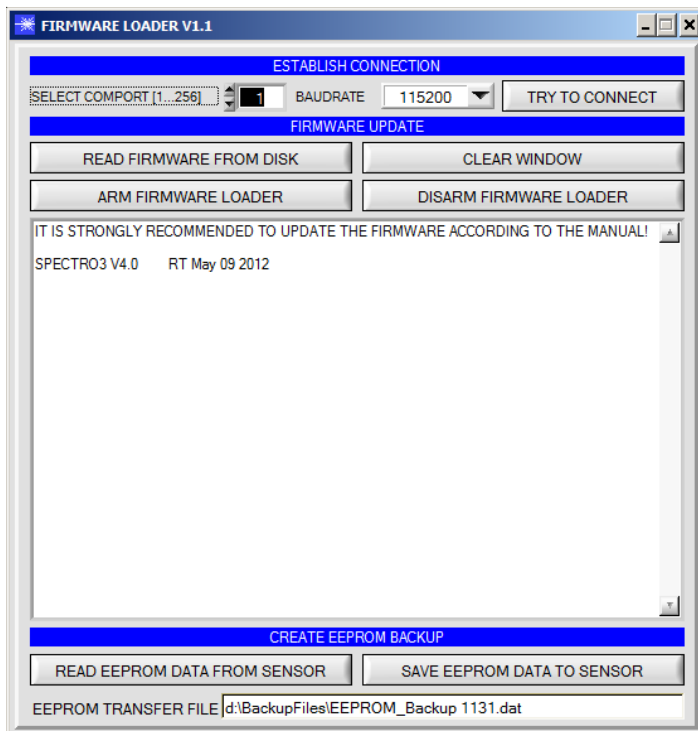


The SCOPE tab visualizes an oscilloscope.



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.



UV Fiber Optics

Available standard UV fiber optics:

- R-S-A1.1-(1.5)-1200-22°-UV
- R-S-A2.0-(2.5)-600-22°-UV
- R-S-A2.0-(2.5)-1200-22°-UV
- R-S-A3.0-(3.0)-1200-22°-UV
- R-S-R1.1-(3x0.5)-600-22°-UV
- R-S-R1.1-(3x0.5)-1200-22°-UV
- R-S-R2.1-(6x1)-1200-22°-UV
- D-P-B3.0-(2.5)-600-22°-UV
- D-S-A2.0-(2.5)-600-22°-UV
- D-S-A3.0-(3.0)-600-22°-UV

Available special UV fiber optics (p. 9-12)

- R-S-A3.0-(3.0)-1200-22°/67°-UV
- R-S-R2.1-(6x1)-1200-22°/67°-UV
- D-S-A3.0-(3.0)-1200-22°/67°-UV
- D-S-R2.1-(6x1)-1200-22°/67°-UV

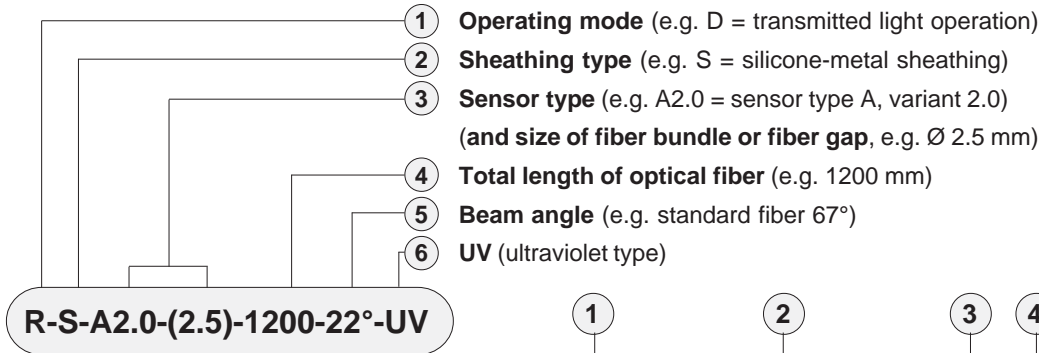
(further fiber optics types are available on request)



Characteristics:

Light-conducting glass fibers are optical components that allow the transmission of light through any curved path based on the principle of total reflection. The individual fiber is composed of high-break core glass and low-break cladding glass. The light beams entering the core glass within the critical angle are guided through the fiber by way of reflection at the core/cladding contact surfaces (step index fiber). The highly flexible optical fibers are made of bundled individual glass fibers. The ends are each glued into a sensor head and a connector. The faces are optically polished. For protection against mechanical, chemical, or thermal destruction the optical fibers are provided with a corresponding protective sheath.

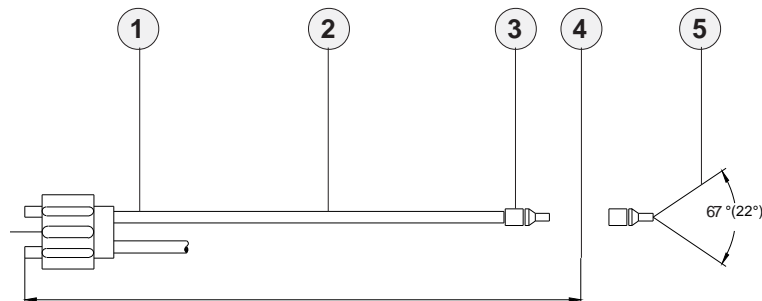
Order code:



R-S-A2.0-(2.5)-1200-22°-UV

Order code for optical fiber

(For detailed description of the various types of fiber optics, please cf. catalog „FIO Series“)



Dimensions of adapter

Attachment optics (e.g. focus lens, reflex optics, prismn optics)

Fiber optics for reflex light operation

Fiber optics for transmitted light operation

Mounting hints

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

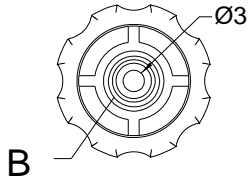
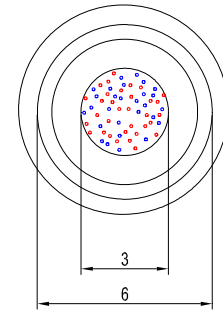
cf. catalog FIO Series



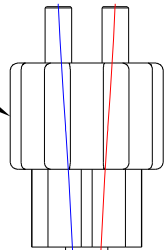
Spezial UV Fiber Optics

R-S-A3.0-(3.0)-1200-22°/67°-UV
Reflected-light UV fiber optics

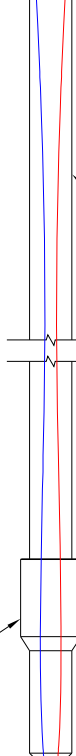
Detail B



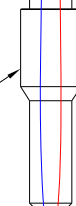
Adapter 2-pin



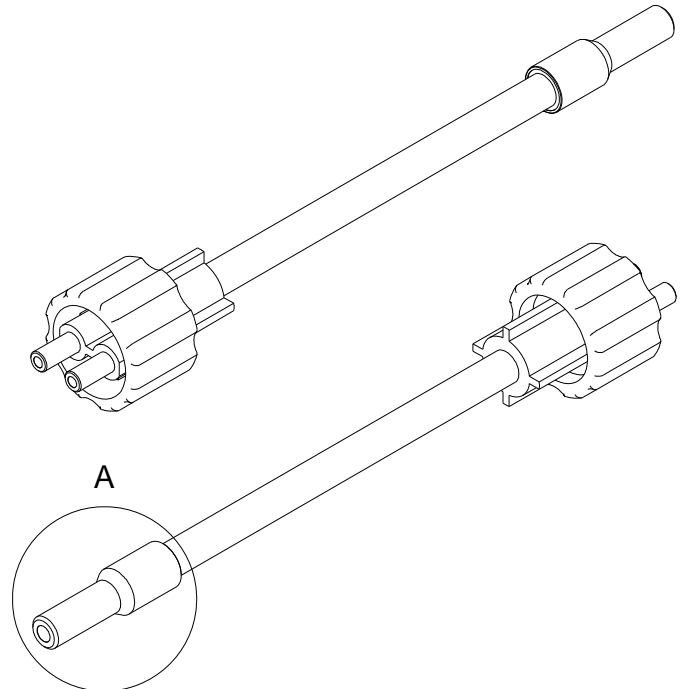
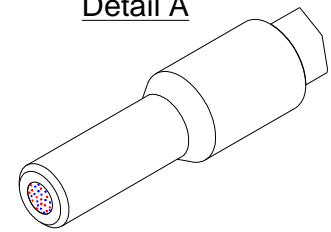
Length
1200mm



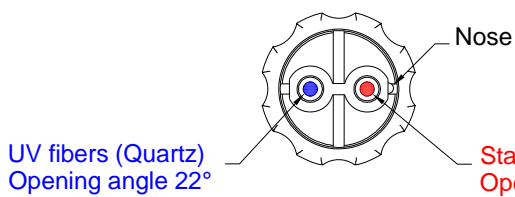
Sensor head type
A3.0 (3.0)



Detail A

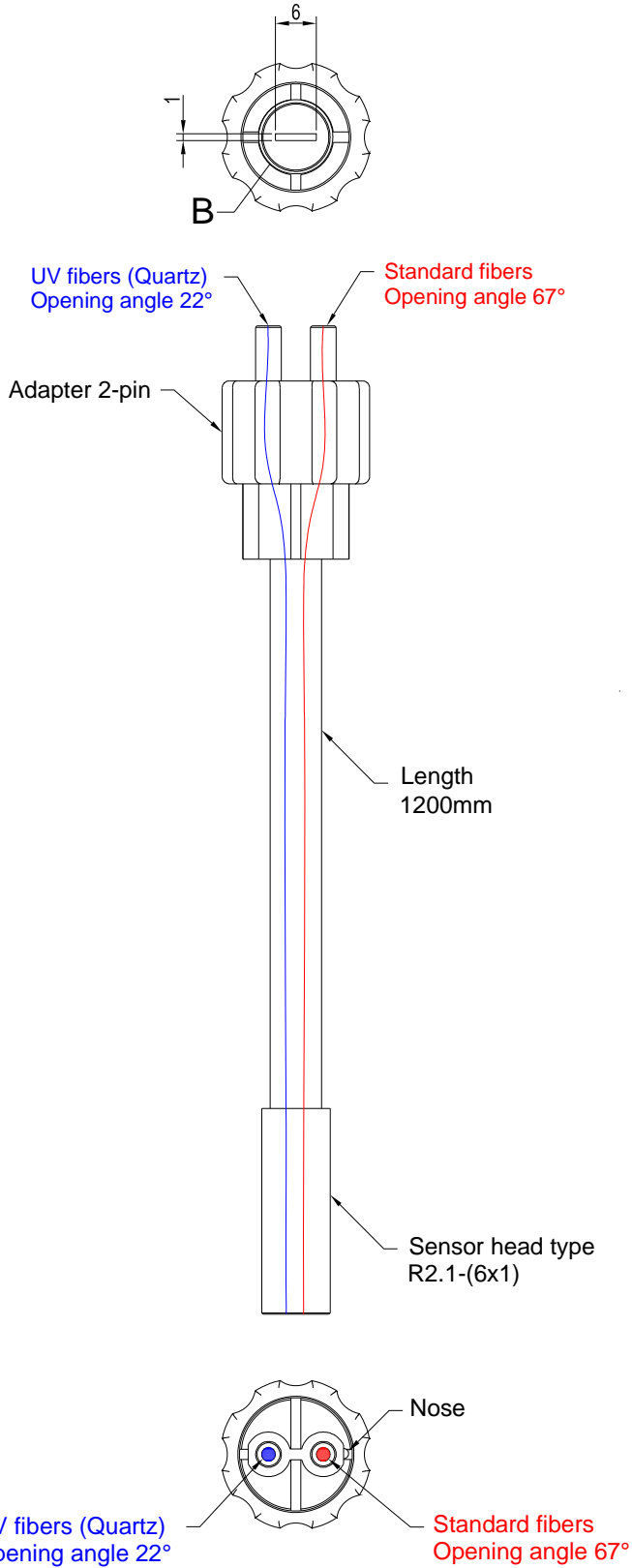


A

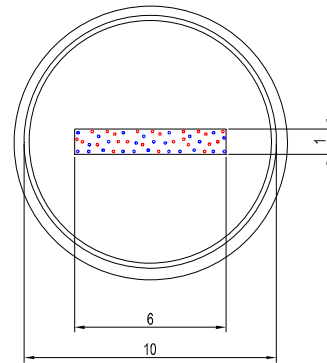


Special UV Fiber Optics

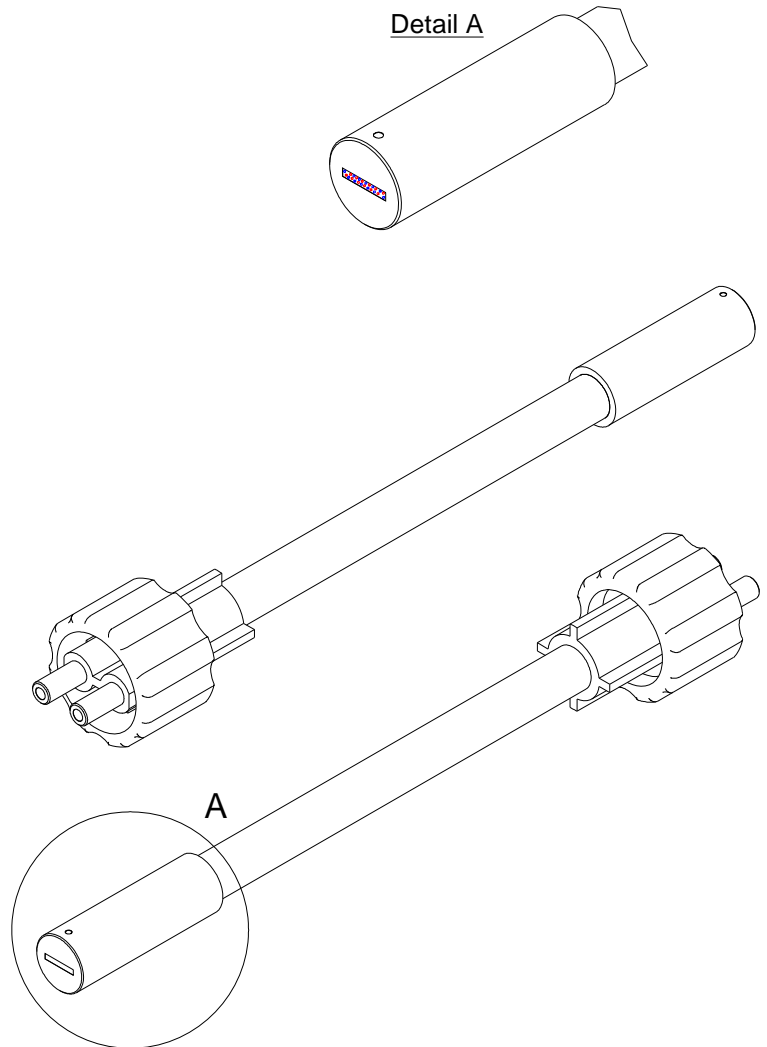
R-S-R2.1-(6x1)-1200-22°/67°-UV
Reflected light UV fiber optics



Detail B



Detail A

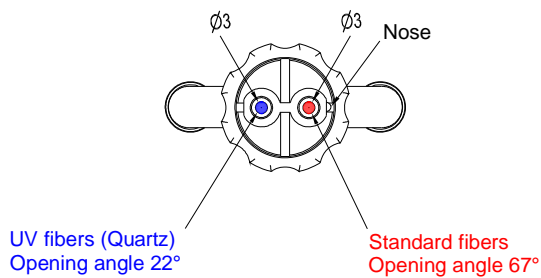
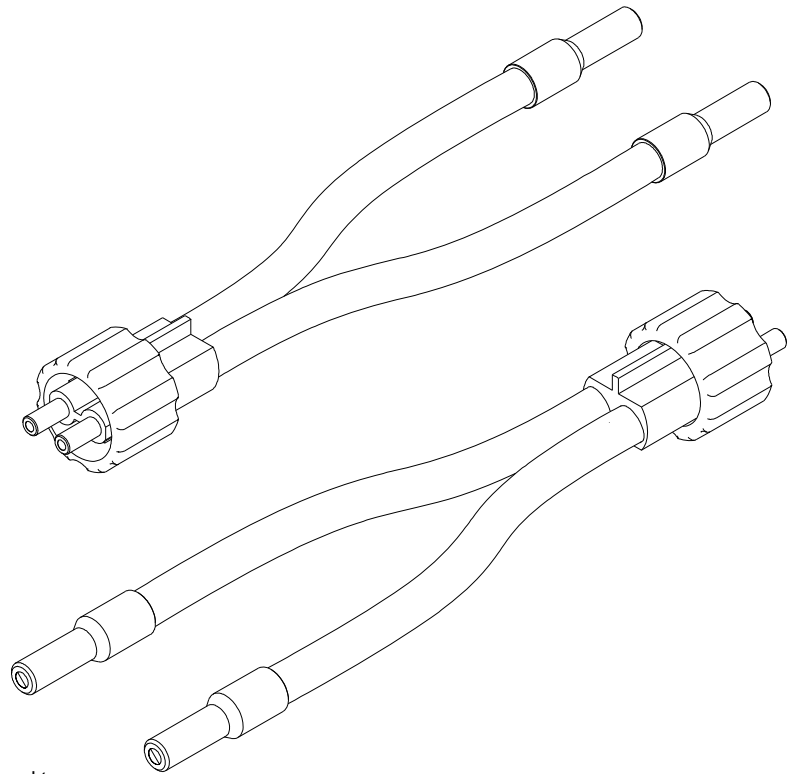
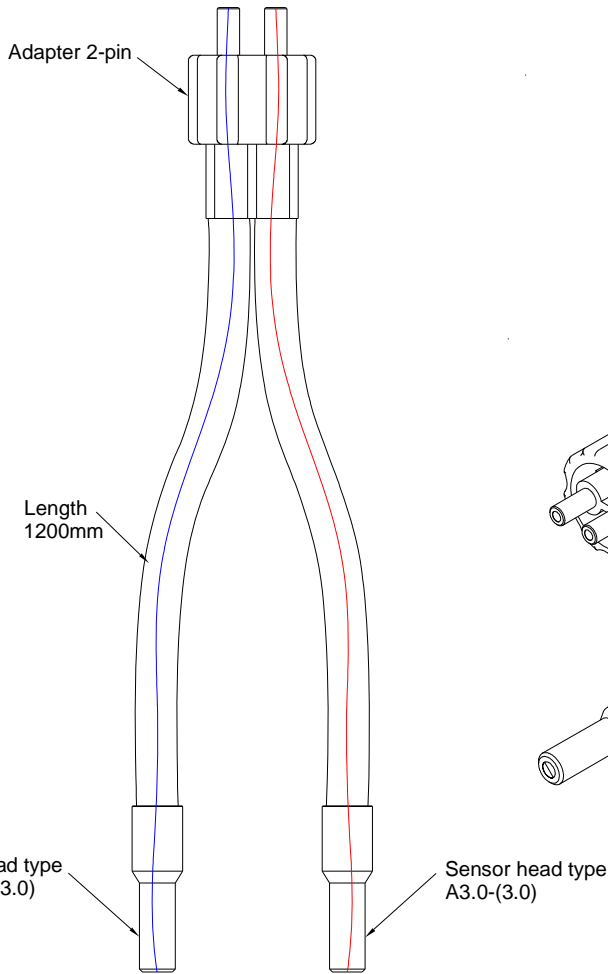
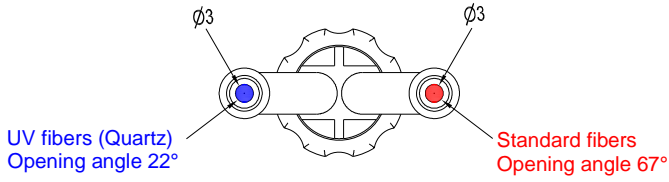
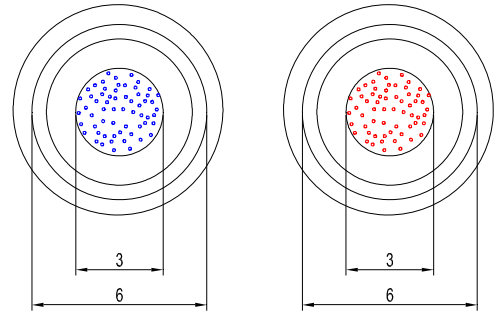




D-S-A3.0-(3.0)-1200-22°/67°-UV
Transmitted-light UV fiber optics

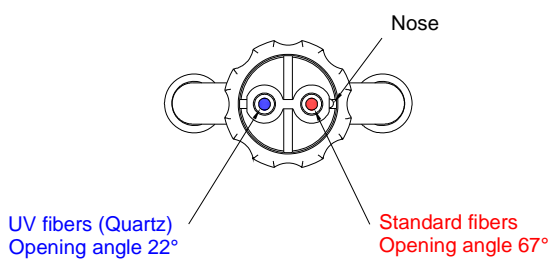
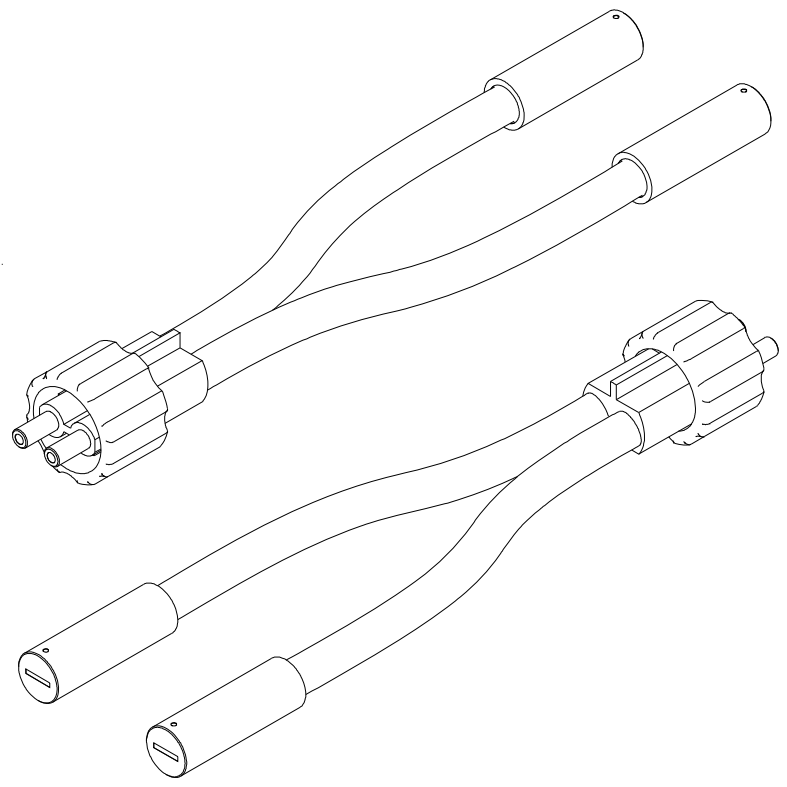
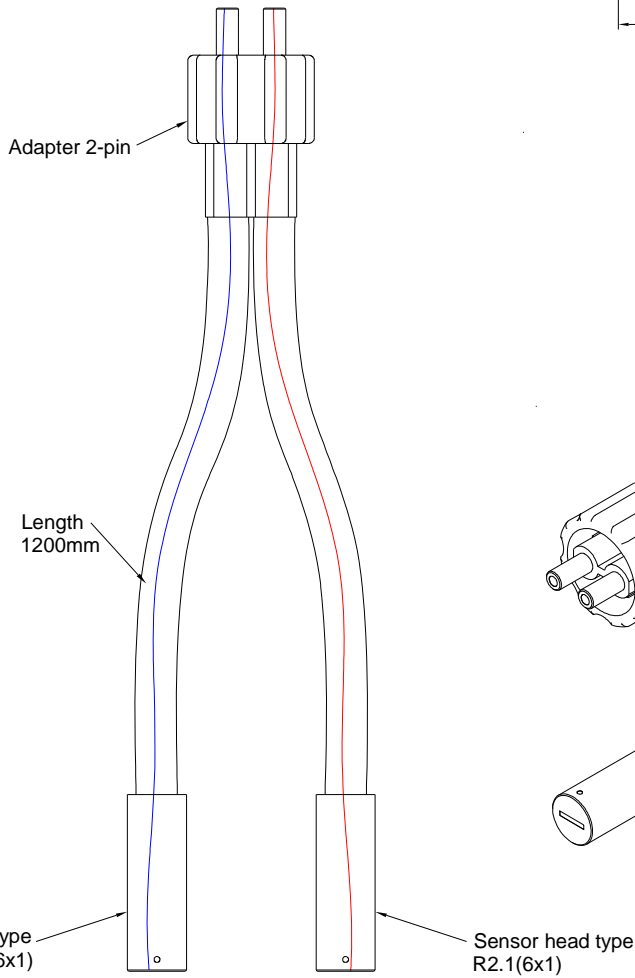
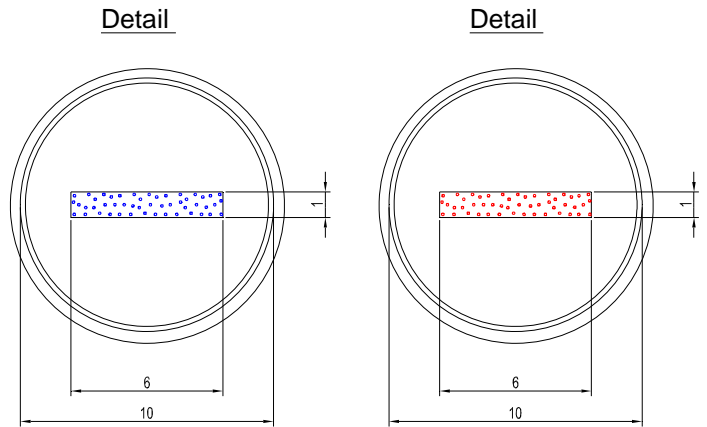
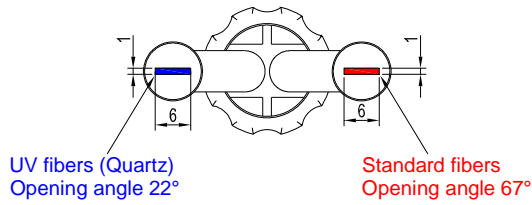
Detail

Detail



Spezial UV Fiber Optics

D-S-R2.1-(6x1)-1200-22°/67°-UV
Transmitted-light UV fiber optics





Optical Frontends

Overview: Optical frontends for UV fiber optics with sensor head type „A3.0“ or „R2.1“:



KL-8-R2.1
KL-9-A3.0



KL-M12-A3.0



KL-M18-A3.0
KL-M18-R2.1



KL-M18-XL-A3.0
KL-M18-XL-R2.1



KL-M34-A3.0
KL-M34-R2.1



KL-M34-XL-A3.0
KL-M34-XL-R2.1



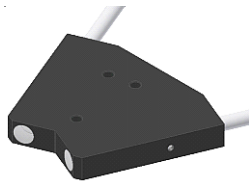
KL-M34/62-A3.0
KL-M34/62-R2.1



KL-52-XL-A3.0



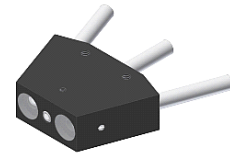
KL-D-10°-45-POL°-A3.0



KL-D-0°/45°-30-A3.0



KL-D-5°-85-POL-A3.0



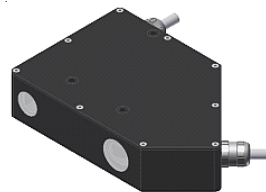
KL-D-40°-23-5/DIF-A3.0



KL-D-20°-20-POL-A3.0



KL-D-M12-0°/30°-9-A3.0



KL-D-0°/45°-85-1200-A3.0

SPECTRO Series

► SPECTRO-2-FIO-(IR2/IR)/(IR3/IR)

- Detection of the water content of various materials
- Transmitter channel 0: IR-LED (950nm) / Receiver channel 0: IR (900nm ... 1700nm)
Transmitter channel 1: IR-LED (1450nm) / Receiver channel 1: IR (900nm ... 1700nm)
- Evaluation mode:
Humidity measurement (HYGROMETRY)
- Fast evaluation methods in DC-operation available
(up to 100kHz)
- Insensitive to outside light (in AC-operation)
- Parameterizable via Windows® software
- RS232 interface (RS232/Ethernet adapter and RS232/USB adapter available)
- Suitable for use in hazardous areas (fiber optics)
- Two analog outputs (0V... +10V and 4mA...20mA)
- Two digital outputs (0V/+24V)
- External trigger input and teach input
- Linearization by means of an editable linearization curve



Design

Product name:

SPECTRO-2-FIO-(IR2/IR)/(IR3/IR)*

(incl. Windows® PC software SPECTRO2-Scope)

*2-channel system

(Transmitter channel 0/Receiver channel 0)/

(Transmitter channel 1/Receiver channel 1)

(IR2/IR)/(IR3/IR):

Transm. channel 0: IR-LED (950nm) /

Receiver channel 0: IR (900nm ... 1700nm)

Transm. channel 1: IR-LED (1450nm) /

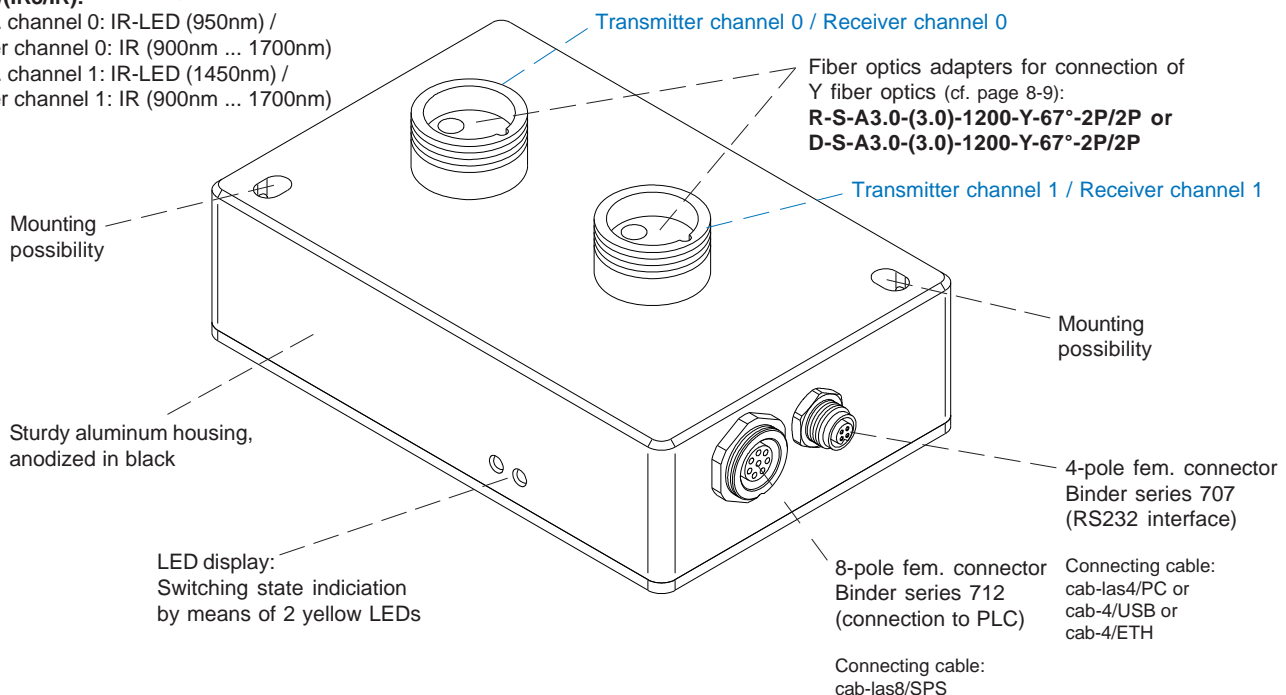
Receiver channel 1: IR (900nm ... 1700nm)

Accessories: (p. 8-11)

Special fiber optics


Optical frontends

Fiber optics fixtures



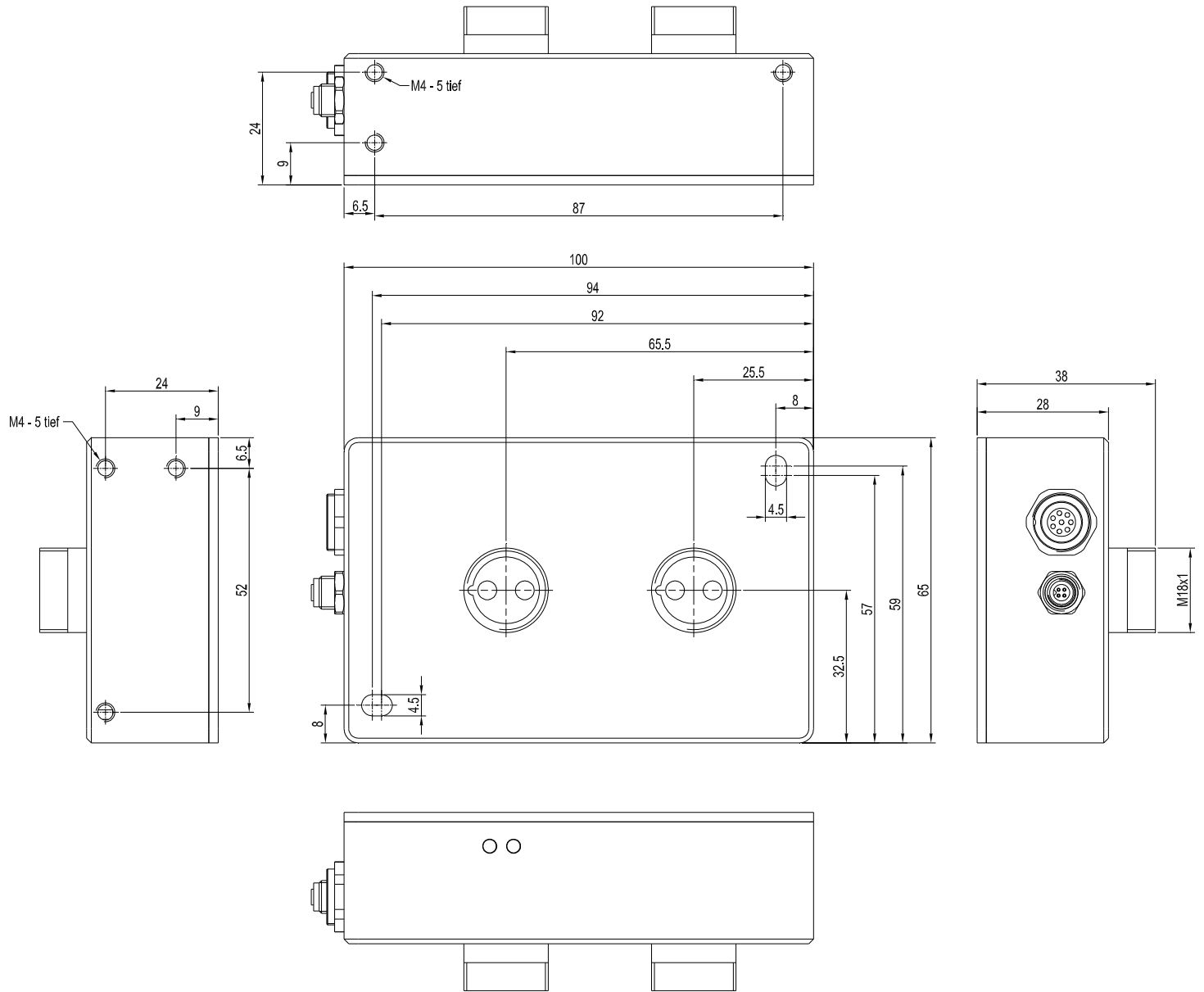


Technical Data

Model	SPECTRO-2-FIO-(IR2/IR)/(IR3/IR)
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
Inputs digital (2x)	IN0 and IN1 (Pin 3 and 4): digital (0V/+24V)
Outputs digital (2x)	OUT0 and OUT1 (Pin 5 and 6): digital (0V/+24V), npn/pnp-able (bright-/dark-switching, can be switched)
Outputs analog (1x)	ANALOG voltage 0 ... +10V or ANALOG current 4 ... 20mA (Pin 7)
Interface	RS232
Pulse lengthening	0 ... 100 ms, einstellbar über PC-Software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency	LED operation, can be switched via PC software: AC operation: max. 85 kHz (depends on parameterization) DC and OFF operation: max. 200 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Analog band width	typ. 90 kHz (-3 dB)
Transmitter (light source)	Transmitter channel 0: IR-LED (950 nm) Transmitter channel 1: IR-LED (1450 nm)
Receiver	Receiver channel 0: Photo diode with IR filter (900 nm ... 1700 nm) Receiver channel 1: Photo diode with IR filter (900 nm ... 1700 nm)
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF)
Object distance (measurement range)	with reflected light fiber optics: typ. 1 mm ... 100 mm (depends on fiber optics and attachment optics) with transmitted light fiber optics: typ. 10 mm ... 200 mm (depends on fiber optics and attachment optics)
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Size of light spot	depends on fiber optics and attachment optics (cf. catalog FIO series)
Reproducibility	2 digits at 12-bit A/D conversion (equates 1/2048)
Housing dimensions	LxWxH approx. 100 mm x 65 mm x 38 mm (incl. fiber optics connector M18x1, without connectors)
Housing material	aluminum, anodized in black
Enclosure rating	IP64
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
Type of connector	connection to PLC: 8-pole fem. connector (Binder 712) connection to PC: 4-pole fem. connector (Binder 707)
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

Connector Assignment

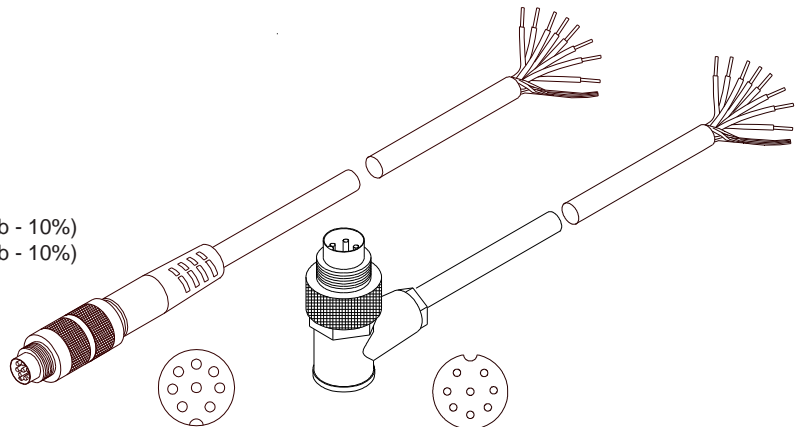
Connection to PLC:

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	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:

Connecting cable (incl. driver software):
 cab-4/USB-(length)
 cab-4/USB-w-(length) (angle type 90°)
 (standard length 2m)

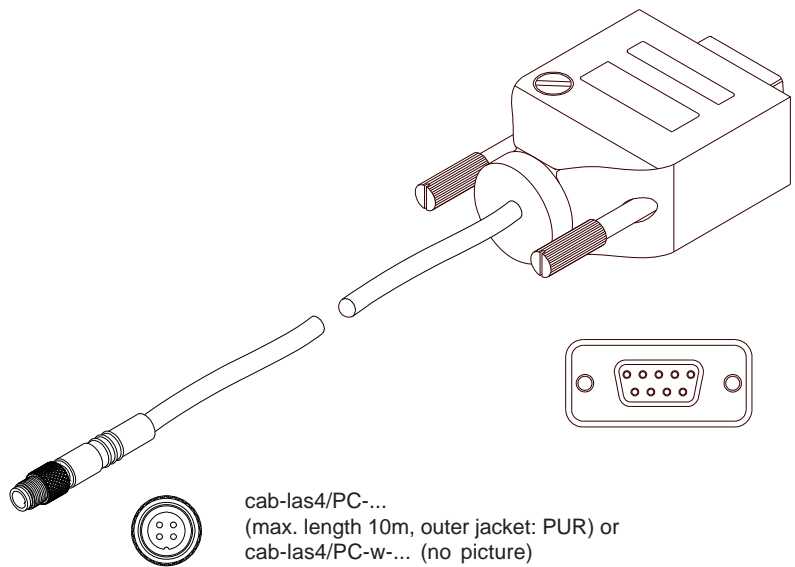
alternative:

Connection to local network via Ethernet bus:

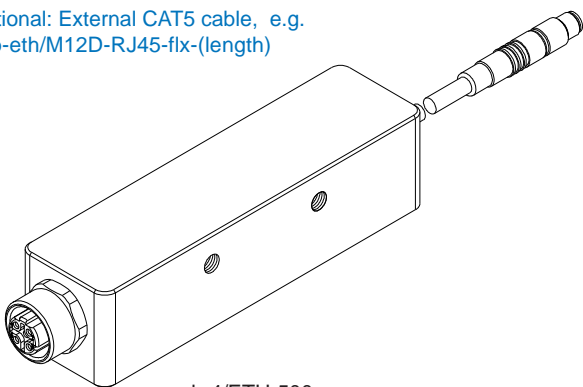
Adapter (incl. software „SensorFinder“):
 cab-4/ETH-500
 (standard length 0.5m)

Optional: External CAT5 cable, e.g.

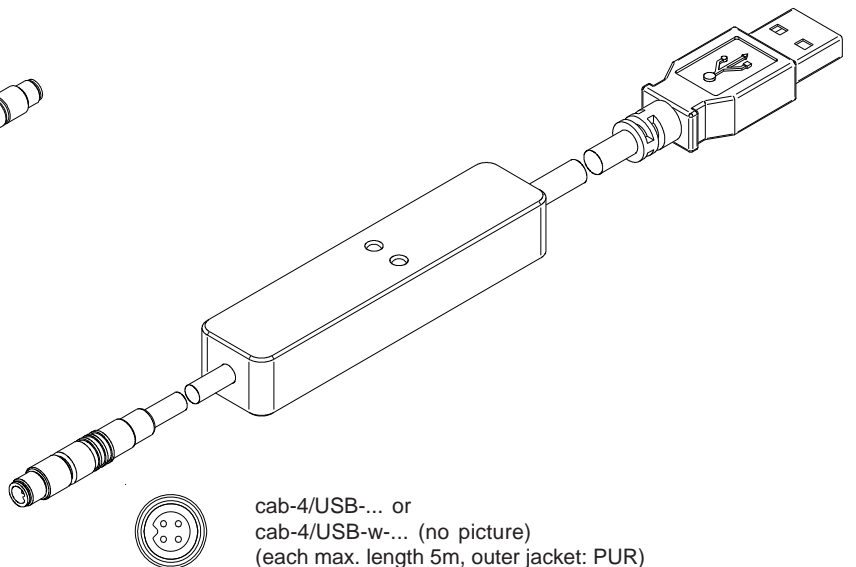
cab-eth/M12D-RJ45-flx-(length)



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)



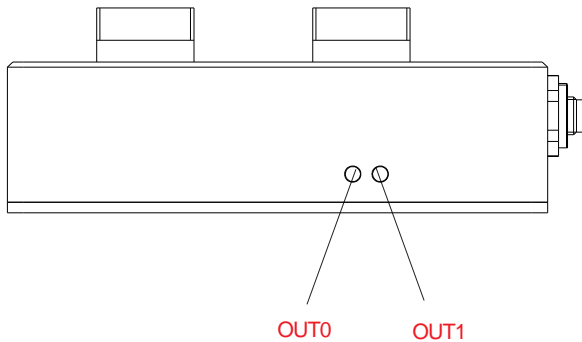
cab-4/USB-... or
 cab-4/USB-w-... (no picture)
 (each max. length 5m, outer jacket: PUR)



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 SPECTRO-2-FIO sensor is a 2-channel system, which means it features two fiber optics connections that (initially) are independent of each other. All the fiber optics of the FIO series (through-beam fiber optics type D-... and reflective fiber optics type R-... as well as fiber optics with two sensor heads type X-...) can be used with this sensor.

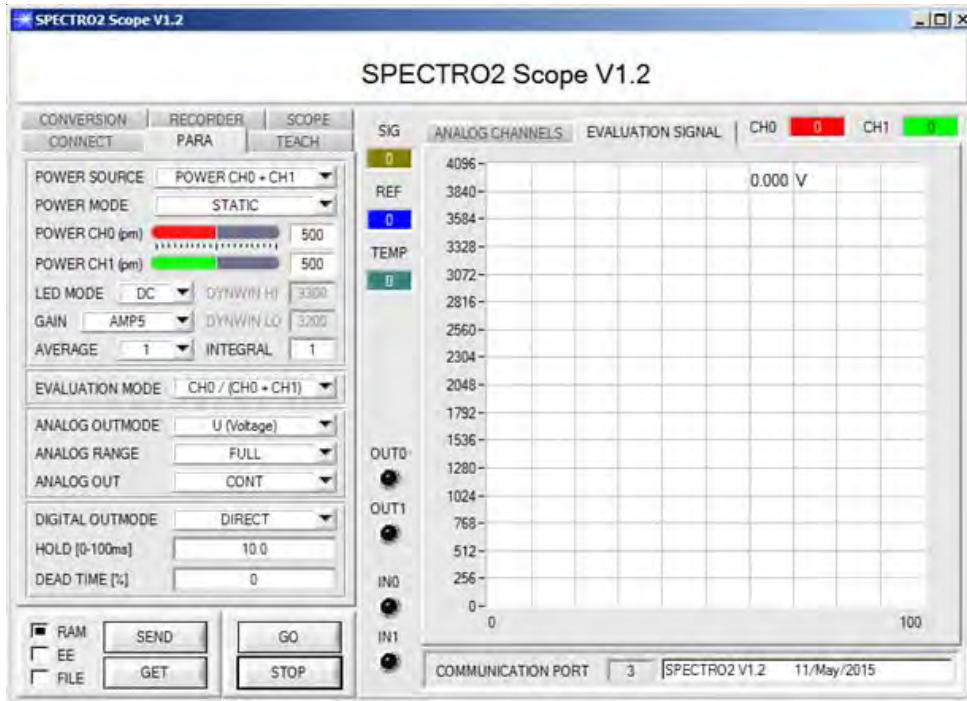
The desired operating mode can be set with the SPECTRO2-Scope Windows® software:

- Separate evaluation (every channel operates independently, typ. 2-channel system)
- Normed evaluation (the relation of the two channels is determined by way of norming)
- Summation (the two channels are added)
- Subtraction (the difference of the two channels is calculated)
- Differentiation (calculation of the first derivative of the two channels)

To prevent mutual influencing of the two channels, different optical filters (depending on the respective type) or a timing offset of the respective LED can be used.

Parameterization

Windows® user interface:



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 an Ethernet adaptor, e.g. SI-RS232/Ethernet-4-...). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.

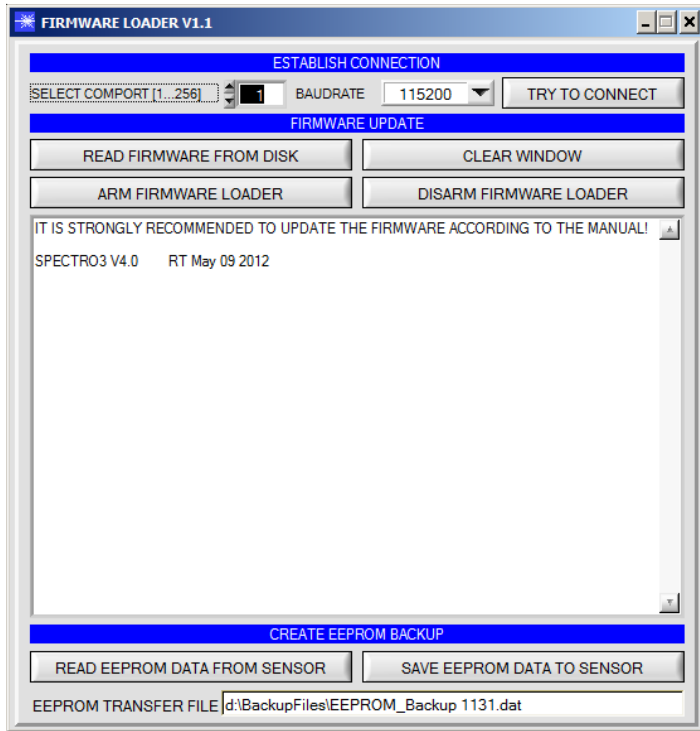


The SCOPE tab visualizes an oscilloscope.



Firmware Update

Firmware update by means of the software „FirmwareLoader“:

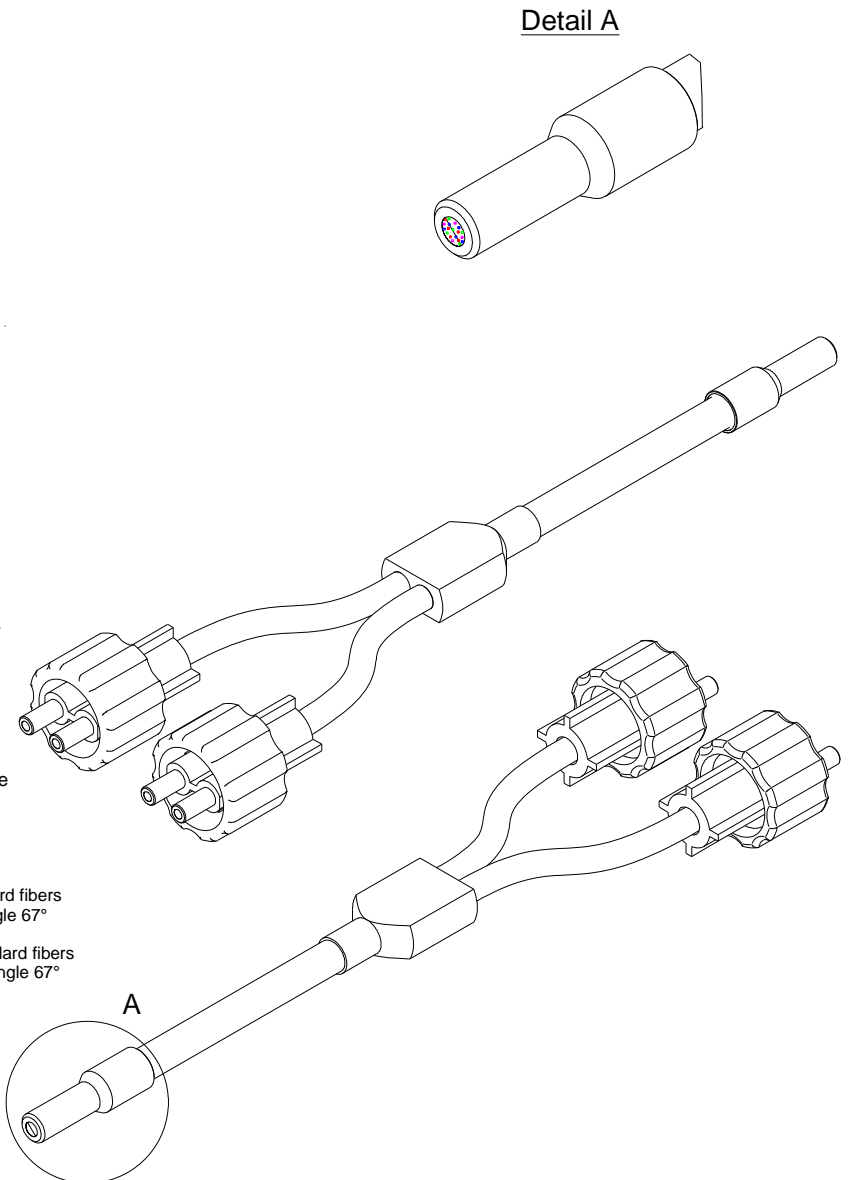
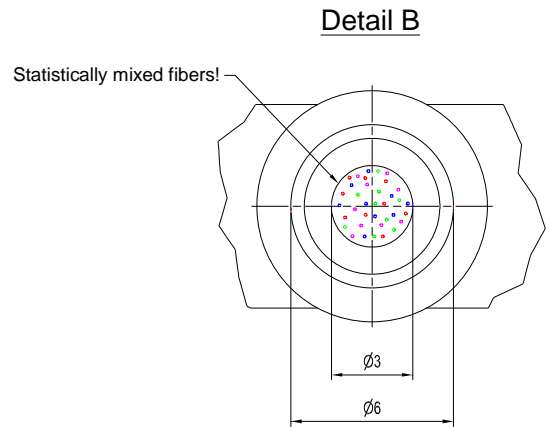
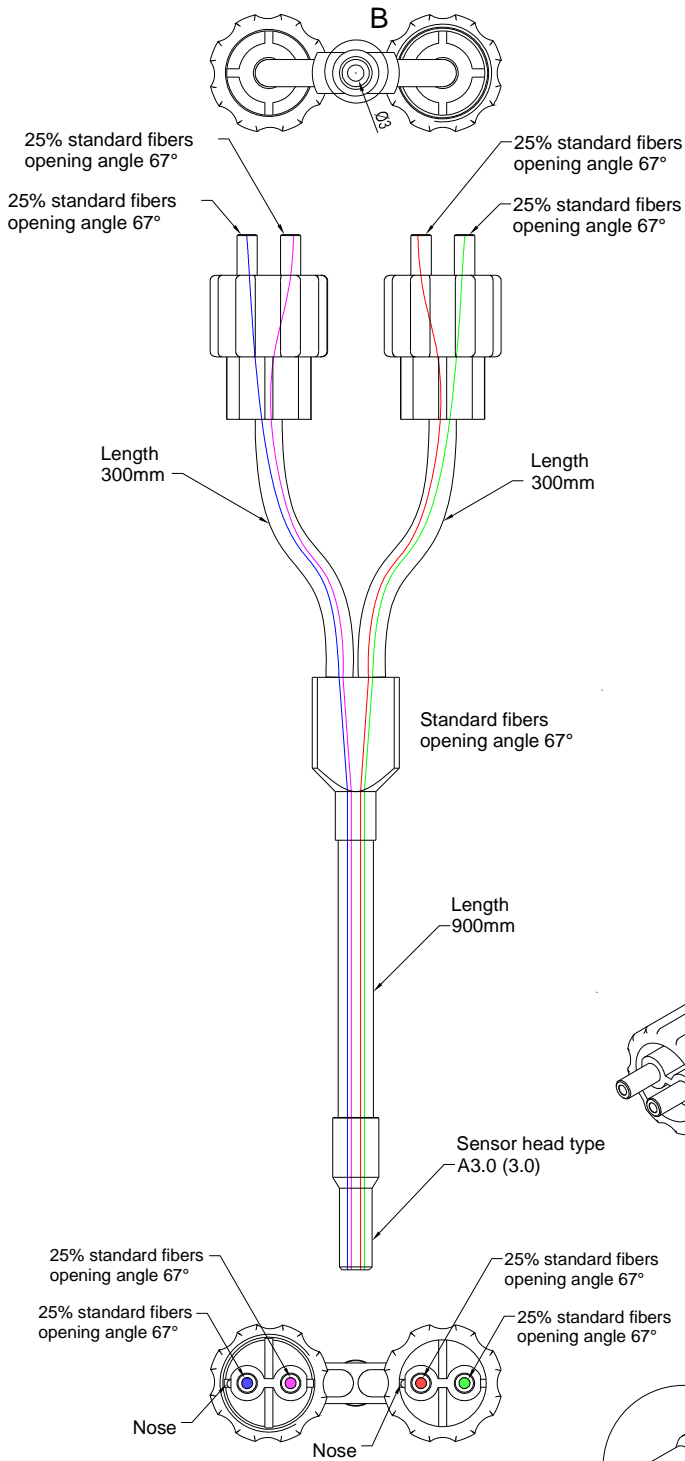


The software „Firmware Loader“ allows the user to perform an automatic firmware update. The update will be carried out through the RS232 interface.

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.

Special Fiber Optics

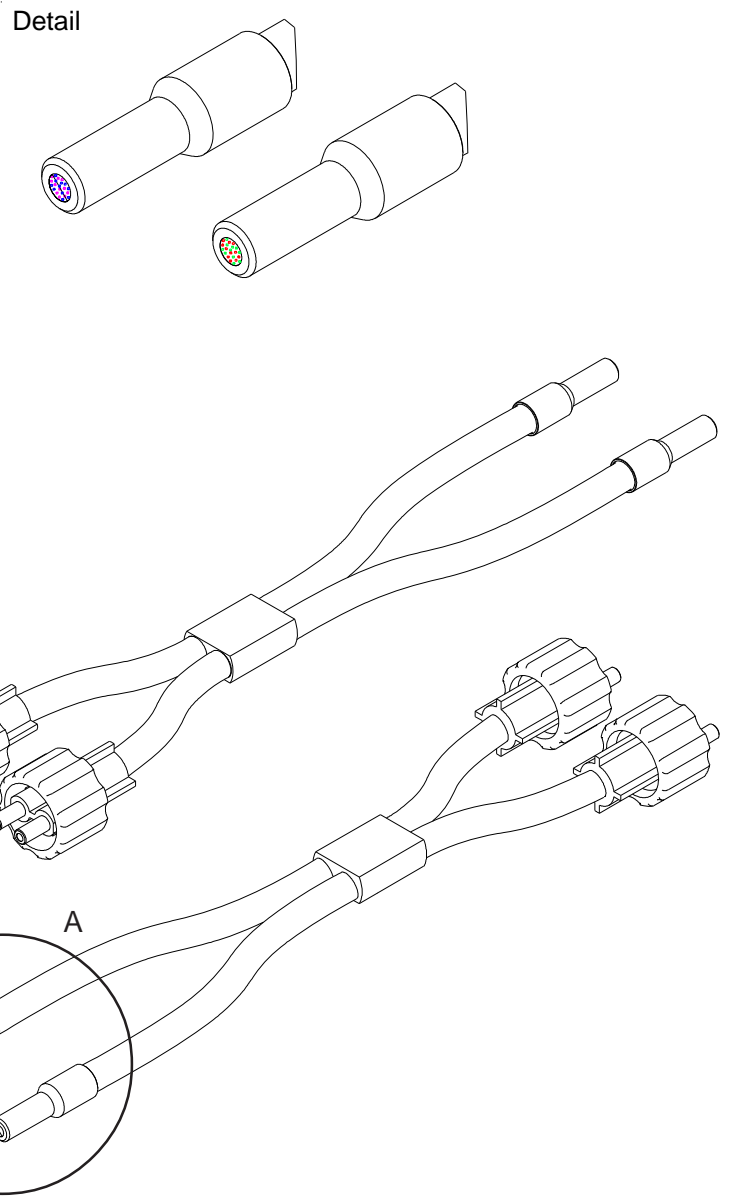
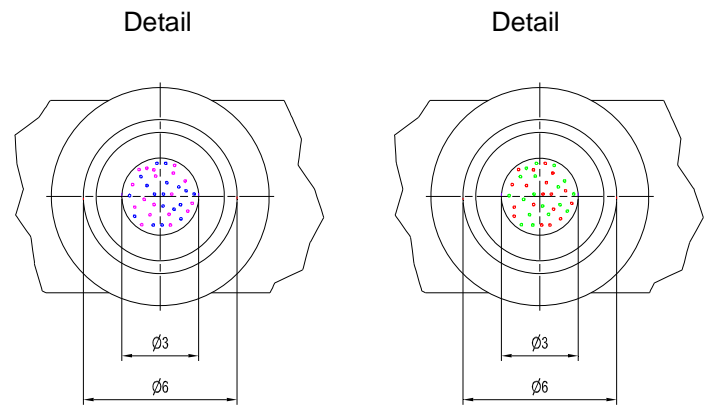
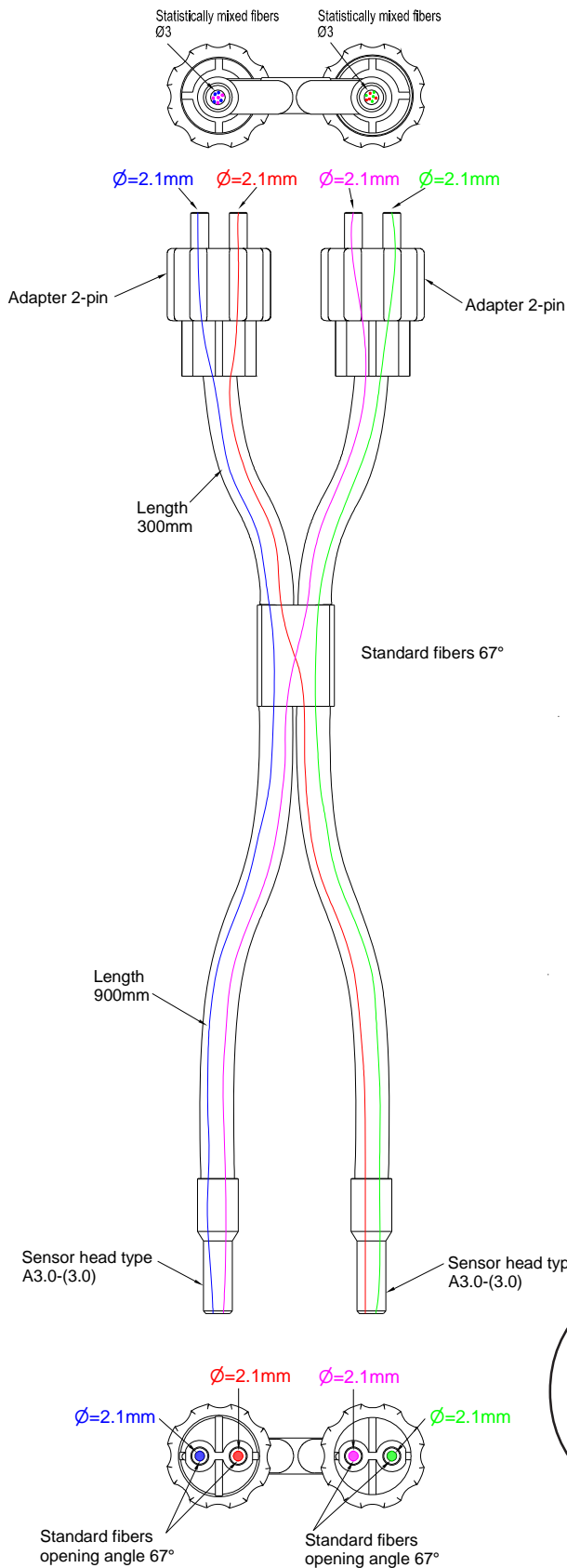
R-S-A3.0-(3.0)-1200-Y-67°-2P/2P
Reflected light fiber optics (Y-version)



All dimensions in mm

Special Fiber Optics

D-S-A3.0-(3.0)-1200-Y-67°-2P/2P
Transmitted-light fiber optics (Y-version)



All dimensions in mm



Optical Frontends

Overview: Optical frontends for fiber optics with sensor head type „A3.0“:



KL-9-A3.0



KL-M12-A3.0



KL-M18-A3.0



KL-M18-XL-A3.0



KL-M34-A3.0



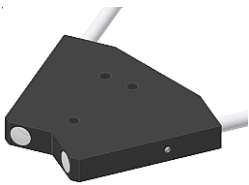
KL-M34-XL-A3.0



KL-M34/62-A3.0



KL-52-XL-A3.0



KL-D-0°/45°-30-A3.0



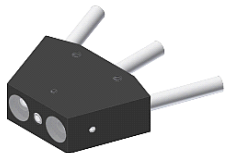
KL-D-5°-85-POL-A3.0



KL-D-10°-45-POL°-A3.0



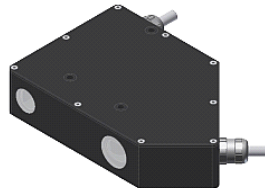
KL-D-20°-20-POL-A3.0



KL-D-40°-23-5/DIF-A3.0



KL-D-M12-0°/30°-9-A3.0



KL-D-0°/45°-85-1200-A3.0



Lichtleiter-Halterungen

Mounting brackets (fixtures) for transmitted light fiber optics with sensor head type „A3.0“:

Part number:	Suitable for fiber optics type: (D= transmitted light)	Characteristics:
C-MOUNT-A3.0-180°-16/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 16 mm, fork width/depth: 50/50 mm
C-MOUNT-A3.0-180°-60/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 94/50 mm
C-MOUNT-A3.0-180°-100/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
MOUNT-A3.0-170°-5	D-S-A3.0-(3.0)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A3.0-150°-10	D-S-A3.0-(3.0)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A3.0-120°-12	D-S-A3.0-(3.0)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A3.0-90°-15	D-S-A3.0-(3.0)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A3.0-40°-20	D-S-A3.0-(3.0)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces



C-MOUNT-A3.0-180°-.../50
+ D-S-A3.0-(3.0)-...-67°



MOUNT-A3.0-40°-20
+ D-S-A3.0-(3.0)-...-67°



MOUNT-A3.0-90°-15
+ D-S-A3.0-(3.0)-...-67°



MOUNT-A3.0-120°-12
+ D-S-A3.0-(3.0)-...-67°



MOUNT-A3.0-150°-10
+ D-S-A3.0-(3.0)-...-67°



MOUNT-A3.0-170°-5
+ D-S-A3.0-(3.0)-...-67°

SPECTRO Series

► SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)

- Distance measurement independent of intensity with BICONE fiber optics, normed contrast comparison of the two channels, 2-channel contrast measurement, simultaneous turbidity measurement using a through-beam and 90° process
- Transmitter channel 0: IR-LED (860nm) / Receiver channel 0: IR (730nm ... 1100nm)
Transmitter channel 1: IR-LED (860nm) / Receiver channel 1: IR (730nm ... 1100nm)
- Various evaluation modes available (in combination with corresponding fiber optics): Distance measurement (BICONE), humidity measurement (HYGROMETRY), contrast comparison (NORM), 2-channel contrast measurement, ...
- Fast evaluation methods in DC-operation available (up to 100kHz)
- Insensitive to outside light (in AC-operation)
- Parameterizable via Windows® software
- RS232 interface (RS232/Ethernet adapter and RS232/USB adapter available)
- Suitable for use in hazardous areas (fiber optics)
- Two analog outputs (0V... +10V and 4mA...20mA)
- Two digital outputs (0V/+24V)
- External trigger input and teach input
- Linearization by means of an editable linearization curve



Design

Product name:

SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)*

(incl. Windows® PC software SPECTRO2-Scope)

*2-channel system

(Transmitter channel 0/Receiver channel 0)/

(Transmitter channel 1/Receiver channel 1)

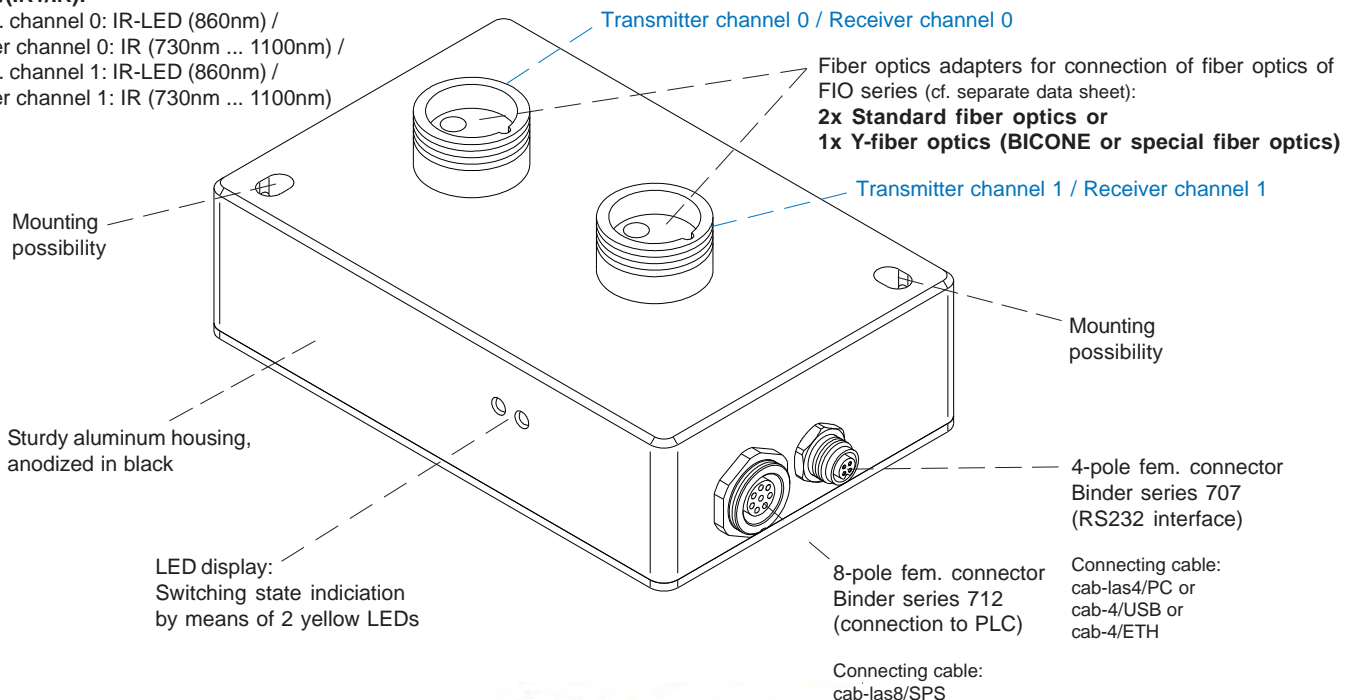
(IR1/IR)/(IR1/IR):

Transm. channel 0: IR-LED (860nm) /

Receiver channel 0: IR (730nm ... 1100nm) /

Transm. channel 1: IR-LED (860nm) /

Receiver channel 1: IR (730nm ... 1100nm)



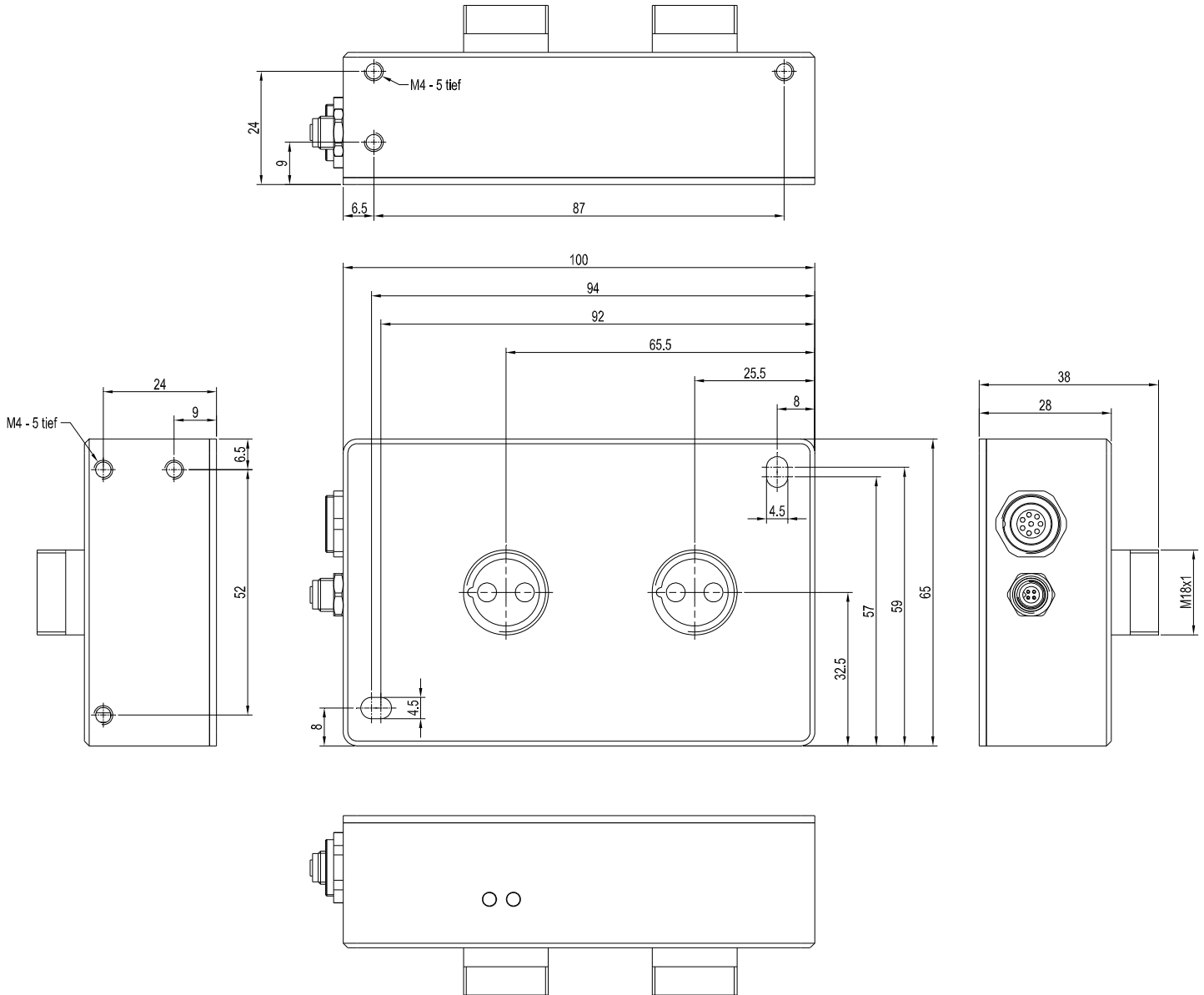
Accessories: (p. 10-23)

Standard fiber optics
BICONE fiber optics
Special fiber optics
Optical frontends
Fiber optics fixtures


Technical Data

Model	SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
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
Inputs digital (2x)	IN0 and IN1 (Pin 3 and 4): digital (0V/+24V)
Outputs digital (2x)	OUT0 and OUT1 (Pin 5 and 6): digital (0V/+24V), npn/pnp-able (bright-/dark-switching, can be switched)
Outputs analog (1x)	ANALOG voltage 0 ... +10V or ANALOG current 4 ... 20mA (Pin 7)
Interface	RS232
Pulse lengthening	0 ... 100 ms, einstellbar über PC-Software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency	LED operation, can be switched via PC software: AC operation: max. 85 kHz (depends on parameterization) DC and OFF operation: max. 200 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Analog band width	typ. 90 kHz (-3 dB)
Transmitter (light source)	Transmitter channel 0: IR-LED (860nm) Transmitter channel 1: IR-LED (860nm)
Receiver	Receiver channel 0: Photo diode with IR filter (730nm...1100nm) Receiver channel 1: Photo diode with IR filter (730nm...1100nm)
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF)
Object distance (measurement range)	with reflected light fiber optics: typ. 1 mm ... 500 mm (depends on fiber optics and attachment optics) with transmitted light fiber optics: typ. 10 mm ... 500 mm (depends on fiber optics and attachment optics)
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Size of light spot	depends on fiber optics and attachment optics (cf. catalog FIO series)
Reproducibility	2 digits at 12-bit A/D conversion (equates 1/2048)
Housing dimensions	LxWxH approx. 100 mm x 65 mm x 38 mm (incl. fiber optics connector M18x1, without connectors)
Housing material	aluminum, anodized in black
Enclosure rating	IP64
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
Type of connector	connection to PLC: 8-pole fem. connector (Binder 712) connection to PC: 4-pole fem. connector (Binder 707)
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

Connector Assignment

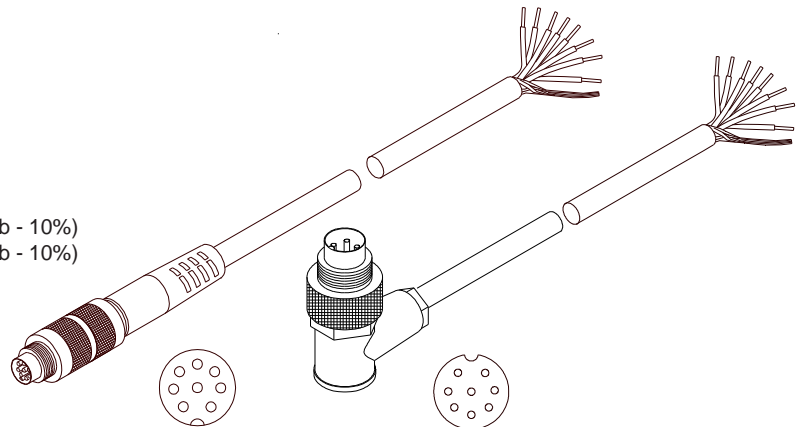
Connection to PLC:

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	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:

Connecting cable (incl. driver software):
 cab-4/USB-(length)
 cab-4/USB-w-(length) (angle type 90°)
 (standard length 2m)

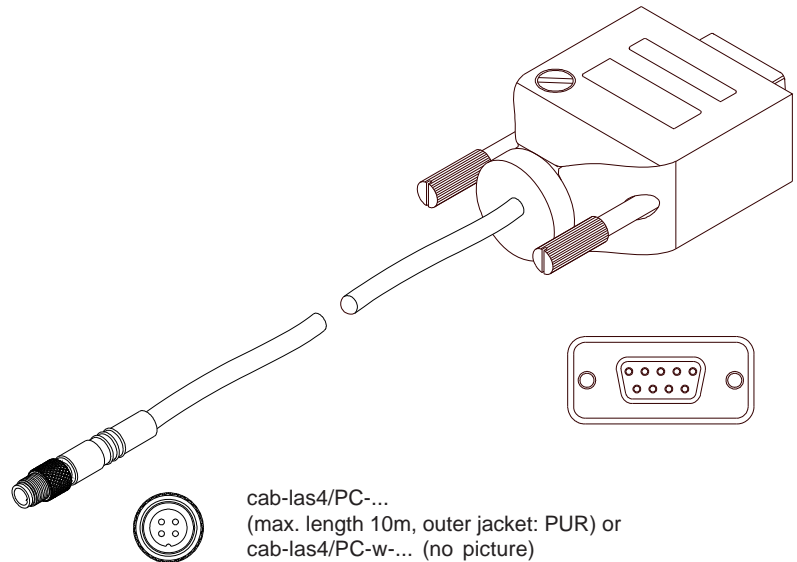
alternative:

Connection to local network via Ethernet bus:

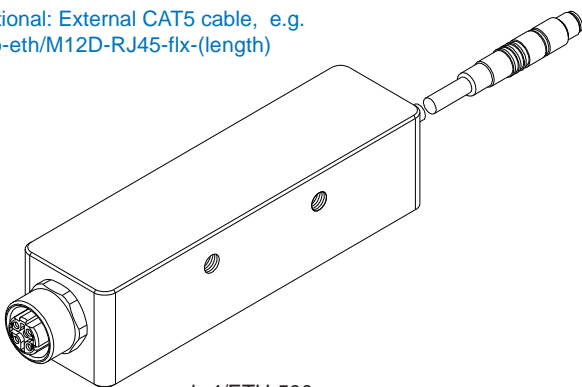
Adapter (incl. software „SensorFinder“):
 cab-4/ETH-500
 (standard length 0.5m)

Optional: External CAT5 cable, e.g.

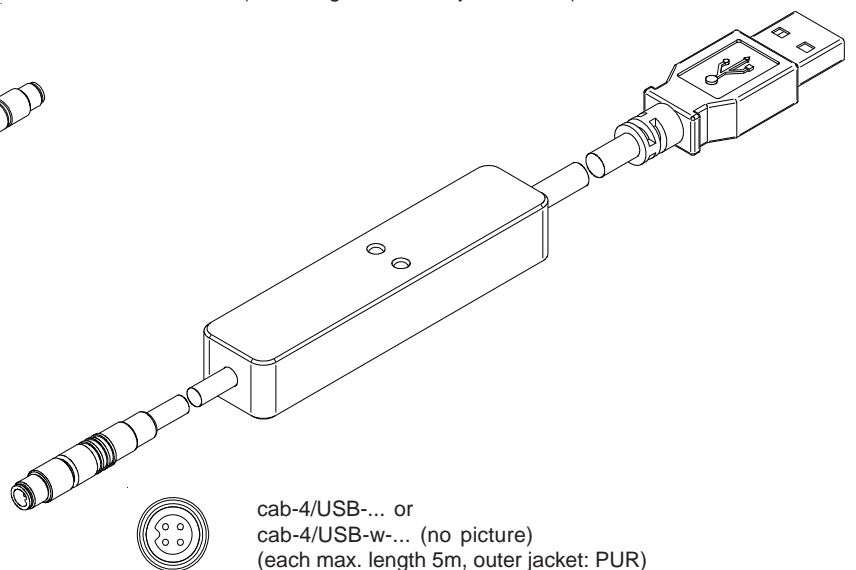
cab-eth/M12D-RJ45-flx-(length)



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)



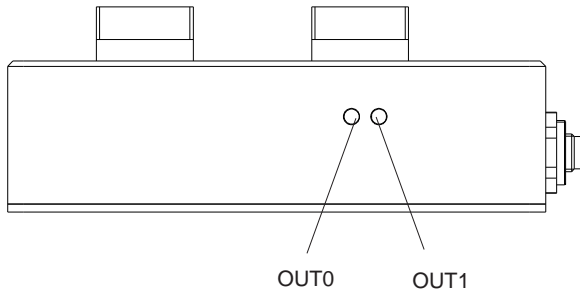
cab-4/USB-... or
 cab-4/USB-w-... (no picture)
 (each max. length 5m, outer jacket: PUR)



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 SPECTRO-2-FIO sensor is a 2-channel system, which means it features two fiber optics connections that (initially) are independent of each other. All the fiber optics of the FIO series (through-beam fiber optics type D-... and reflective fiber optics type R-... as well as fiber optics with two sensor heads type X-...) can be used with this sensor.

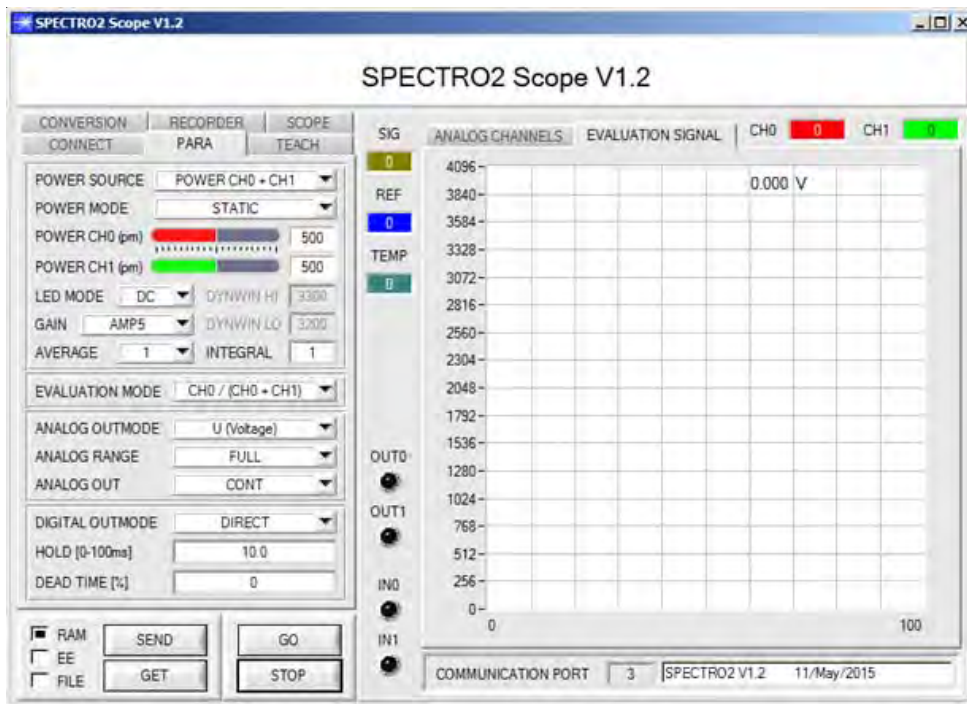
The desired operating mode can be set with the SPECTRO2-Scope Windows® software:

- Separate evaluation (every channel operates independently, typ. 2-channel system)
- Normed evaluation (the relation of the two channels is determined by way of norming)
- Summation (the two channels are added)
- Subtraction (the difference of the two channels is calculated)
- Differentiation (calculation of the first derivative of the two channels)

To prevent mutual influencing of the two channels, different optical filters (depending on the respective type) or a timing offset of the respective LED can be used.

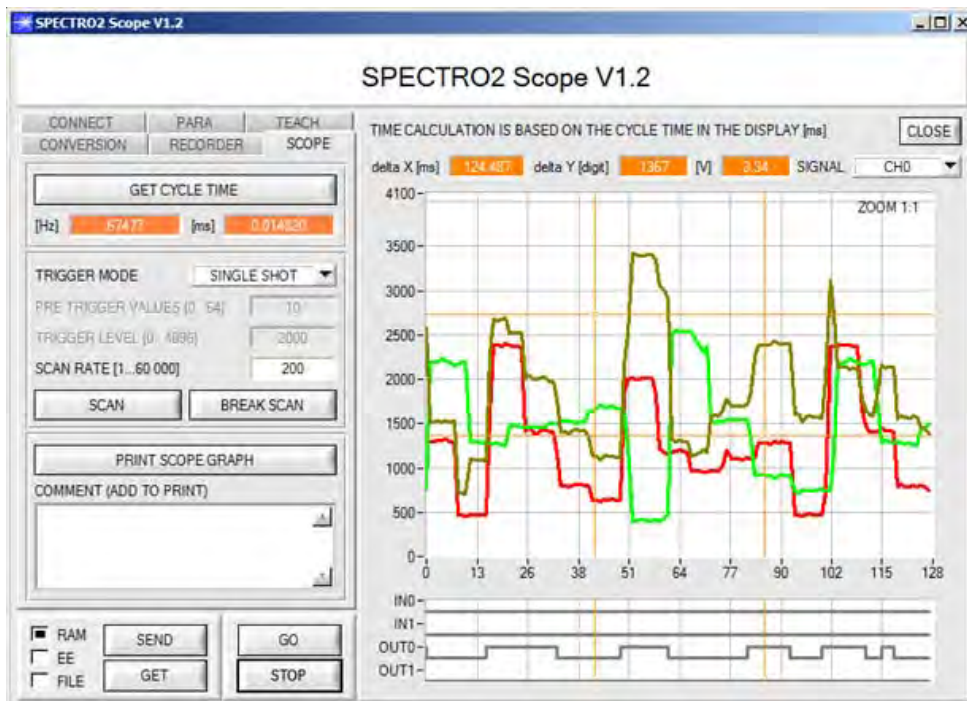
Parameterization

Windows® user interface:



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 an Ethernet adaptor, e.g. SI-RS232/Ethernet-4-...). Through the interface all the parameters can be stored in the non-volatile EEPROM of the sensor.

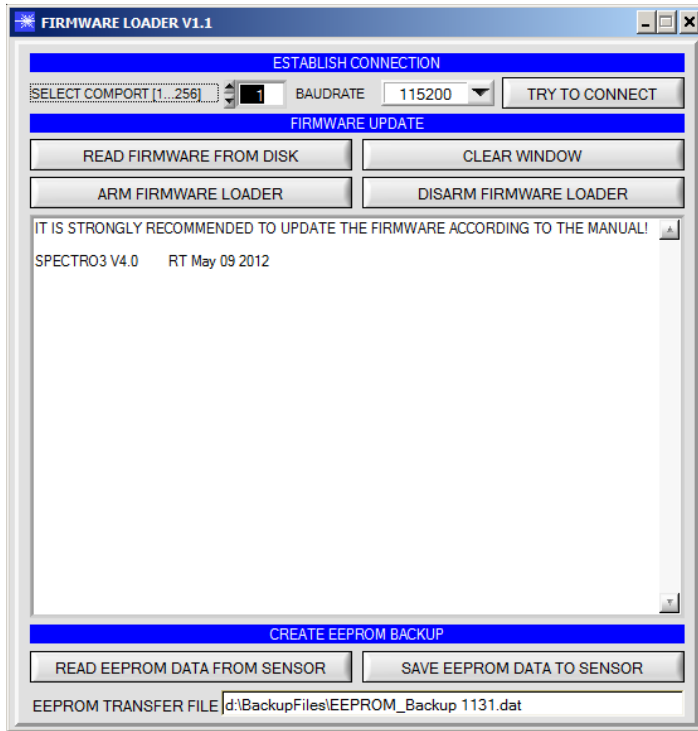


The SCOPE tab visualizes an oscilloscope.



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.

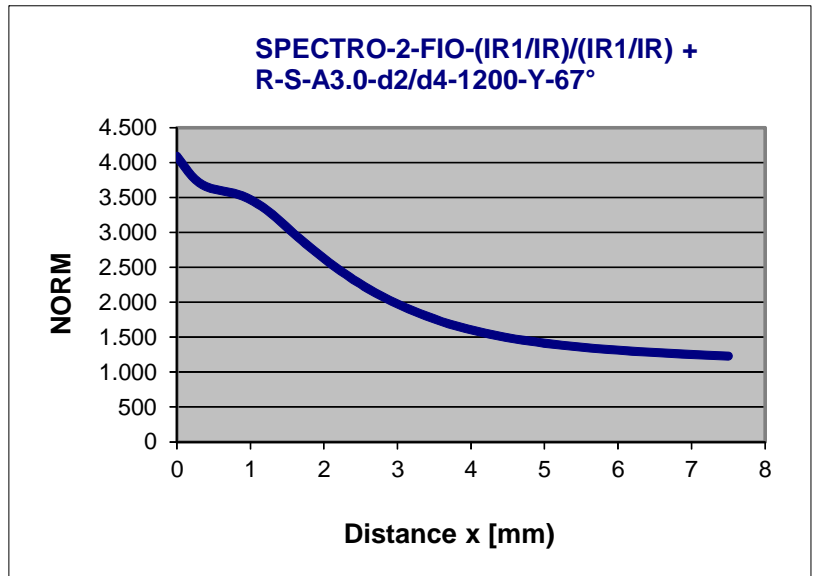
An initialisation file (xxx.ini) and a firmware file (xxx.elf.S) are required for performing a firmware update. These files can be obtained from your supplier. In some cases an additional firmware file for the program memory (xxx.elf.p.S) is also needed, and this file will be automatically provided together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



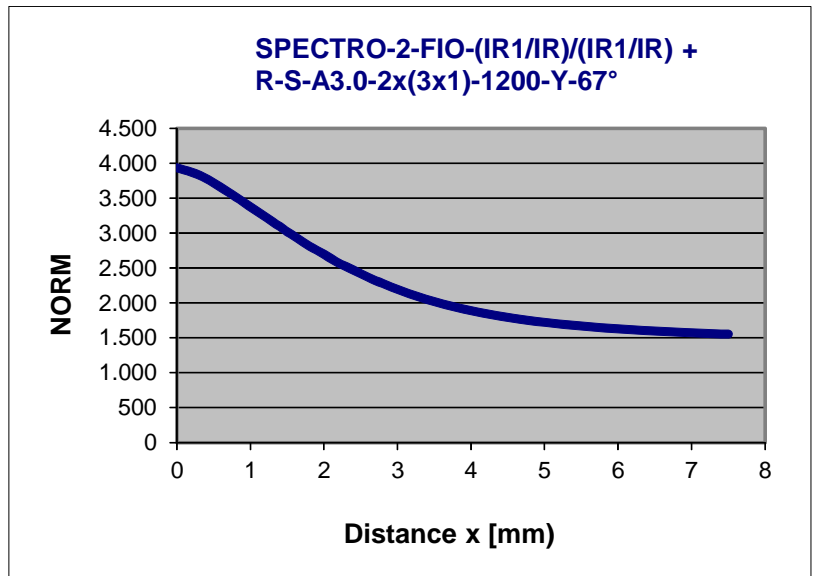
Diagrams

Diagrams: Standardized value NORM depending on the distance of the object (white paper) to the fiber optics head

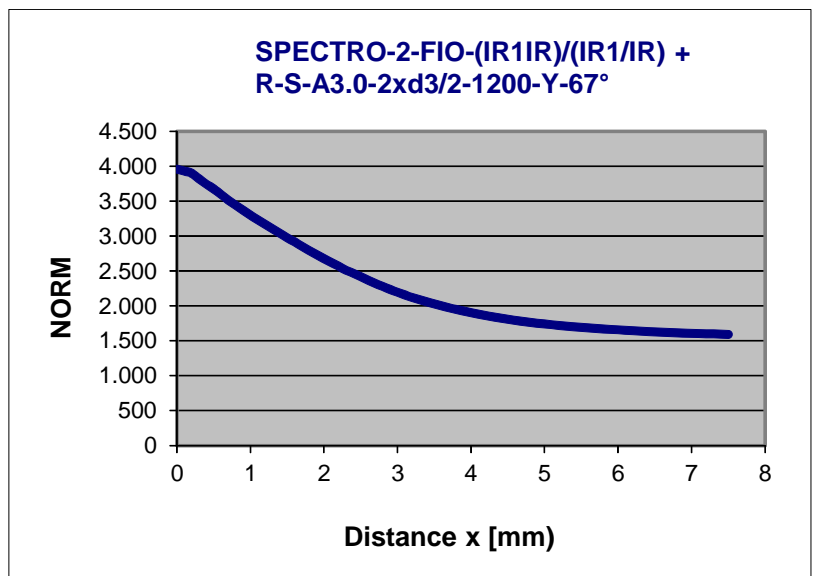
Standardized value NORM
SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
with fiber optics R-S-A3.0-d2/d4-1200-Y-67°



Standardized value NORM
SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
with fiber optics R-S-A3.0-2x(3x1)-1200-Y-67°



Standardized value NORM
SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
with fiber optics R-S-A3.0-2xd3/2-1200-Y-67°

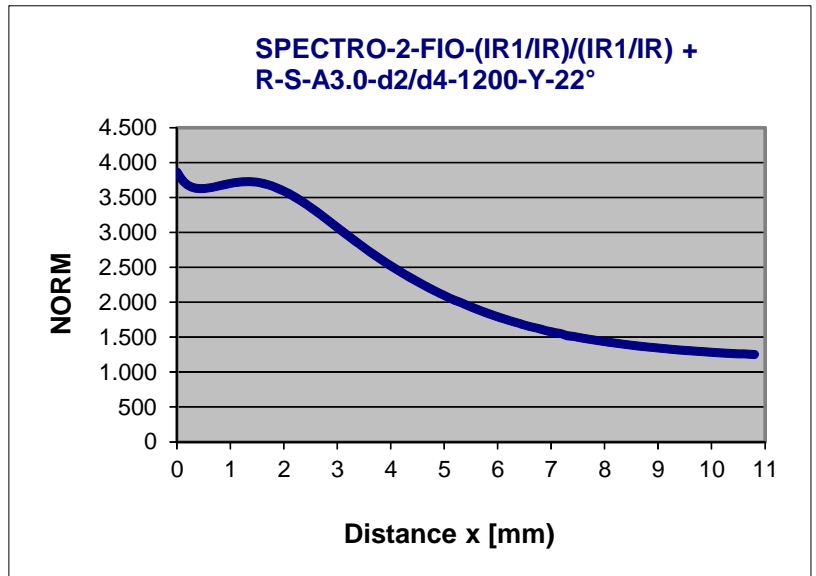




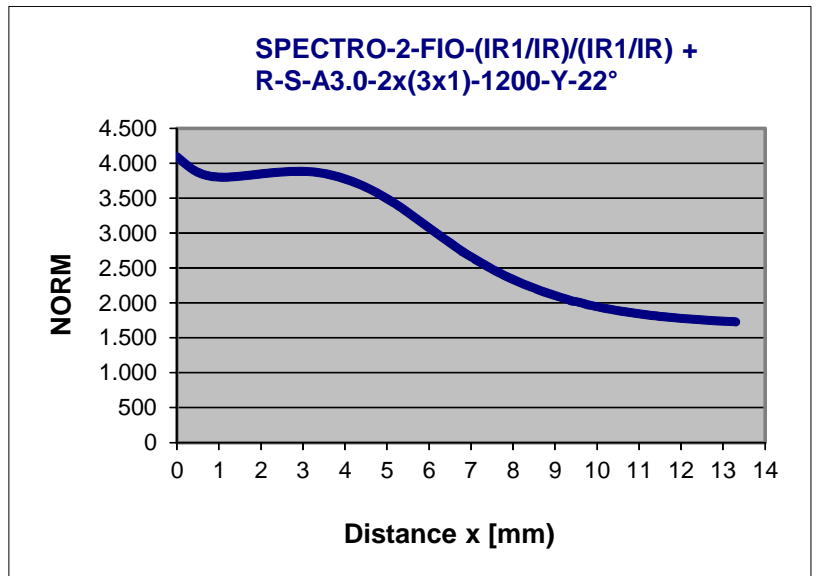
Diagrams

Diagrams: Standardized value NORM depending on the distance of the object (white paper) to the fiber optics head

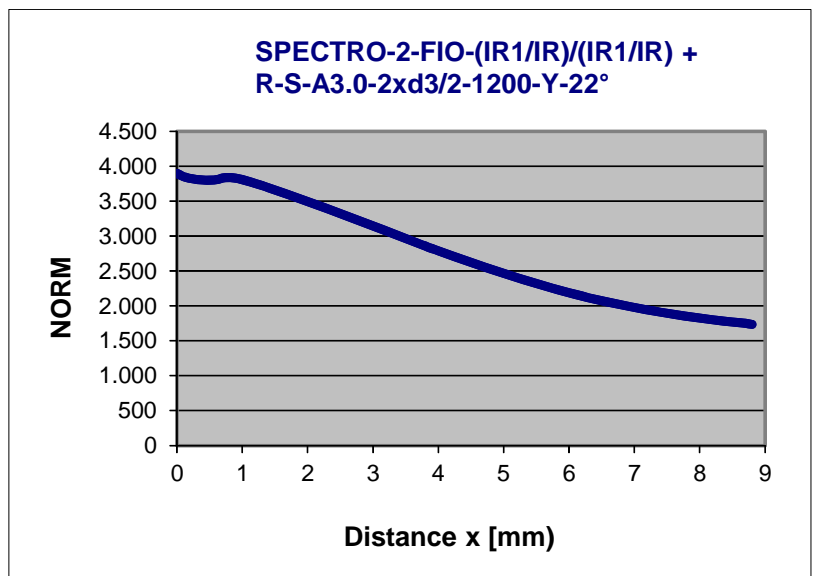
Standardized value NORM
SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
with fiber optics R-S-A3.0-d2/d4-1200-Y-22°



Standardized value NORM
SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
with fiber optics R-S-A3.0-2x(3x1)-1200-Y-22°



Standardized value NORM
SPECTRO-2-FIO-(IR1/IR)/(IR1/IR)
with fiber optics R-S-A3.0-2xd3/2-1200-Y-22°





Fiber Optics

Field of use:

Optical fibers offer solutions for difficult tasks in optoelectronics. They can be used universally and allow flexible applications.

Advantages:

- Highest quality
- Selection from different fiber types
- Thermal stability
- Great variety of available standard sensor heads
- Special designs
- Various attachment optics available



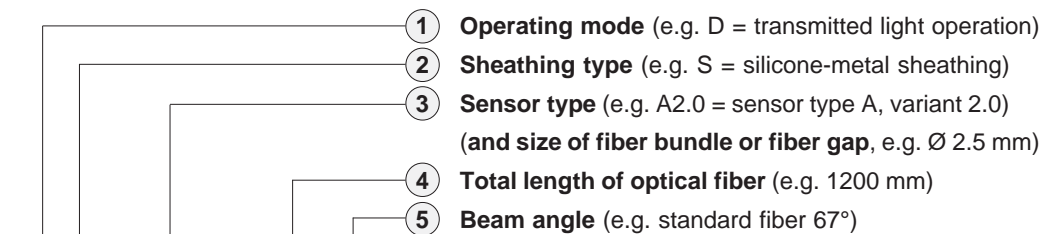
Characteristics:

Light-conducting glass fibers are optical components that allow the transmission of light through any curved path based on the principle of total reflection.

The individual fiber is composed of high-break core glass and low-break cladding glass. The light beams entering the core glass within the critical angle are guided through the fiber by way of reflection at the core/cladding contact surfaces (step index fiber).

The highly flexible optical fibers are made of bundled individual glass fibers. The ends are each glued into a sensor head and a connector. The faces are optically polished. For protection against mechanical, chemical, or thermal destruction the optical fibers are provided with a corresponding protective sheath.

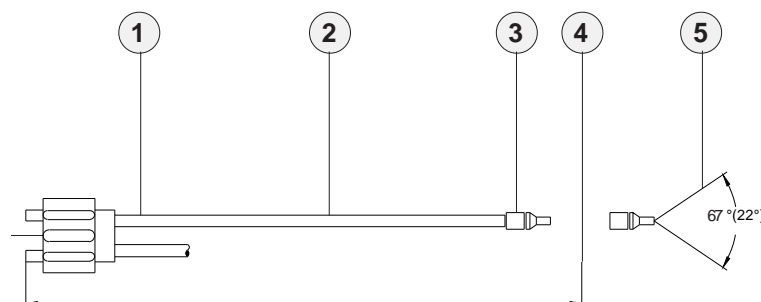
Order Code:



D-S-A2.0-(2.5)-1200-67°

Order code for optical fiber

(For detailed description of the various types of fiber optics, please cf. catalog „FIO Series“)



Dimensions of adapter

Attachment optics (e.g. focus lens, reflex optics, prismn optics)

Fiber optics for reflex light operation

Fiber optics for transmitted light operation

Mounting hints

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

cf. catalog FIO Series

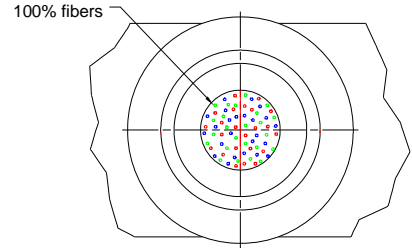




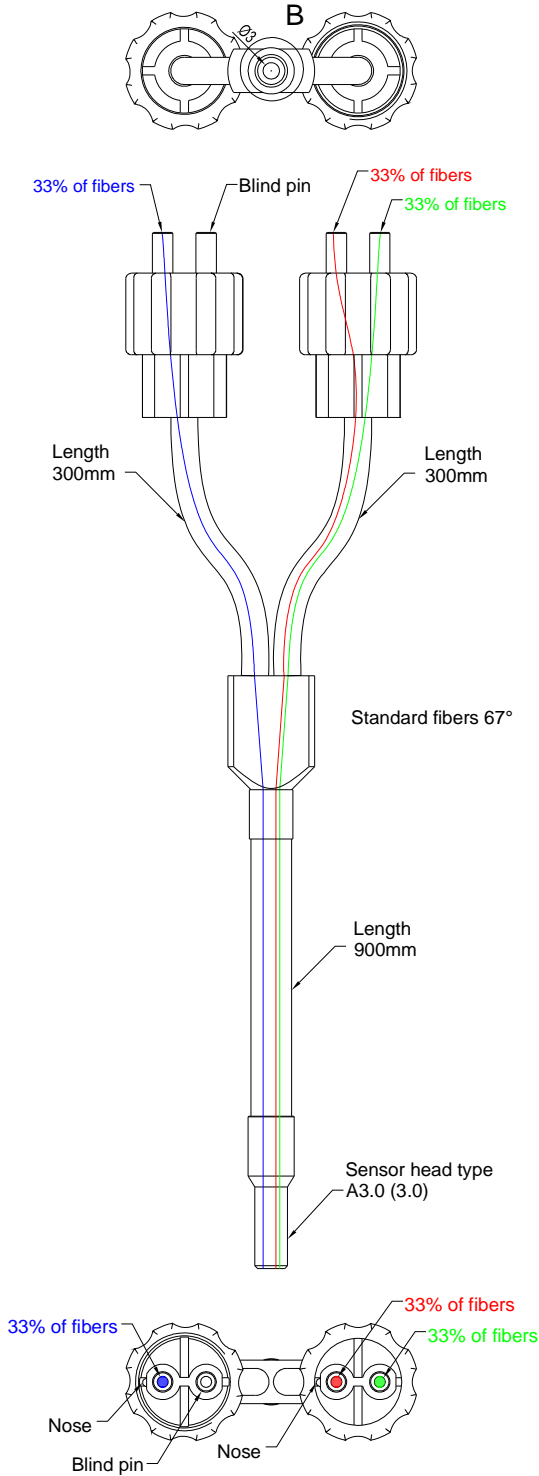
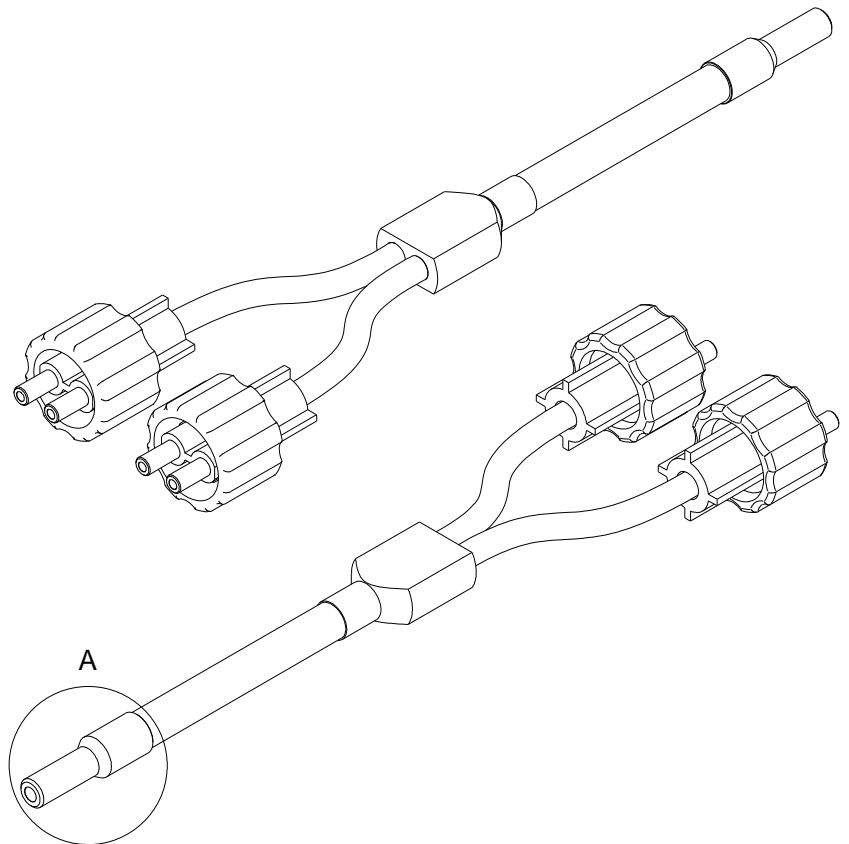
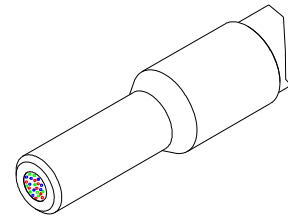
BICONE Fiber Optics

R-S-A3.0-(3.0)-1200-Y-67°-(1P+1BP)/2P

Detail B



Detail A

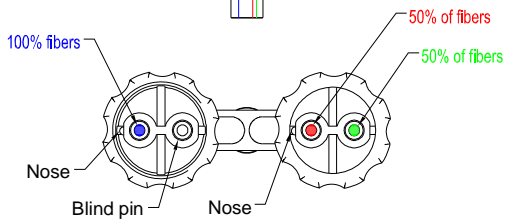
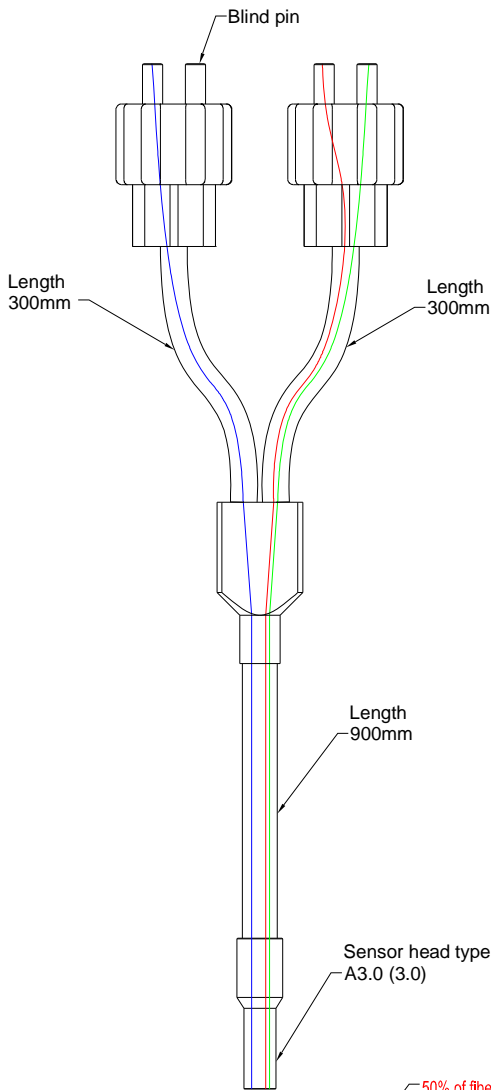
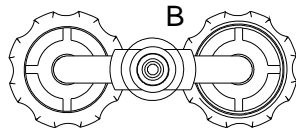


All dimensions in mm

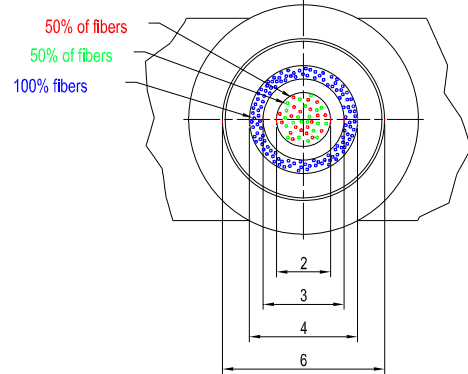
BICONE Fiber Optics

R-S-A3.0-(d2/d4)-1200-Y-22°-(1P+1BP)/2P

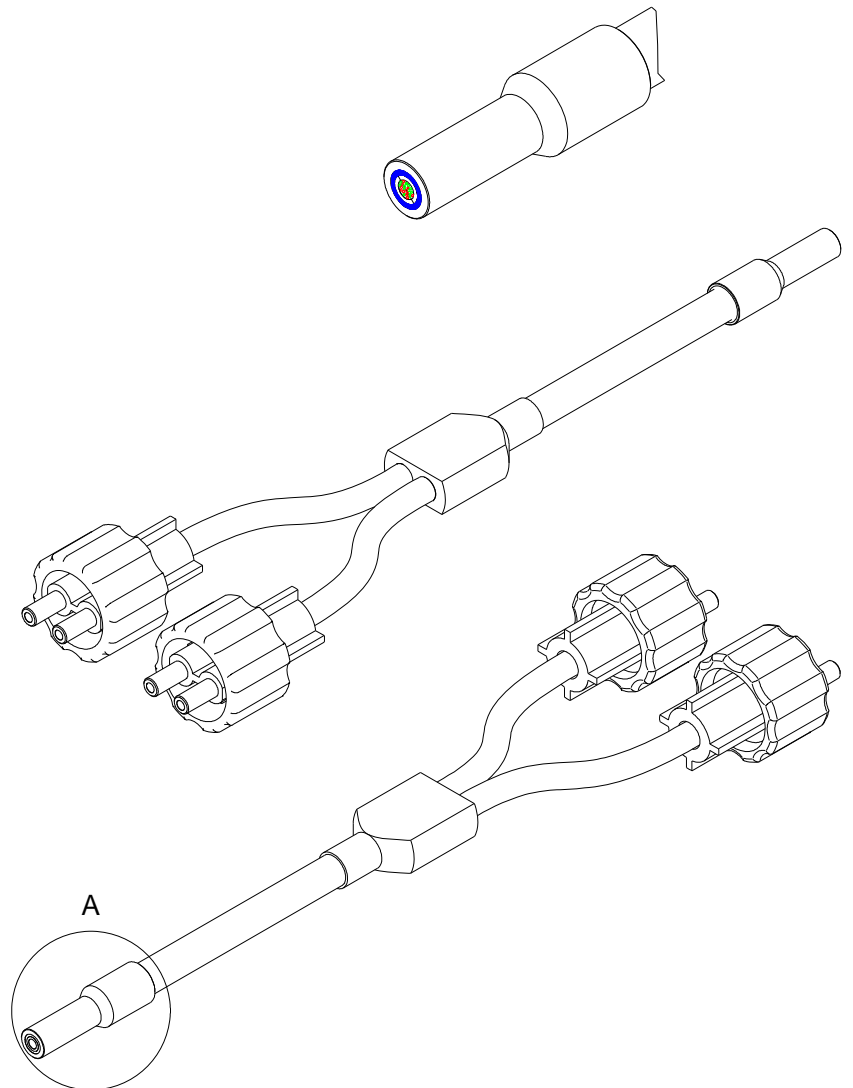
R-S-A3.0-(d2/d4)-1200-Y-67°-(1P+1BP)/2P



Detail B



Detail A



All dimensions in mm

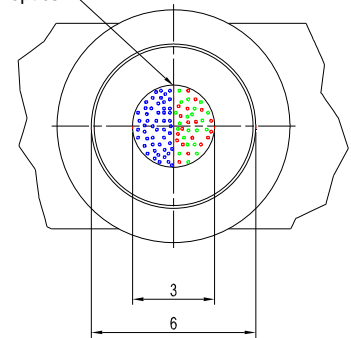
BICONE Fiber Optics

R-S-A3.0-(2xd3/2)-1200-Y-22°-(1P+1BP)/2P

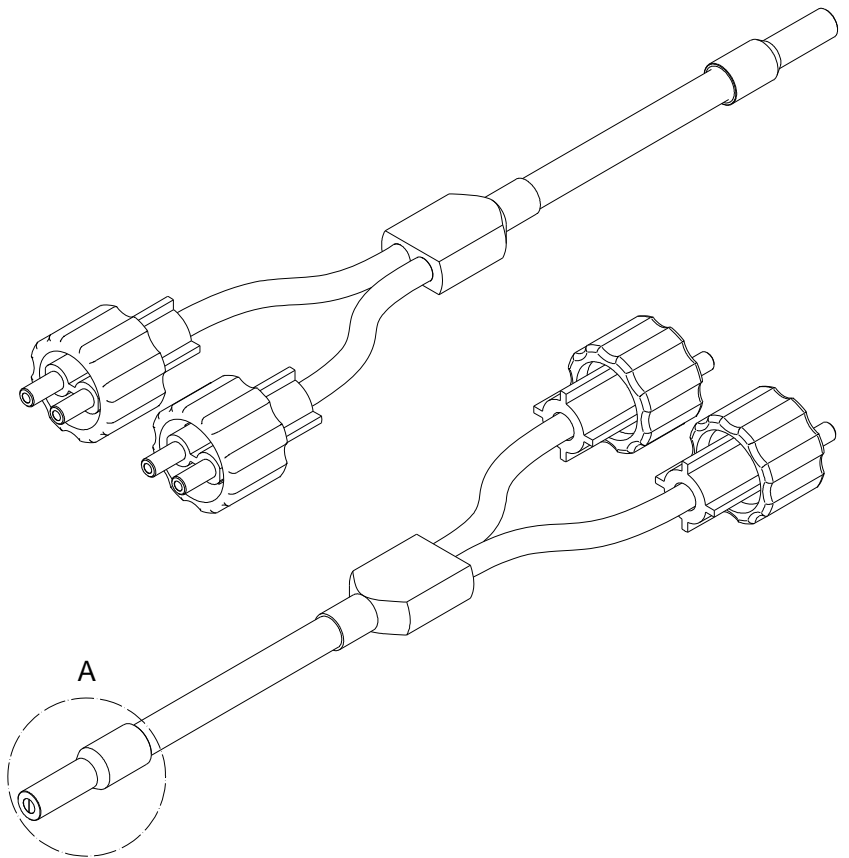
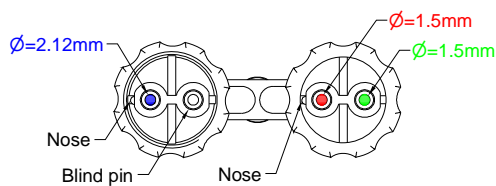
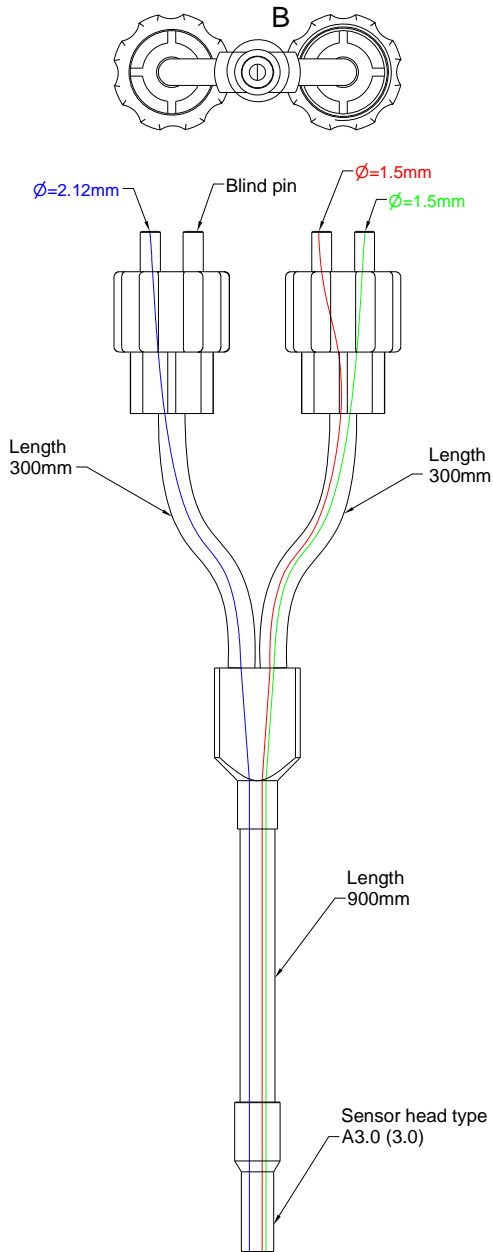
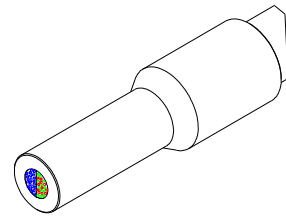
R-S-A3.0-(2xd3/2)-1200-Y-67°-(1P+1BP)/2P

No separating layer between, but fiber optics are divided into two sectors!

Detail B



Detail A

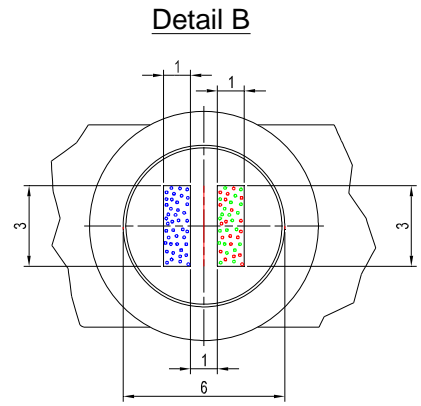


All dimensions in mm

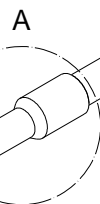
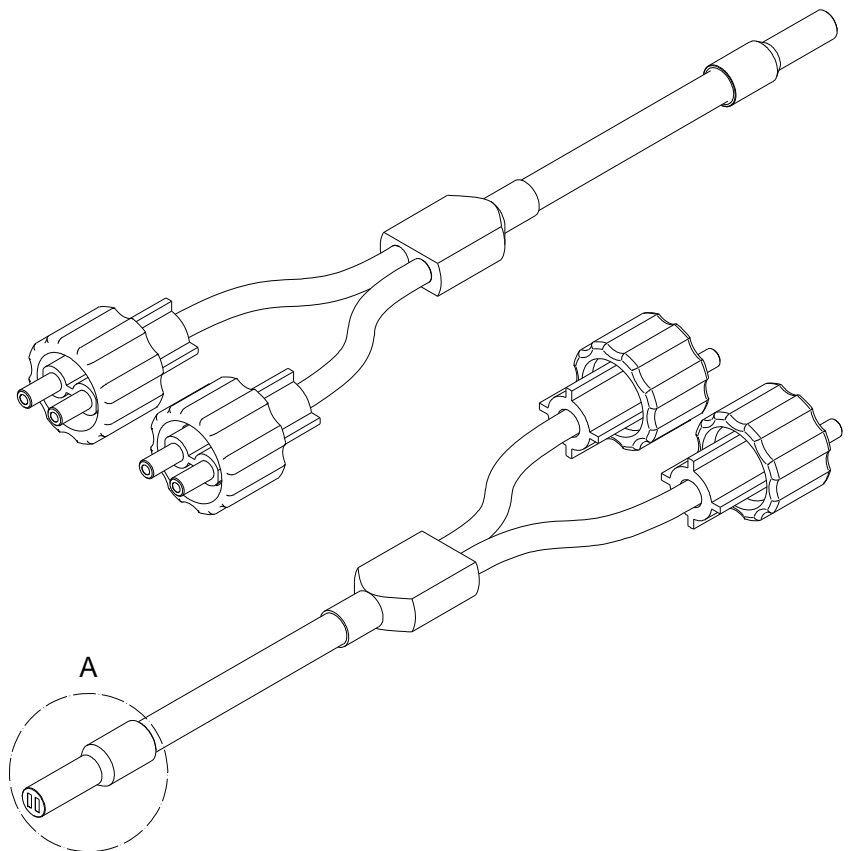
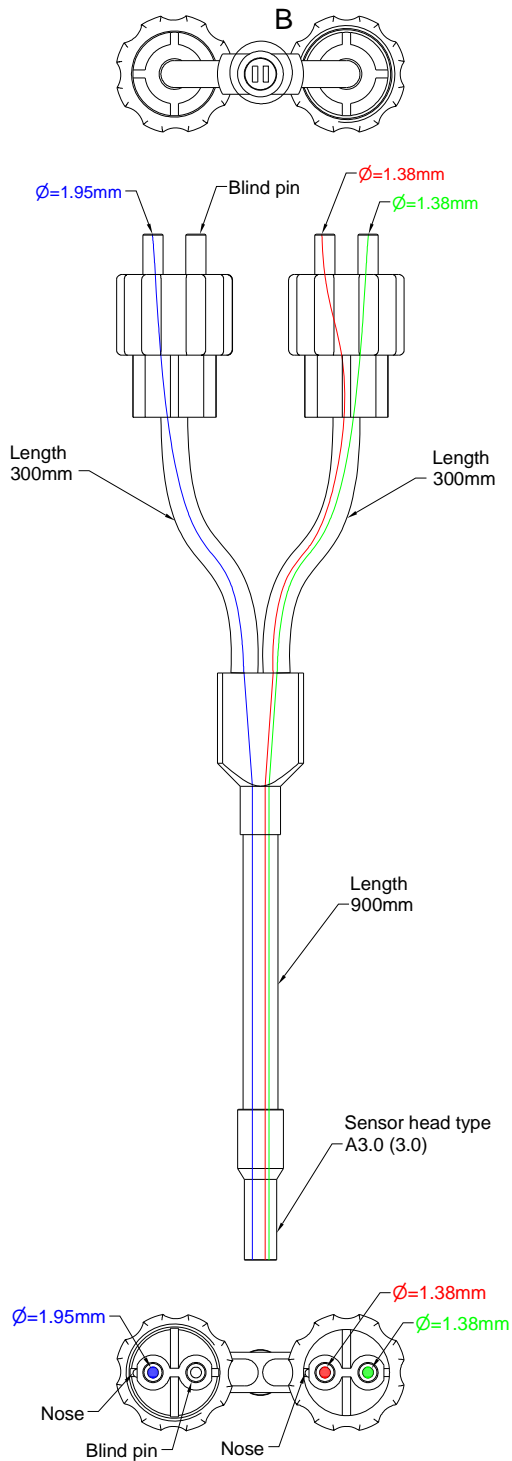
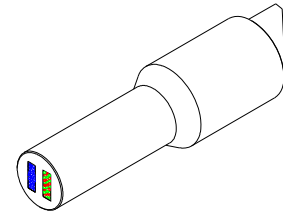
BICONE Fiber Optics

R-S-A3.0-2x(3x1)-1200-Y-22°-(1P+1BP)/2P

R-S-A3.0-2x(3x1)-1200-Y-67°-(1P+1BP)/2P



Detail A



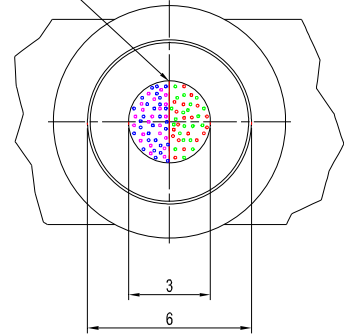
All dimensions in mm

Special Fiber Optics

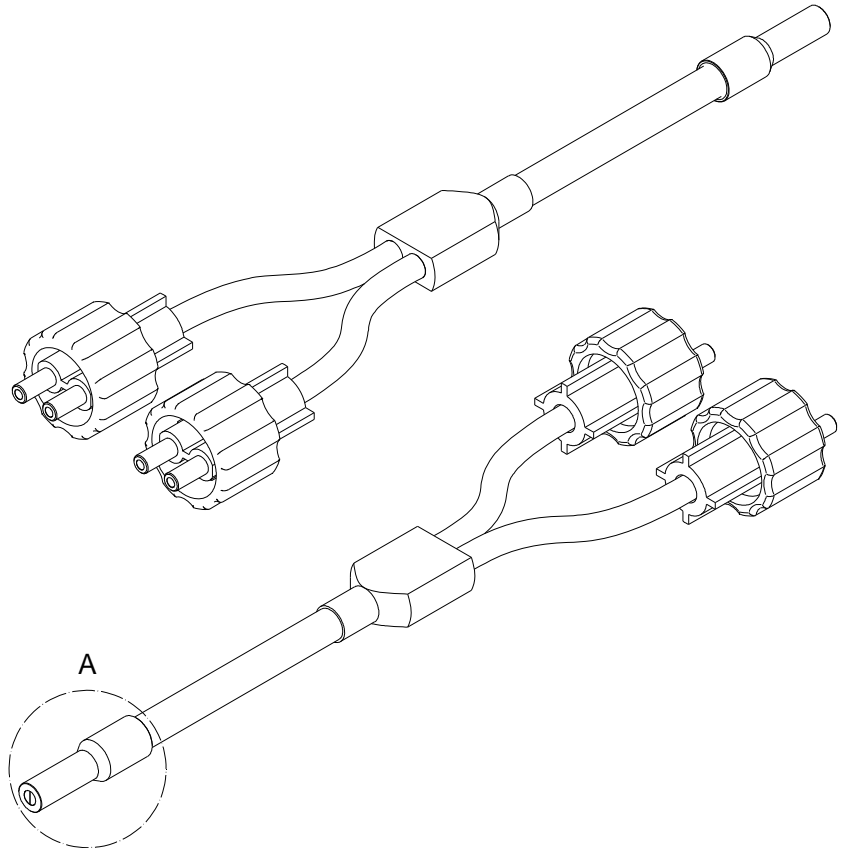
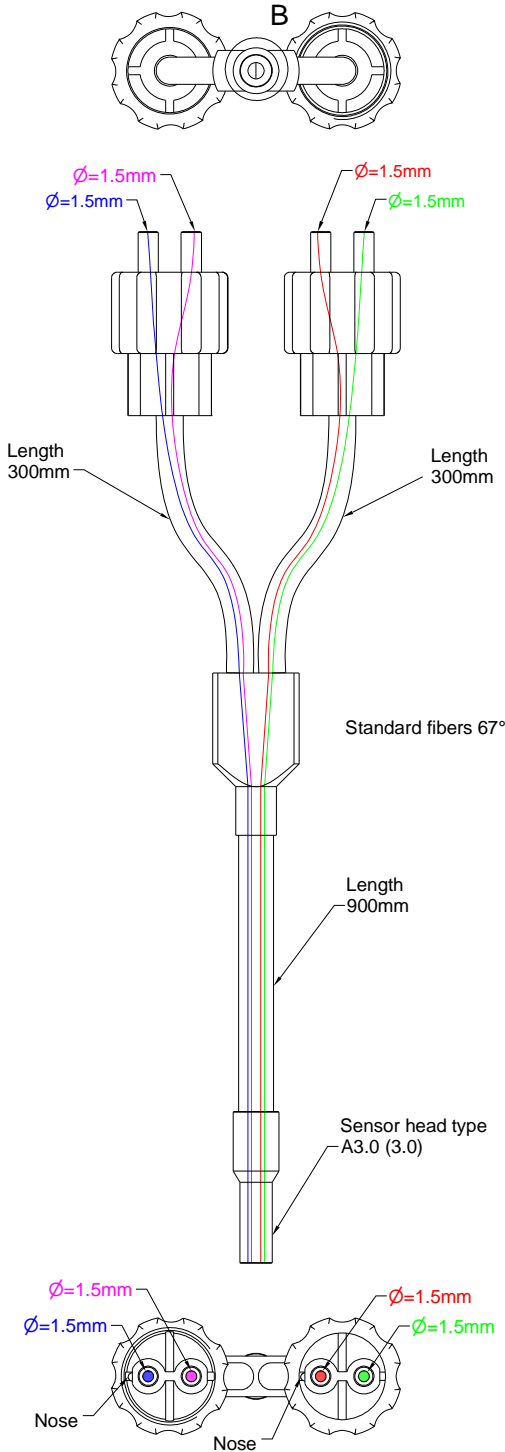
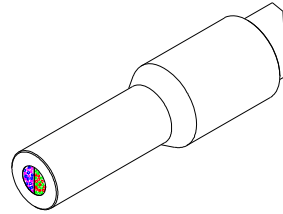
R-S-A3.0-(2xd3/2)-1200-Y-67°-2P/2P

Detail B

No separating layer between, but fiber optics are divided into two sectors!



Detail A

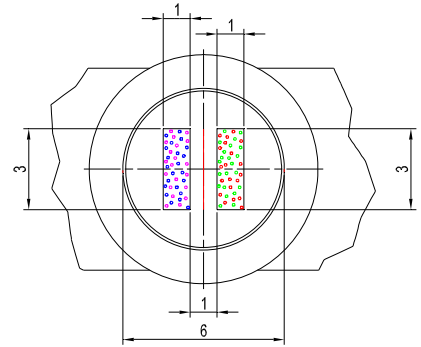


All dimensions in mm

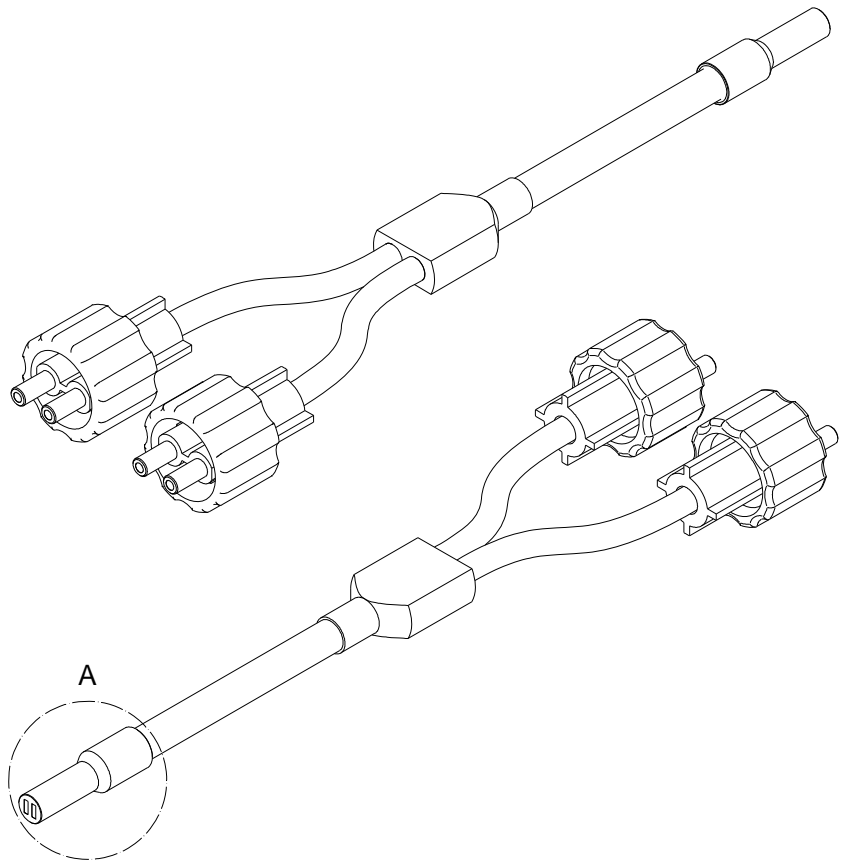
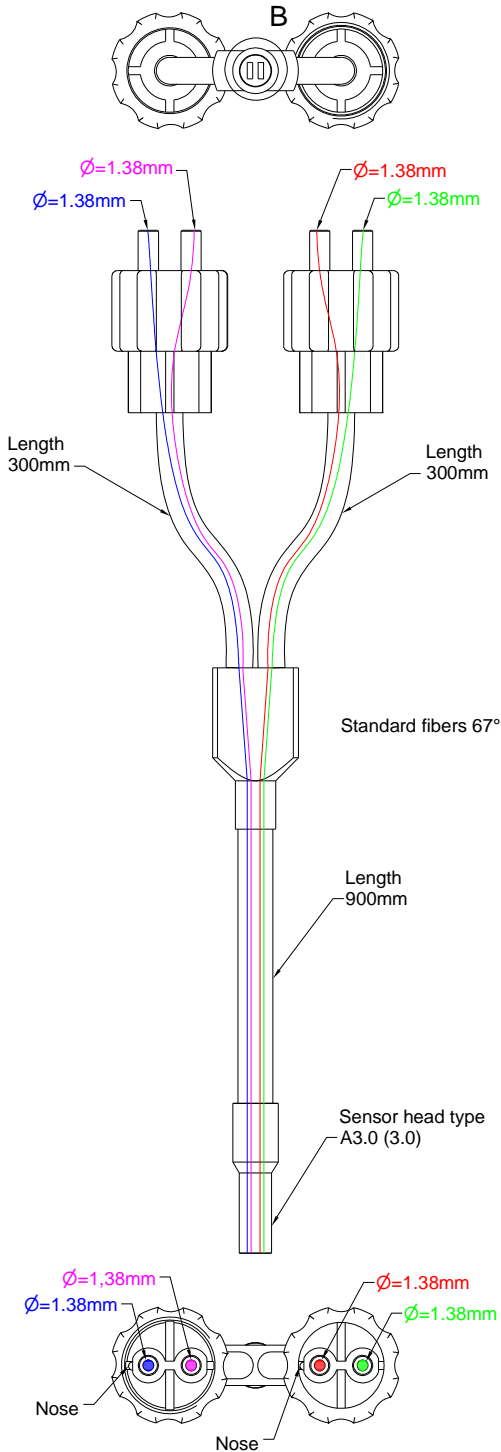
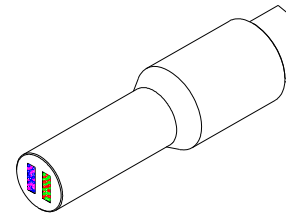
Special Fiber Optics

R-S-A3.0-2x(3x1)-1200-Y-67°-2P/2P

Detail B



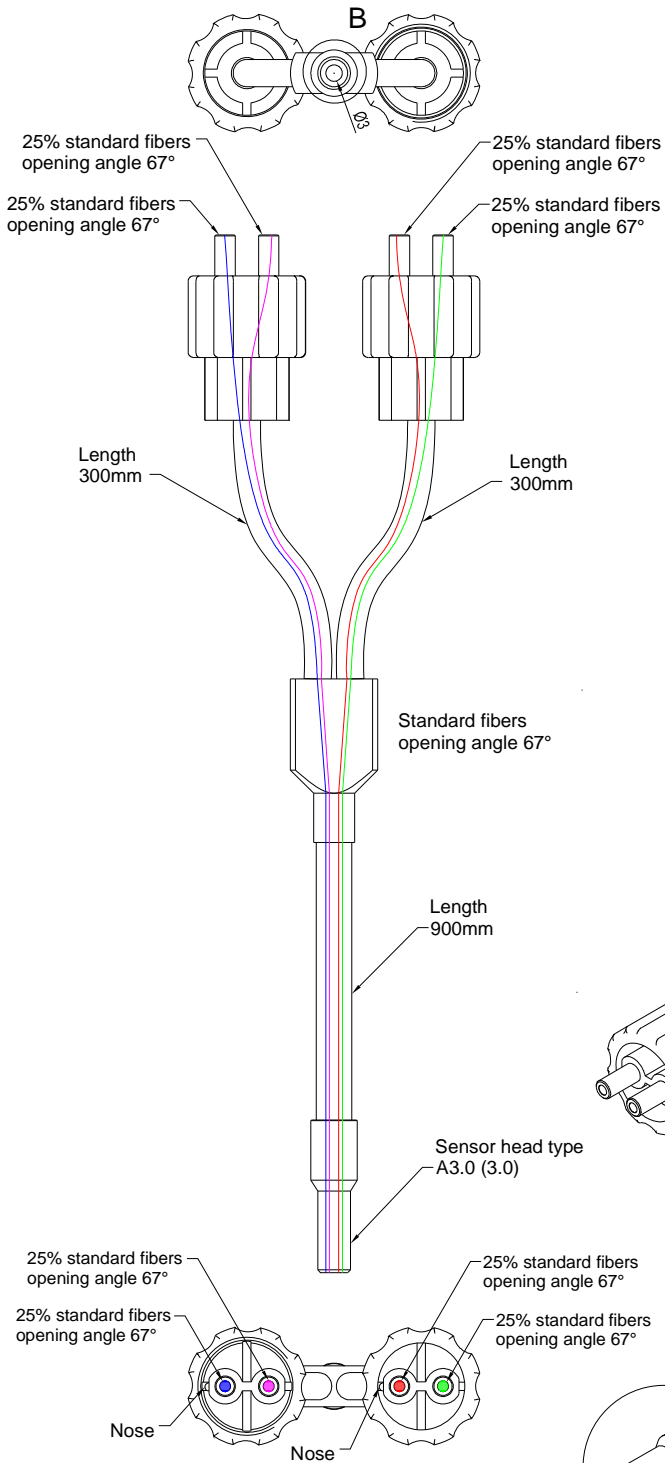
Detail A



All dimensions in mm

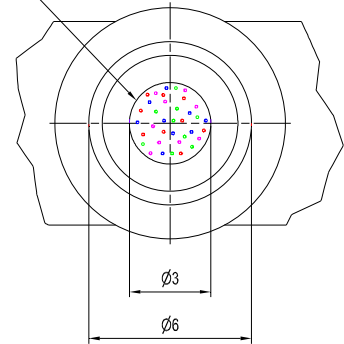
Special Fiber Optics

R-S-A3.0-(3.0)-1200-Y-67°-2P/2P

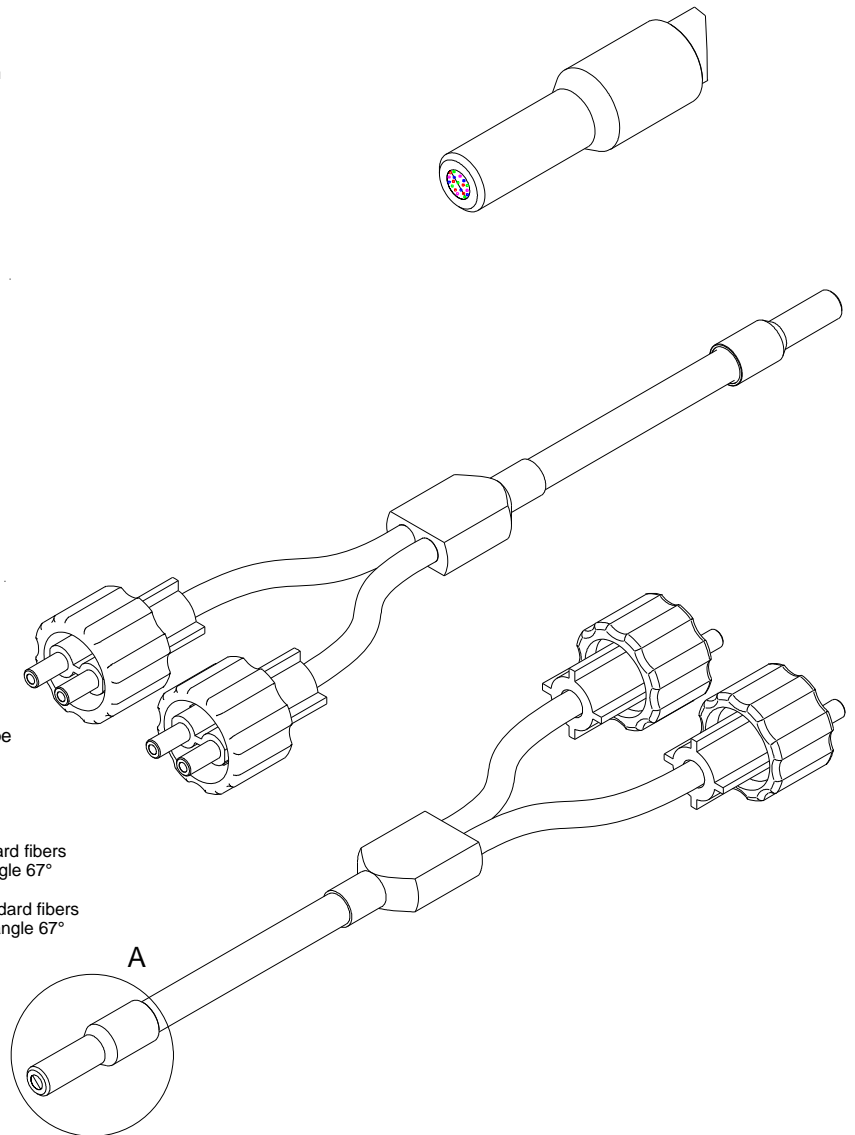


Detail B

Statistically mixed fibers!



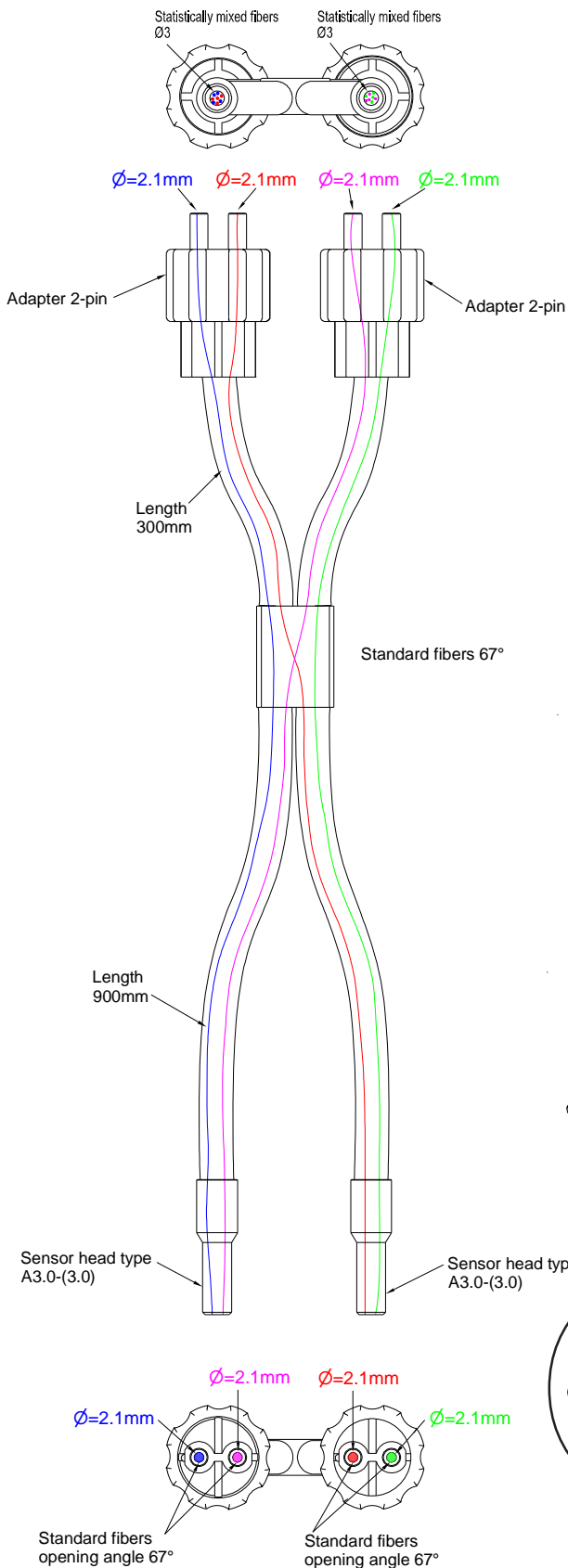
Detail A



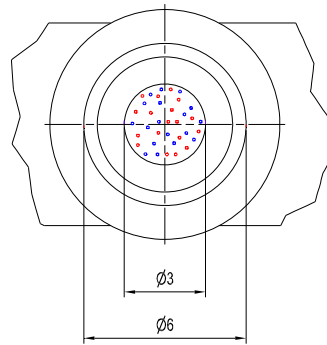
All dimensions in mm

Special Fiber Optics

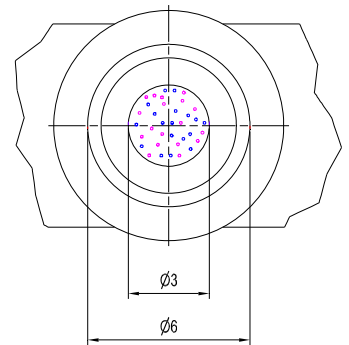
D-S-A3.0-(3.0)-1200-Y-67°-2P/2P



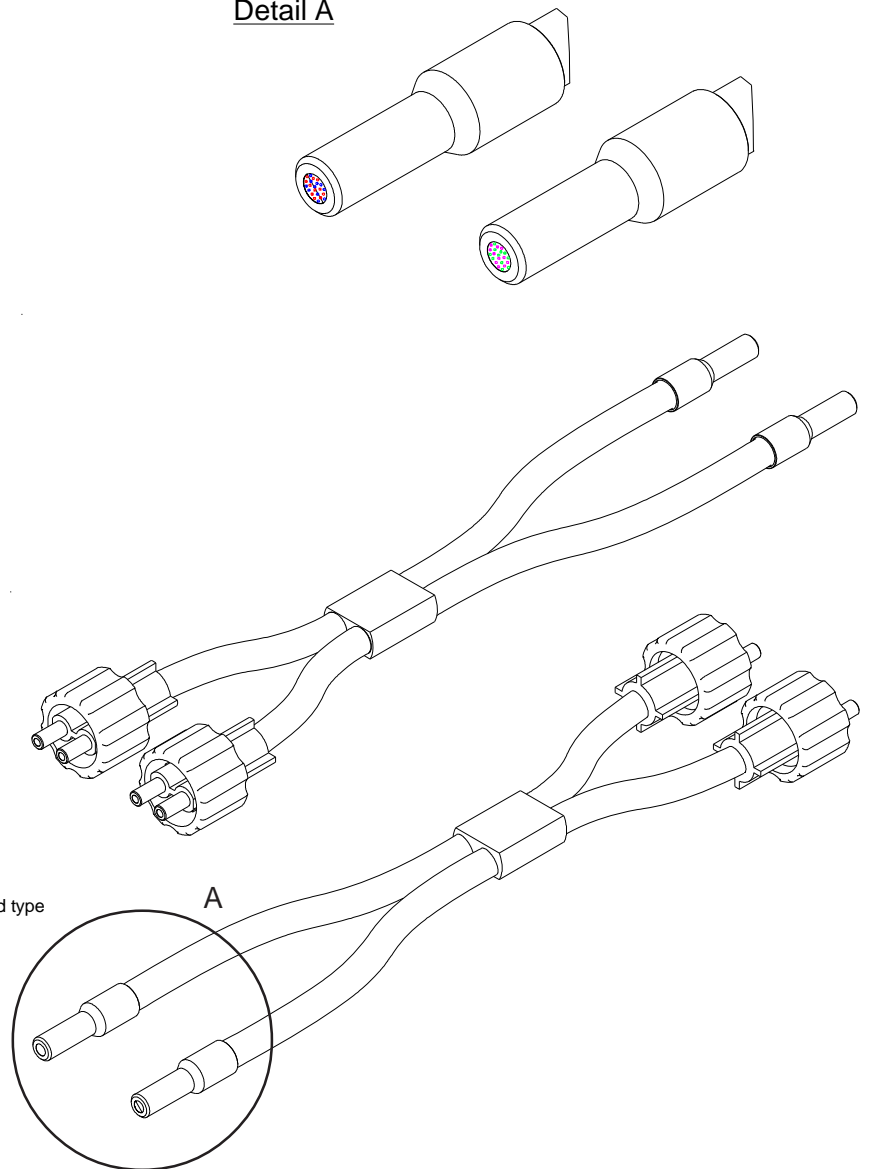
Detail



Detail



Detail A



All dimensions in mm



Optical Frontends

Overview: Optical frontends for fiber optics





Optical Frontends

Optical frontends for reflected light or transmitted light fiber optics:

Part number:	Suitable for fiber optics type: (R, T = reflected light, D= transmitted light)	Characteristics:
KL-1-A2.0 (2 pcs. necessary)	D-S-A2.0-(2.5)-...-67° or 22°	Transmitter/receiver distance typ. 50 mm ... 200 mm
KL-2-A2.0	R-S-A2.0-(2.5)-...-67° or 22°	Transmitter/receiver distance max. 300 mm, beam divergency ± 7,5°
KL-2-A2.0 (2 pcs. necessary)	D-S-A2.0-(2.5)-...-67° or 22°	Transmitter/receiver distance max. 300 mm, beam divergency ± 7,5°
KL-3-A2.0	R-S-A2.0-(2.5)-...-67° or 22°	Working distance typ. 10 mm ... 20 mm
KL-D-3/30-R/D-A2.0	R/D-S-A2.0-(2.5)-1200-67° <i>Special version*</i>	Working distance typ. 30 mm
KL-4-A1.1	R-S-A1.1-(0.6)-...-67° or 22°	Working distance typ. 10 mm ... 15 mm
KL-4-A1.1	R-S-A1.1-(1.1)-...-67° or 22°	Working distance typ. 10 mm ... 15 mm
KL-4-A1.1	R-S-A1.1-(1.5)-...-67° or 22°	Working distance typ. 10 mm ... 15 mm
KL-5-R1.1	R-S-R1.1-(3x0.5)-...-67° or 22°	Working distance typ. 8 mm ... 20 mm
KL-8-R2.1	R-S-R2.1-(6x1)-...-67° or 22°	Working distance typ. 8 mm ... 25 mm
KL-8-N-R2.1	R-S-R2.1-(6x1)-...-67° or 22°	Working distance typ. 8 mm ... 25 mm <i>with guide slot (adjustment aid)</i>
KL-8/90°-R2.1	R-S-R2.1-(6x1)-...-67° oder 22°	Working distance typ. 8 mm ... 25 mm
KL-9-A3.0	R-S-A3.0-(3.0)-...-67° or 22°	Working distance typ. 8 mm ... 25 mm
KL-90-A2.0 (2 pcs. necessary)	D-S-A2.0-(2.5)-...-67° or 22°	Working distance typ. 20 mm ... 100 mm - <i>prismatic optics</i>
KL-52-XL-A3.0	R-S-A3.0-(3.0)-...-67°	Optics diameter 52 mm
KL-M8-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 8 mm ... 20 mm
KL-M12-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 8 mm ... 40 mm
KL-M12-XL-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M12-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M12/90°-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M12-XL-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 10 mm ... 100 mm
KL-M18-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 20 mm ... 60 mm
KL-M18-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 20 mm ... 60 mm
KL-M18-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 20 mm ... 60 mm
KL-M18-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 20 mm ... 60 mm
KL-M18-XL-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 10 mm ... 200 mm
KL-M18-XL--0°/(17°-60°)-30-M5.0	2x T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Angle between the two fiber optics is adjustable from 17° to 60°

*Special version:

Version is different to the standard version (e.g. no standard fiber adapter) and therefore is suitable only for certain sensors or applications



Optical Frontends

Optical frontends for reflected light or transmitted light fiber optics:

Part number:	Suitable for fiber optics type: (R, T = reflected light, D= transmitted light)	Characteristics:
KL-M34-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 100 mm ... 250 mm
KL-M34-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 100 mm ... 250 mm
KL-M34-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 100 mm ... 250 mm
KL-M34-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 100 mm ... 250 mm
KL-M34-XL-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-M5.0	T-S-M5.0-(5.0)-...-67° <i>Special version*</i>	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-M6.0	T-S-M6.0-(6.0)-...-67° <i>Special version*</i>	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-(M25x1.5)-M8.0	T-S-M8.0-(8.0)-...-67° <i>Special version*</i>	as above but with cable screw fitting M25x1.5
KL-M34-XL-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 50 mm ... 400 mm
KL-M34/62-A1.1	R-S-A1.1-(1.5)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-A2.0	R-S-A2.0-(2.5)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-A3.0	R-S-A3.0-(3.0)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-R1.1	R-S-R1.1-(3x0.5)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-M34/62-R2.1	R-S-R2.1-(6x1)-...-67°	Working distance typ. 80 mm ... 200 mm
KL-D-0°/2.5°-300-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 100 mm ... 500 mm
KL-D-0°/40°-9-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-0°/42°-9-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-0°/45°-30-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-0°/45°-30-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-5°-85-POL-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-5°-85-POL-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-6°-200-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 100 mm ... 230 mm
KL-D-14°-84-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 60 mm ... 120 mm
KL-D-14°-84-A2.0-T400	D-S-A2.0-(2.5)-1200-67°-T400	Working distance typ. 60 mm ... 120 mm <i>thermally stable up to 400°C</i>
KL-D-17°-49-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 30 mm ... 80 mm
KL-D-20°-31-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 10 mm ... 50 mm
KL-D-28°-26-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 50 mm
KL-D-28°-26-KG2-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 50 mm
KL-D-30°-23-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 30 mm
KL-D-30°-23-KG2-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 20 mm ... 30 mm
KL-D-40°-13-A2.0	D-S-A2.0-(2.5)-...-67°	Working distance typ. 15 mm ... 25 mm
KL-D-40°-23-5/DIF-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-40°-23-5/DIF-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-45°-14-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-M12-0°/30°-9-A2.0	D-S-A2.0-(2.5)-...-67°	(to be supplemented)
KL-D-M12-0°/30°-9-A3.0	D-S-A3.0-(3.0)-...-67°	(to be supplemented)
KL-D-M12-XL-0°/30°-30-A2.0	D-S-A2.0-30°/30-A2.0 <i>Special version*</i>	Working distance typ. 10 mm ... 100 mm

*Special version:

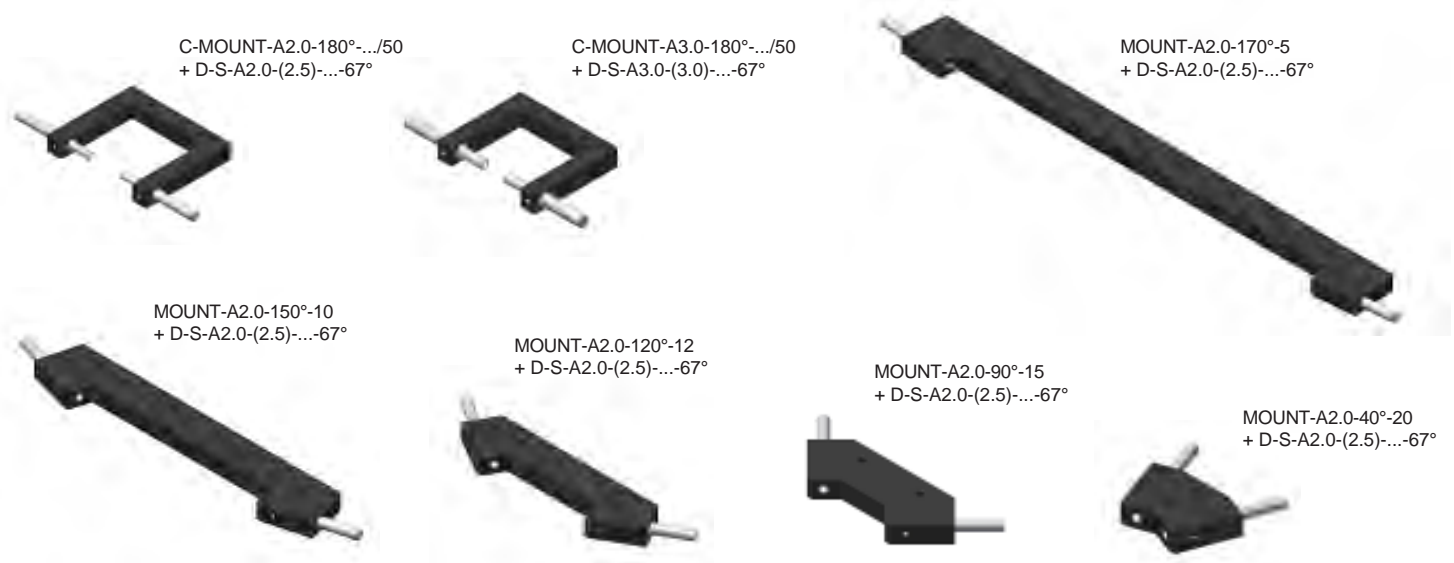
Version is different to the standard version (e.g. no standard fiber adapter) and therefore is suitable only for certain sensors or applications



Fiber Optics Fixtures

Mounting brackets (fixtures) for transmitted light fiber optics with sensor head type „A2.0“, „A3.0“, or „R2.1“:

Part number:	Suitable for fiber optics type: (D= transmitted light)	Characteristics:
C-MOUNT-A2.0-180°-22/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 22 mm, fork width/depth: 50/50 mm
C-MOUNT-A2.0-180°-60/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 60/50 mm
C-MOUNT-A2.0-180°-100/50	D-S-A2.0-(2.5)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
C-MOUNT-A3.0-180°-16/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 16 mm, fork width/depth: 50/50 mm
C-MOUNT-A3.0-180°-60/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 60 mm, fork width/depth: 94/50 mm
C-MOUNT-A3.0-180°-100/50	D-S-A3.0-(3.0)-...-67°	Transmitter/receiver distance 100 mm, fork width/depth: 100/50 mm
MOUNT-A2.0-170°-5	D-S-A2.0-(2.5)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A3.0-170°-5	D-S-A3.0-(3.0)-...-67°	Angle of incidence 85° to the vertical in a distance of 5 mm to the object, gloss control of extremely rough surfaces
MOUNT-A2.0-150°-10	D-S-A2.0-(2.5)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A3.0-150°-10	D-S-A3.0-(3.0)-...-67°	Angle of incidence 75° to the vertical in a distance of 10 mm to the object, gloss control of rough surfaces
MOUNT-A2.0-120°-12	D-S-A2.0-(2.5)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A3.0-120°-12	D-S-A3.0-(3.0)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-R1.1-120°-12	D-S-R1.1-(3x0.5)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-R2.1-120°-12	D-S-R2.1-(6x1)-...-67°	Angle of incidence 60° to the vertical in a distance of 12 mm to the object, gloss control of matt to light glossy surfaces
MOUNT-A2.0-90°-15	D-S-A2.0-(2.5)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A3.0-90°-15	D-S-A3.0-(3.0)-...-67°	Angle of incidence 45° to the vertical in a distance of 15 mm to the object, gloss control of matt to glossy surfaces
MOUNT-A2.0-40°-20	D-S-A2.0-(2.5)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces
MOUNT-A3.0-40°-20	D-S-A3.0-(3.0)-...-67°	Angle of incidence 20° to the vertical in a distance of 20 mm to the object, gloss control of very glossy surfaces





Fiber Optics Fixtures

Mounting brackets (fixtures) for transmitted light fiber optics with sensor head type „Q....“ (cross-section converter):

Part number:	Suitable for fiber optics type:	Characteristics:
	(D= transmitted light)	
C-MOUNT-Q1-180°-50/50	D-S-Q1-(5x0.5)-...-67°	Width of measuring range: 5 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q2-180°-50/50	D-S-Q2-(10x0.3)-...-67°	Width of measuring range: 10 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q3-180°-50/50	D-S-Q3-(18x0.3)-...-67°	Width of measuring range: 18 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q4-180°-50/50	D-S-Q4-(28x0.2)-...-67°	Width of measuring range: 28 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q5-180°-50/50	D-S-Q5-(38x0.15)-...-67°	Width of measuring range: 38 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm
C-MOUNT-Q6-180°-50/50	D-S-Q6-(48x0.15)-...-67°	Width of measuring range: 48 mm, transmitter/receiver distance: 50 mm, distance beginning of measurement range (inner side) to inner edge of housing: 50 mm



C-MOUNT-Q1-180°-50/50
+ D-S-Q1-(5x0.5)-...-67°



C-MOUNT-Q2-180°-50/50
+ D-S-Q2-(10x0.3)-...-67°



C-MOUNT-Q3-180°-50/50
+ D-S-Q3-(18x0.3)-...-67°



C-MOUNT-Q4-180°-50/50
+ D-S-Q4-(28x0.2)-...-67°



C-MOUNT-Q5-180°-50/50
+ D-S-Q5-(38x0.15)-...-67°



C-MOUNT-Q6-180°-50/50
+ D-S-Q6-(48x0.15)-...-67°

Mounting brackets (fixtures) for BICONE fiber optics or special fiber optics with sensor head type „A3.0“:

Part number:	Suitable for fiber optics type:	Characteristics:
	(BICONE or special fiber optics)	
MOUNT-A3.0/A3.0-0°/0°-9	R-S-A3.0-(3.0)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(d2/d4)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-(d2/d4)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-2x(3x1)-1200-Y-22°-(1P+1BP)/2P R-S-A3.0-2x(3x1)-1200-Y-67°-(1P+1BP)/2P R-S-A3.0-(2xd3/2)-1200-Y-67°-2P/2P R-S-A3.0-2x(3x1)-1200-Y-67°-2P/2P R-S-A3.0-(3.0)-1200-Y-67°-2P/2P D-S-A3.0-(3.0)-1200-Y-67°-2P/2P	Parallel alignment of the fiber optics, distance of the fiber optics bundles (centers) to each other = 9 mm

