

SPECTRO Series

► SPECTRO-3-FIO-UV-MSM-DIG

- Big working range: typ. 1 mm ... 500 mm (depends on fiber optics and attachment optics)
- Various UV light conducting fiber optics available
- L*a*b* , L*C*h* , L*u*v* , L*u'v' and xyY evaluation (CIE standard)
- Up to 31 colors (max. 48 in group mode) can be stored
- RS232 interface (USB or Ethernet adapter is available)
- UV-LED, 375 nm, modulated (AC-/DC-operation or OFF for luminous objects can be switched)
- Detection of different luminescent colors
- Insensitive to outside light (in AC-operation)
- Scan frequency max. 35 kHz, switching frequency typ. 60 kHz
- Several TEACH functions (via PC, PLC, or push button)
- Various evaluation algorithms can be activated
- "BEST HIT" mode ("human color assessment")
- Switching state display by means of 5 yellow LEDs
- Parameterizable via Windows® software, scope function
- Temperature compensated
- Averaging can be activated (from 1 up to over 32000 values)
- 3-color filter detector (true color detector: "human color perception")
- Possibility for connection of external UV light source ELS-UV-1P (365 nm)



Design

Product name:

SPECTRO-3-FIO-UV-MSM-DIG

(incl. Windows® PC software SPECTRO3-MSM-DIG-Scope)

Sturdy aluminum housing, anodized in blue

Accessories: (p. 9-15)

UV fiber optics
Attachment optics
External UV light source
Special fiber optics
Mounting flanges

Fiber optics adaptor for connection of UV fiber optics of FIO Series (cf. catalog FIO Series)

4-pole fem. connector Binder Series 707 (connection to external UV light source ELS-UV-1P)*

* former product name: SPECTRO-ELS-UV

4-pole fem. connector Binder Series 707 (RS232 interface)

Connecting cable: cab-las4/PC or cab-4/USB or cab-4/ETH

LED display: Switching state indication by means of 5 yellow LEDs

TEACH button (external teaching via input IN0)

8-pole fem. connector Binder Series 712 (connection to PLC)

Connecting cable: cab-las8/SPS

Mounting screws (M34)



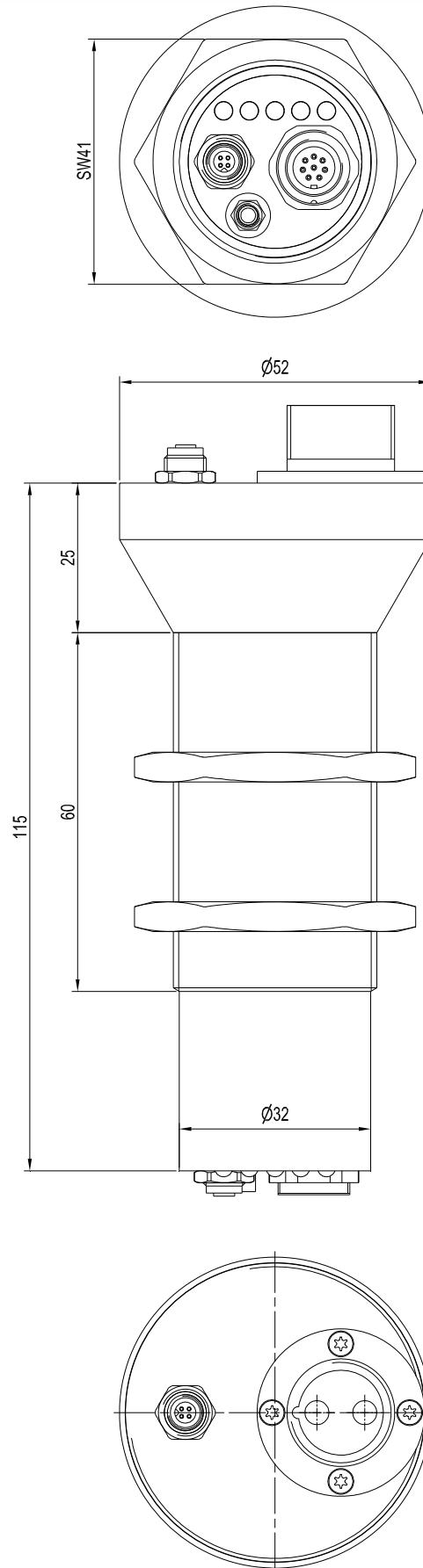


Technical Data

Model	SPECTRO-3-FIO-UV-MSM-DIG
Voltage supply	+24VDC ($\pm 10\%$), reverse polarity protected, overcurrent protected
Current consumption	< 160 mA (with connected external UV light source ELS-UV-1P: < 500 mA)
Max. switching current	100 mA, short circuit proof
Switching state indication	5 yellow LED visualize the physical state of the outputs OUT0 ... OUT4
Input digital (1x)	IN0 (Pin 3), digital (0V/+24V) or teach button at the housing
Outputs digital (5x)	OUT0 ... OUT4 (Pin 4 ... 8): digital (0V/+24V), npn/pnp-able (bright/dark-switching, can be switched)
Interface	RS232
Pulse lengthening	0 ... 100 ms, adjustable via PC software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency	LED operation, can be switched via PC software: AC operation: max. 20 kHz (depends on parameterization) DC and OFF operation: max. 35 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Transmitter (light source)	UV LED, 375 nm
Transmitter control	can be switched via PC software: AC operation (LED MODE-AC), DC operation (LED MODE-DC), OFF operation (LED MODE-OFF) or PULSE operation (LED MODE -PULSE)
Object distance (measuring 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	3-color filter detector (TRUE COLOR detector, "human color perception"), color filter curves acc. to CIE 1931
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Size of light spot	circular: typ. $\varnothing 1,5$ mm ... $\varnothing 3$ mm or rectangular: typ. 3 mm x 0.5 mm ... 6 mm x 1 mm depends on fiber optics and attachment optics (cf. catalog FIO series)
Reproducibility	in the X, Y color range each 1 digit at 12-bit A/D conversion
Temperature drift X,Y	$\Delta X/\Delta T$; $\Delta Y/\Delta T$ typ. 0,2 digits/ $^{\circ}\text{C}$ (< 0,01% / $^{\circ}\text{C}$)
Measurement accuracy	$\Delta E = 0.7$
Resolution	$\Delta E \geq 0.01$ in case of color space L*u*v': $\Delta u'v' = 0.001$
Color spaces	L*a*b* , L*C*h* , L*u*v* , L'u'v' , and xyY (CIE standard)
Color memory capacity	non-volatile EEPROM with parameter sets for max. 31 colors (max. 48 in group mode)
Housing dimensions	length approx. 115 mm x $\varnothing 32$ mm (threaded M34x1.5) or $\varnothing 52$ mm (optics holding device), without connectors
Housing material	aluminum, anodized in blue (fiber optics adaptor: 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) connection to external UV light source ELS-UV-1P: 4-pol. fem. connector (Binder 707)
Operating temp. range	-20 $^{\circ}\text{C}$... +55 $^{\circ}\text{C}$
Storage temperature range	-20 $^{\circ}\text{C}$... +85 $^{\circ}\text{C}$
EMC test acc. to	DIN EN 60947-5-2
External light source	possibility of connection of an external UV light source type ELS-UV-1P (365 nm)



Dimensions



All dimensions in mm



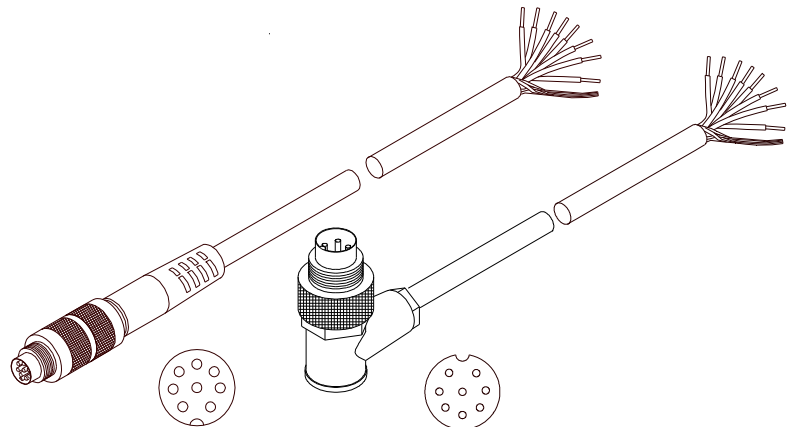
Connector Assignment

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
4	yellow	OUT0 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
5	grey	OUT1 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
6	pink	OUT2 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
7	blue	OUT3 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
8	red	OUT4 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)

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:

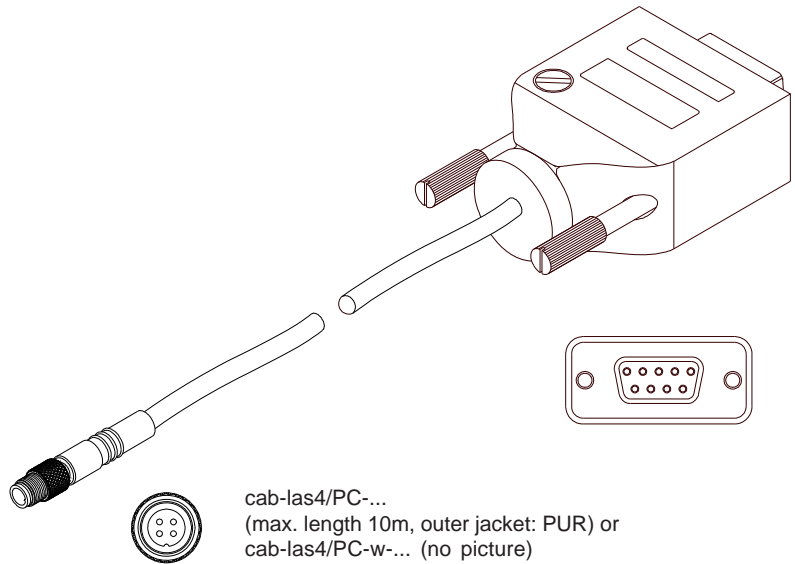
Connecting cable (incl. driver software):
 cab-4/USB-(length)
 cab-4/USB-w-(length) (angle type 90°)
 (standard length 2m)

alternative:

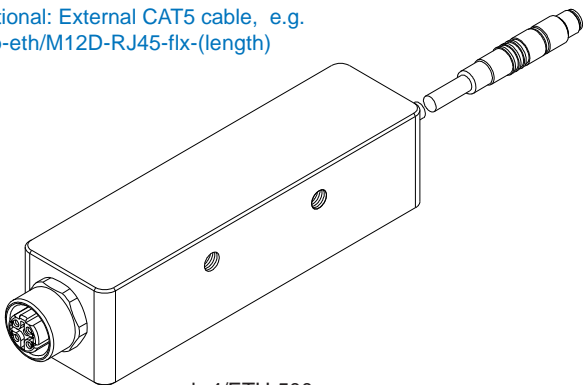
Connection to local network via Ethernet bus:

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

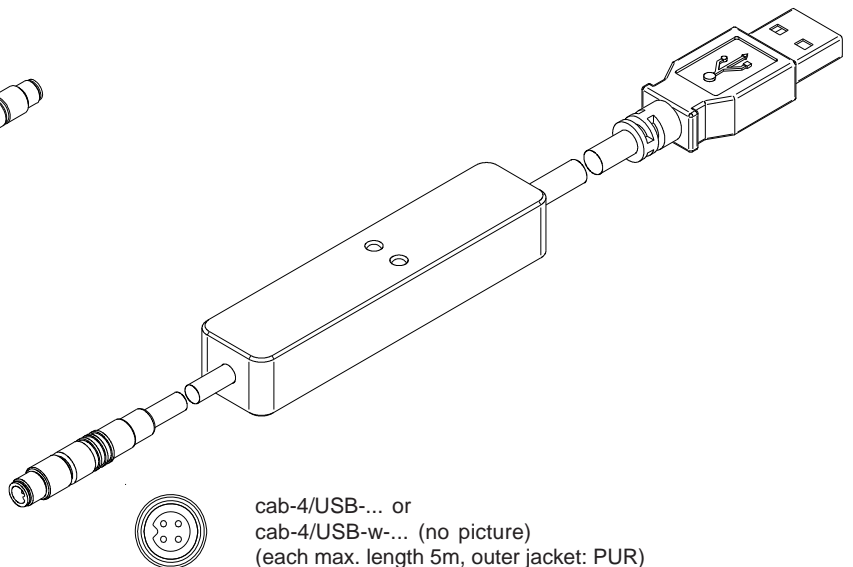
Optional: External CAT5 cable, e.g.
 cab-eth/M12D-RJ45-flx-(length)



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)



Measuring Principle

Measuring principle of the color sensors of SPECTRO-3-MSM-DIG series:

The SPECTRO-3-MSM-DIG provides highly flexible signal acquisition. For example, the sensor can be operated in alternating-light mode (AC mode), which makes the sensor insensitive to extraneous light. It also can be set to constant-light mode (DC mode), which makes the sensor extremely fast. With the stepless adjustment of the integrated light source as well as the selectable gain of the receiver signal and an INTEGRAL function the sensor can be set to almost any surface or any "self-luminous object".

When the integrated light source of the SPECTRO-3-MSM-DIG color sensor is activated, the sensor detects the radiation that is diffusely reflected from the object. As a light source the SPECTRO-3-MSM-DIG color sensor uses LEDs (in case of color sensor type -VISUV additionally UV LEDs) with adjustable transmitter power. An integrated 3-fold receiver for the red, green, and blue content of the light that is reflected from the object, or the light that is emitted by a "self-luminous object", is used as a receiver.

The color sensors of the SPECTRO-3-MSM-DIG series can be taught up to 31 colors that are provided directly at the outputs, and up to 48 colors that are output by means of grouping. For each of these taught colors it is possible to set tolerances. Evaluation of the taught colors is performed either with the "FIRST HIT" or with the "BEST HIT" mode. With "FIRST HIT" the first hit in the teach table is output, and with "BEST HIT" the best hit in the teach table is output. Raw data are represented with 12 bit resolution.

Color detection either operates continuously or is started through an external PLC trigger signal. The respective detected color either is provided as a binary code at the 5 digital outputs or can be sent directly to the outputs, if only up to 5 colors are to be detected. At the same time the detected color code is visualised by means of 5 LEDs at the housing of the SPECTRO-3-MSM-DIG.

[Please note: Visualisation by means of LEDs not available with SPECTRO-3-JR-MSM-DIG and SPECTRO-3-MSM-DIG-VIS or -VISUV types.]

With a TEACH button at the sensor housing the color sensor can be taught up to 31 colors (max. 48 colors in group mode). For this purpose the corresponding evaluation mode must be set with the software. The TEACH button is connected in parallel to the input IN0 (green wire at cable cab-las8/SPS). **[Please note: TEACH button not available with SPECTRO-3-JR-MSM-DIG and SPECTRO-3-MSM-DIG-VIS or -VISUV types.]**

Parameters and measurement values can be exchanged between a PC and the SPECTRO-3-MSM-DIG color sensor through the serial RS232 interface. All the parameters for color detection also can be saved to the non-volatile EEPROM of the SPECTRO-3-MSM-DIG color sensor through this serial RS232 interface. When parameterisation is finished, the color sensor continues to operate with the current parameters in STAND-ALONE mode without a PC.

Possible firmware updates can be easily performed through the RS232 interface, even with the sensor system in installed condition (a firmware update is performed via the software „FirmwareLoader“).



Visualization

Visualization of the color code:

[not available with SPECTRO-3-JR-MSM-DIG and SPECTRO-3-MSM-DIG-VIS or -VISUV types.]

The color code is visualised by way of 5 yellow LEDs at the housing of the SPECTRO-3-MSM-DIG color sensor. At the same time in the binary mode (OUT BINARY) the color code indicated on the LED display is output as 5-bit binary information at the digital outputs OUT0 to OUT4 of the 8-pole SPECTRO-3/PLC socket.

The SPECTRO-3-MSM-DIG color sensor is able to process a maximum of 31 colors (color code 0 ... 30) in accordance with the corresponding rows in the COLOR TEACH TABLE. An "error" respectively a "not detected color" is displayed by the lighting of all LED (OUT0 ... OUT4 digital outputs are set to HIGH-level).

In the DIRECT mode (OUT DIRECT HI or OUT DIRECT LO) the maximum numbers of colors to be taught is 5 (color no. 0, 1, 2, 3, 4). If DIRECT HI is activated, the specially digital output is set to HI, while the other 4 are set to LO. If the current color does not correspond with any of the teach-in colors, all digital outputs are set to LOW (no LED is lighting).

If DIRECT LO is activated, the specially digital output is set to LO, while the other 4 are set to HI. If the current color does not correspond with any of the teach-in colors, all digital outputs are set to HIGH (all LED are lighting).

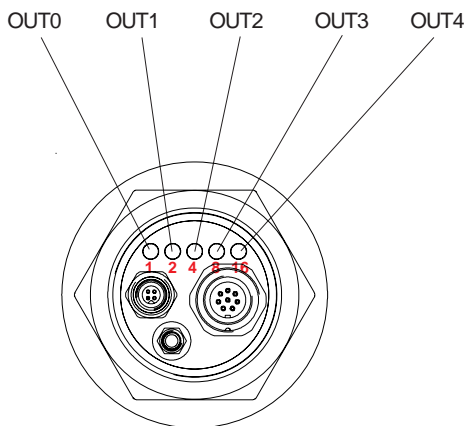
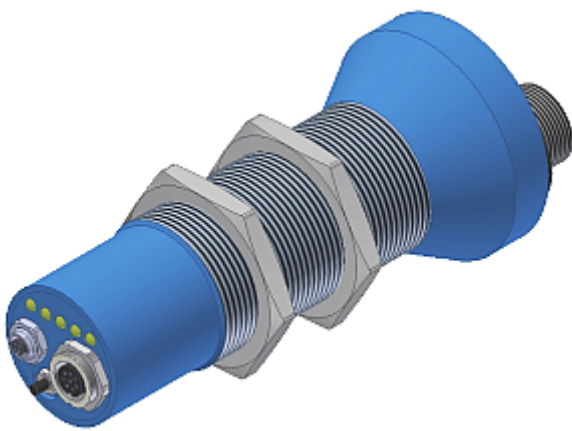


LED Display

LED display:

The color code is visualized by means of 5 yellow LEDs at the housing of the color sensor. At the same time the color code indicated at the LED display is output as 5-bit binary information at the digital outputs OUT0 ... OUT4 of the 8-pole PLC connector.

In the DIRECT mode the maximum number of color codes to be taught is 5. These 5 color codes can be directly output at the 5 digital outputs. The respective detected color code is displayed by means of the 5 yellow LEDs at the color sensor housing.



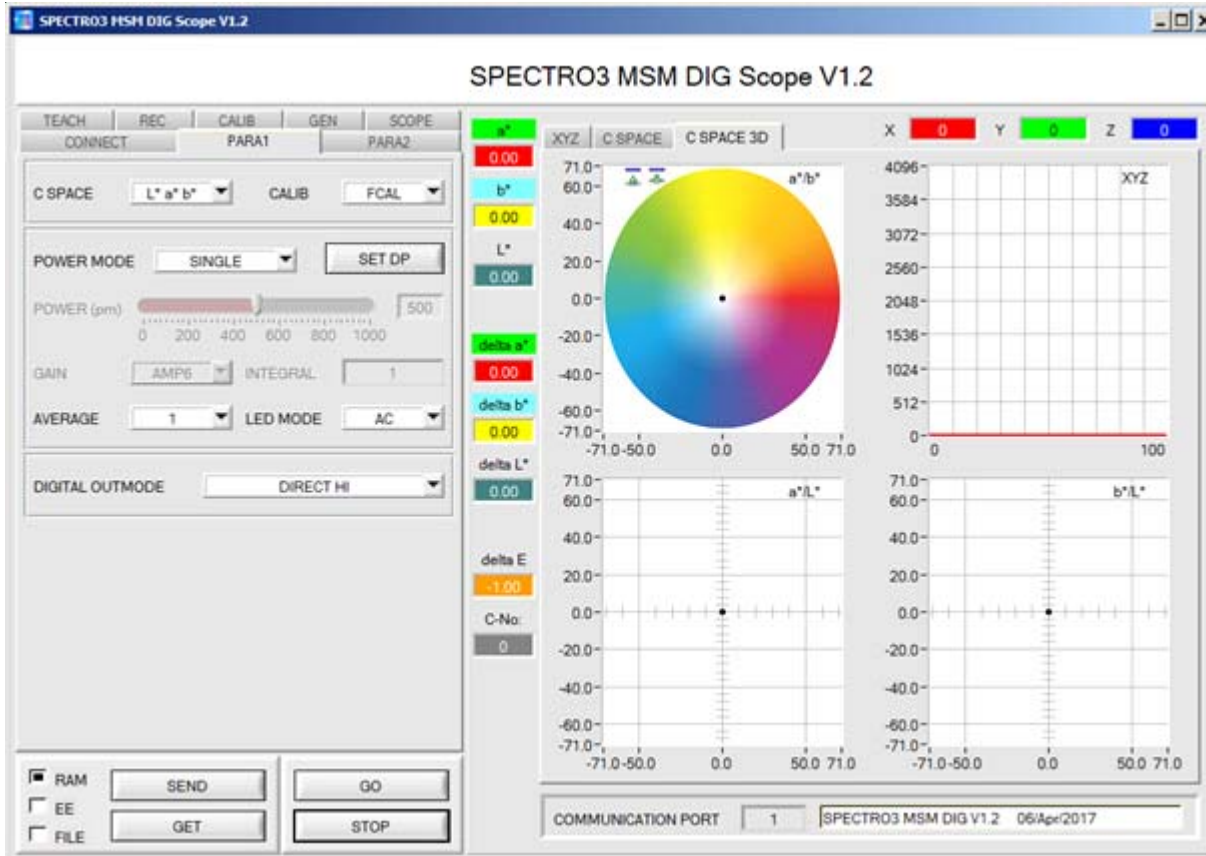
○ ○ ○ ○ ○ 0	● ○ ○ ○ ○ 1	○ ● ○ ○ ○ 2
● ● ○ ○ ○ 3	○ ○ ● ○ ○ 4	● ○ ● ○ ○ 5
○ ● ● ○ ○ 6	● ● ● ○ ○ 7	○ ○ ○ ● ○ 8
● ○ ○ ● ○ 9	○ ● ○ ● ○ 10	● ● ○ ● ○ 11
○ ○ ● ● ○ 12	● ○ ● ● ○ 13	○ ● ● ● ○ 14
● ● ● ● ○ 15	○ ○ ○ ○ ● 16	● ○ ○ ○ ● 17
○ ● ○ ○ ● 18	● ● ○ ○ ● 19	○ ○ ● ○ ● 20
● ○ ● ○ ● 21	○ ● ● ○ ● 22	● ● ● ○ ● 23
○ ○ ○ ● ● 24	● ○ ○ ● ● 25	○ ● ○ ● ● 26
● ● ○ ● ● 27	○ ○ ● ● ● 28	● ○ ● ● ● 29
○ ● ● ● ● 30	● ● ● ● ● Error or „not detected“	



Parameterization
Windows® user interface:

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

The color sensor is parameterized under Windows® with the SPECTRO3-MSM-DIG-Scope software. The Windows® user interface facilitates the teach-in process at the color sensor and supports the operator in the task of adjustment and commissioning of the color sensor.



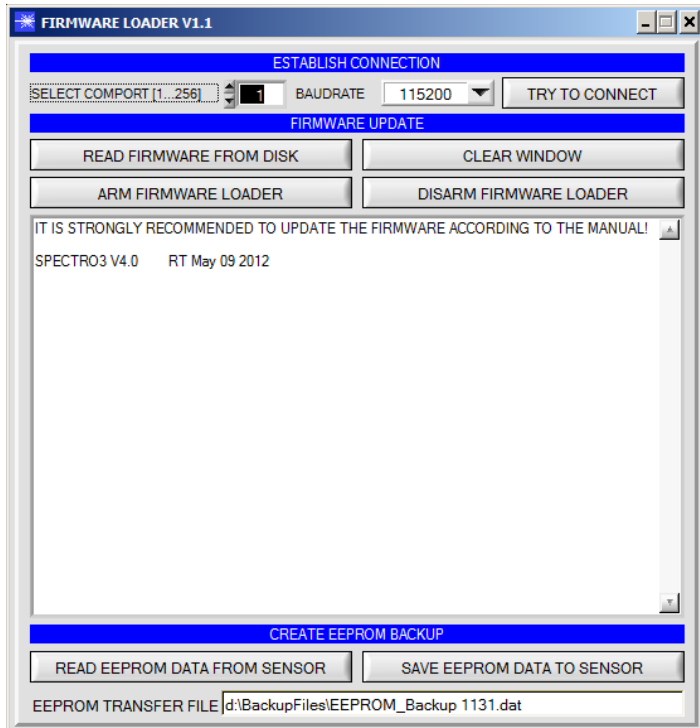
The RS232 interface (tab PARA1 or PARA2) is used for setting parameters such as:

- POWER MODE: Light power of the LED
 - SET DP: Set Double Parameter
 - LED MODE: Triggering of the internal light source (AC, DC)
 - GAIN: Used for setting the gain of the receiver (AMP1 ... AMP8)
 - AVERAGE: Number of scanning values (measurement values, 1 ... 32768) over which the raw signal measured at the receiver is averaged. A higher AVERAGE default value reduces noise of the raw signals at the receiver unit and there will be a decrease of the maximal available switching frequency of the sensor.
 - INTEGRAL: Number of scan values (measurement values) over which the raw signal measured at the receiver is summed up. This integral function allows the reliable detection even of extremely weak signals
 - C SPACE: Selection of a color space ($L^*a^*b^*$, $L^*C^*h^*$, $L^*u^*v^*$, $L^*u^*v^*$, or xyY) for the calculation of the color stimulus specification
 - DIGITAL OUTMODE: Triggering of the five digital outputs (OUT0 ... OUT4)
 - EVALUATION MODE: Evaluation mode (FIRST HIT or BEST HIT)
 - TRIGGER: Continuous or external or self trigger (CONT, EXT1, EXT2, TRANS)
 - EXTEACH: In all the evaluation modes teaching of a color can be performed externally through IN0 or by means of the button at the sensor housing [Please note: TEACH button not available with SPECTRO-3-JR-MSM-DIG and SPECTRO-3-MSM-DIG-VIS or -VISUV types.]
 - INTLIM: Minimum intensity required for color evaluation
 - MAXCOL-No.: Number of colors to be checked
- Tab TEACH
Opens a window where you can teach colors to the TEACH TABLE
- Tab CALIB
Selection of calibration mode (FCAL = factory calibration or UCAL = user calibration).
- Tab SCOPE
Visualises an oscilloscope
- Tab GEN
Displays the current temperature value TEMP in the sensor housing
- Tab REC
Data recorder



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 types:

- R-S-A1.1-(1.5)-1200-22°-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)-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

(further fiber optics types or lengths available on request)



Available special UV fiber optics types
(for use with external light source ELS-UV-1P):

- R-S-A1.1-(1.5)-1200-Y-22°/67°-UV
- R-S-A2.0-(2.5)-1200-Y-22°/67°-UV
- R-S-A3.0-(3.0)-1200-Y-22°/67°-UV
- R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV
- R-S-R2.1-(6x1)-1200-Y-22°/67°-UV

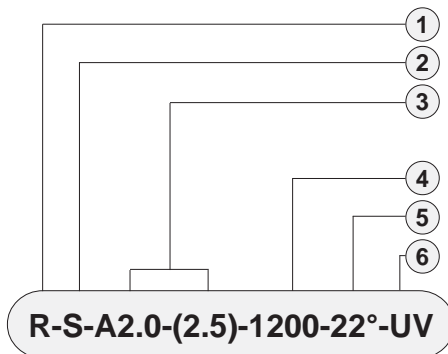
(further fiber optics lengths available on request)



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.

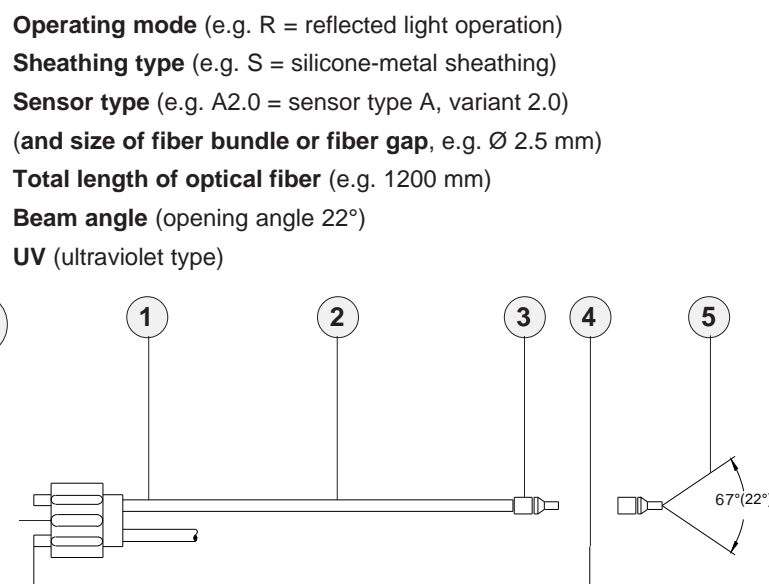
Order Code:



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, 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



Optical Frontends

Overview: Optical frontends for reflected light UV fiber optics



KL-3-A2.0
KL-4-A1.1
KL-5-R1.1
KL-8-R2.1
KL-9-A3.0



KL-M8-A1.1



KL-M12-A1.1
KL-M12-A2.0
KL-M12-A3.0
KL-M12-R1.1



KL-M12-XL-A1.1
KL-M12-XL-A2.0
KL-M12-XL-R1.1



KL-M18-A1.1
KL-M18-A2.0
KL-M18-A3.0
KL-M18-R1.1
KL-M18-R2.1



KL-M18-XL-A1.1
KL-M18-XL-A2.0
KL-M18-XL-A3.0
KL-M18-XL-R1.1
KL-M18-XL-R2.1



KL-M34-A1.1
KL-M34-A2.0
KL-M34-A3.0
KL-M34-R1.1
KL-M34-R2.1



KL-M34-XL-A1.1
KL-M34-XL-A2.0
KL-M34-XL-A3.0
KL-M34-XL-R1.1
KL-M34-XL-R2.1



KL-M34/62-A1.1
KL-M34/62-A2.0
KL-M34/62-A3.0
KL-M34/62-R1.1
KL-M34/62-R2.1



Optical Frontends

Optical frontends for UV fiber optics (22°-UV) or UV fiber optics in Y-shape (22°/67°-UV, used with external UV light source):

Part number:	Suitable for UV fiber optics type: (R = reflected light)	Characteristics:
KL-3-A2.0	R-S-A2.0-(2.5)-1200-22°-UV R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 20 mm Working distance typ. 10 mm ... 20 mm
KL-4-A1.1	R-S-A1.1-(1.5)-1200-22°-UV R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 15 mm Working distance typ. 10 mm ... 15 mm
KL-5-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 20 mm Working distance typ. 8 mm ... 20 mm
KL-8-R2.1	R-S-R2.1-(6x1)-1200-22°-UV R-S-R2.1-(6x1)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 25 mm Working distance typ. 8 mm ... 25 mm
KL-9-A3.0	R-S-A3.0-(3.0)-1200-22°-UV R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 25 mm Working distance typ. 8 mm ... 25 mm
KL-M8-A1.1	R-S-A1.1-(1.5)-1200-22°-UV R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 20 mm Working distance typ. 8 mm ... 20 mm
KL-M12-A1.1	R-S-A1.1-(1.5)-1200-22°-UV R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 20 mm Working distance typ. 8 mm ... 20 mm
KL-M12-A2.0	R-S-A2.0-(2.5)-1200-22°-UV R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 20 mm Working distance typ. 8 mm ... 20 mm
KL-M12-A3.0	R-S-A3.0-(3.0)-1200-22°-UV R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 20 mm Working distance typ. 8 mm ... 20 mm
KL-M12-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 8 mm ... 20 mm Working distance typ. 8 mm ... 20 mm
KL-M12-XL-A1.1	R-S-A1.1-(1.5)-1200-22°-UV R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 30 mm ... 200 mm Working distance typ. 30 mm ... 200 mm
KL-M12-XL-A2.0	R-S-A2.0-(2.5)-1200-22°-UV R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 30 mm ... 200 mm Working distance typ. 30 mm ... 200 mm
KL-M12-XL-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 30 mm ... 200 mm Working distance typ. 30 mm ... 200 mm
KL-M18-A1.1	R-S-A1.1-(1.5)-1200-22°-UV R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 60 mm Working distance typ. 10 mm ... 60 mm
KL-M18-A2.0	R-S-A2.0-(2.5)-1200-22°-UV R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 80 mm Working distance typ. 10 mm ... 80 mm
KL-M18-A3.0	R-S-A3.0-(3.0)-1200-22°-UV R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 80 mm Working distance typ. 10 mm ... 80 mm
KL-M18-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 60 mm Working distance typ. 10 mm ... 60 mm
KL-M18-R2.1	R-S-R2.1-(6x1)-1200-22°-UV R-S-R2.1-(6x1)-1200-Y-22°/67°-UV	Working distance typ. 10 mm ... 80 mm Working distance typ. 10 mm ... 80 mm



Optical Frontends

Optical frontends for UV fiber optics (22°-UV) or UV fiber optics in Y-shape (22°/67°-UV, used with external UV light source):

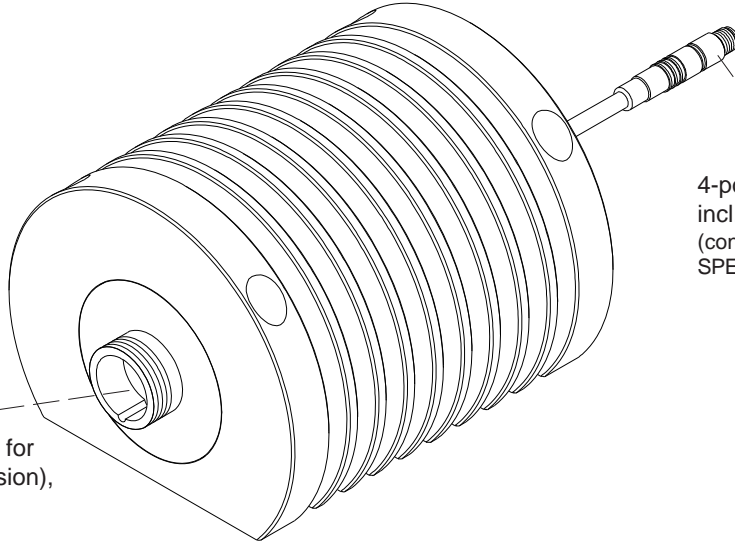
Part number:	Suitable for UV fiber optics type: (R = reflected light)	Characteristics:
KL-M18-XL-A1.1	R-S-A1.1-(1.5)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M18-XL-A2.0	R-S-A2.0-(2.5)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M18-XL-A3.0	R-S-A3.0-(3.0)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M18-XL-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M18-XL-R2.1	R-S-R2.1-(6x1)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-R2.1-(6x1)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M34-A1.1	R-S-A1.1-(1.5)-1200-22°-UV	Working distance typ. 50 mm ... 200 mm
	R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 200 mm
KL-M34-A2.0	R-S-A2.0-(2.5)-1200-22°-UV	Working distance typ. 50 mm ... 250 mm
	R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 250 mm
KL-M34-A3.0	R-S-A3.0-(3.0)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M34-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV	Working distance typ. 50 mm ... 200 mm
	R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 200 mm
KL-M34-R2.1	R-S-R2.1-(6x1)-1200-22°-UV	Working distance typ. 50 mm ... 300 mm
	R-S-R2.1-(6x1)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 300 mm
KL-M34-XL-A1.1	R-S-A1.1-(1.5)-1200-22°-UV	Working distance typ. 50 mm ... 400 mm
	R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-A2.0	R-S-A2.0-(2.5)-1200-22°-UV	Working distance typ. 50 mm ... 400 mm
	R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-A3.0	R-S-A3.0-(3.0)-1200-22°-UV	Working distance typ. 50 mm ... 400 mm
	R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV	Working distance typ. 50 mm ... 400 mm
	R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 400 mm
KL-M34-XL-R2.1	R-S-R2.1-(6x1)-1200-22°-UV	Working distance typ. 50 mm ... 400 mm
	R-S-R2.1-(6x1)-1200-Y-22°/67°-UV	Working distance typ. 50 mm ... 400 mm
KL-M34/62-A1.1	R-S-A1.1-(1.5)-1200-22°-UV	Working distance typ. 80 mm ... 200 mm
	R-S-A1.1-(1.5)-1200-Y-22°/67°-UV	Working distance typ. 80 mm ... 200 mm
KL-M34/62-A2.0	R-S-A2.0-(2.5)-1200-22°-UV	Working distance typ. 80 mm ... 200 mm
	R-S-A2.0-(2.5)-1200-Y-22°/67°-UV	Working distance typ. 80 mm ... 200 mm
KL-M34/62-A3.0	R-S-A3.0-(3.0)-1200-22°-UV	Working distance typ. 80 mm ... 200 mm
	R-S-A3.0-(3.0)-1200-Y-22°/67°-UV	Working distance typ. 80 mm ... 200 mm
KL-M34/62-R1.1	R-S-R1.1-(3x0.5)-1200-22°-UV	Working distance typ. 80 mm ... 200 mm
	R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV	Working distance typ. 80 mm ... 200 mm
KL-M34/62-R2.1	R-S-R2.1-(6x1)-1200-22°-UV	Working distance typ. 80 mm ... 200 mm
	R-S-R2.1-(6x1)-1200-Y-22°/67°-UV	Working distance typ. 80 mm ... 200 mm

External UV Light Source

ELS-UV-1P

External UV light source (lighting unit), 365 nm
(please order separately)

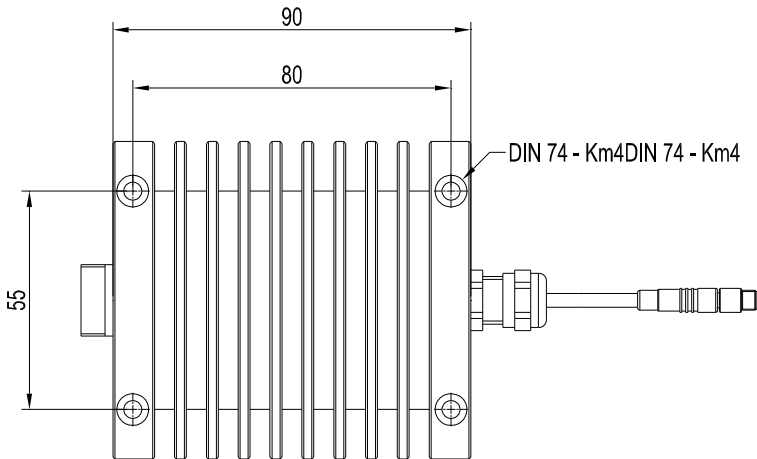
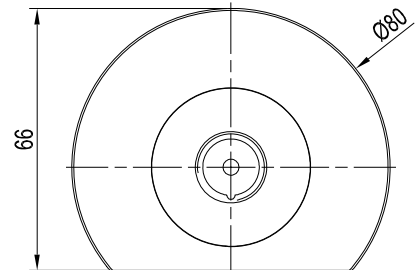
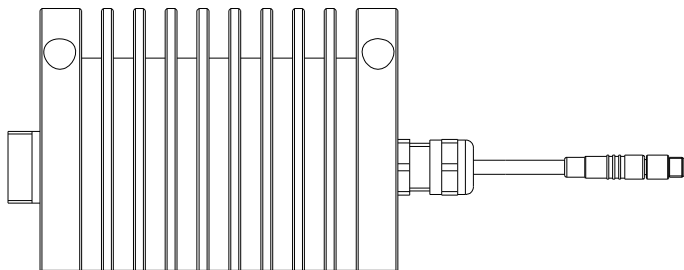
ATTENTION!
Increased LED power!
Do not look directly
into the beam!



4-pole connector Binder 707
incl. PU cable, length approx. 500 mm
(connection to
SPECTRO-3-FIO-UV-MSM-DIG)

Fiber optics adapter (1-pole) for
reflex light fiber optics (Y-version),
to choose:

- R-S-A1.1-(1.5)-(length)-Y-22°/67°-UV
- R-S-A2.0-(2.5)-(length)-Y-22°/67°-UV
- R-S-A3.0-(3.0)-(length)-Y-22°/67°-UV
- R-S-R1.1-(3x0.5)-(length)-Y-22°/67°-UV
- R-S-R2.1-(6x1)-(length)-Y-22°/67°-UV



All dimensions in mm



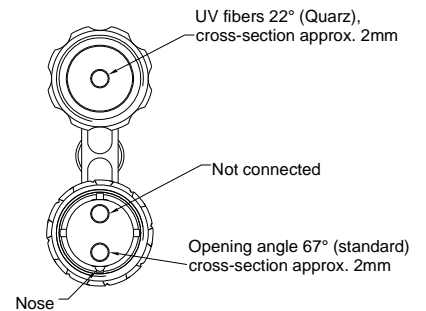
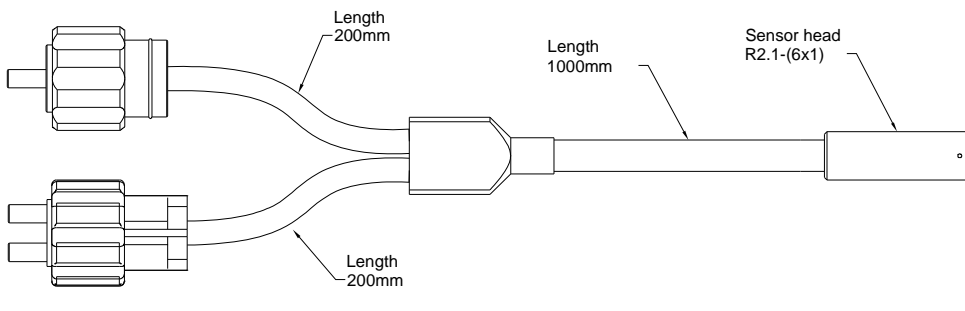
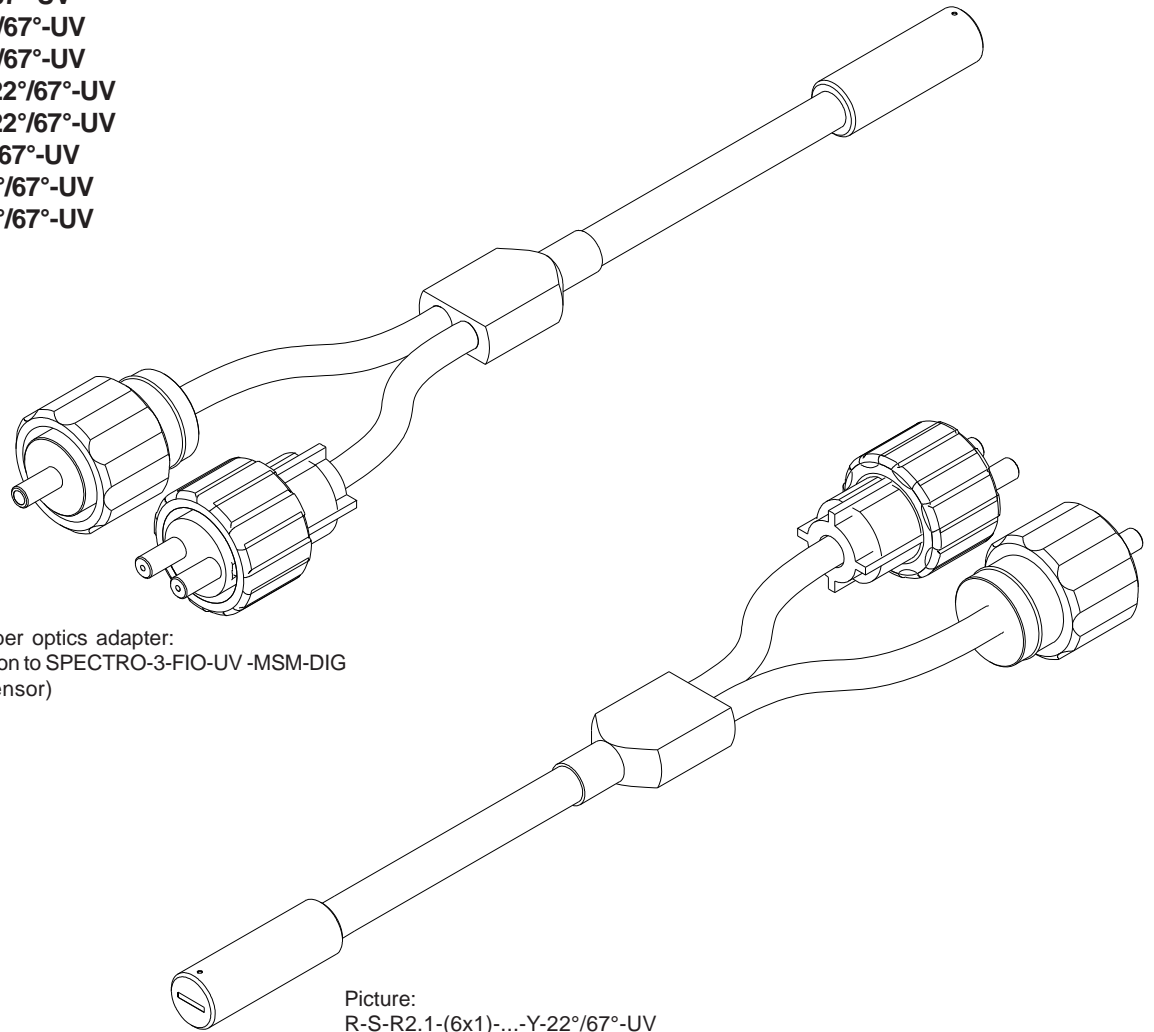
Special UV Fiber Optics

Special UV fiber optics (reflex light, Y-version)

for use with external UV light source ELS-UV-1P and color sensor SPECTRO-3-FIO-UV-MSM-DIG:

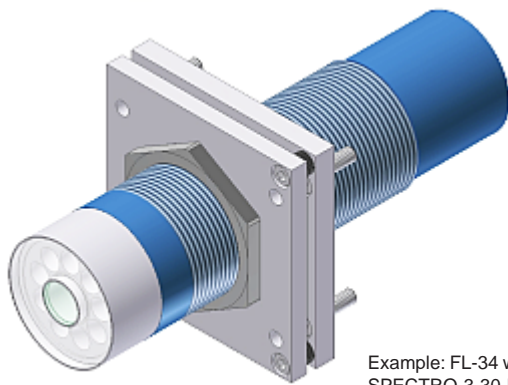
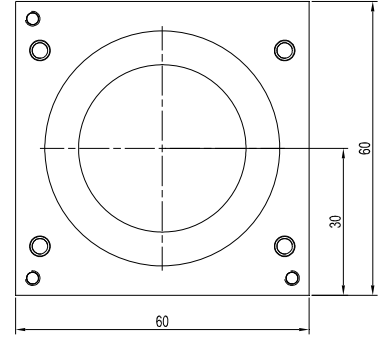
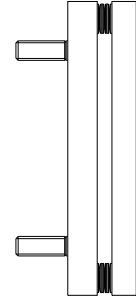
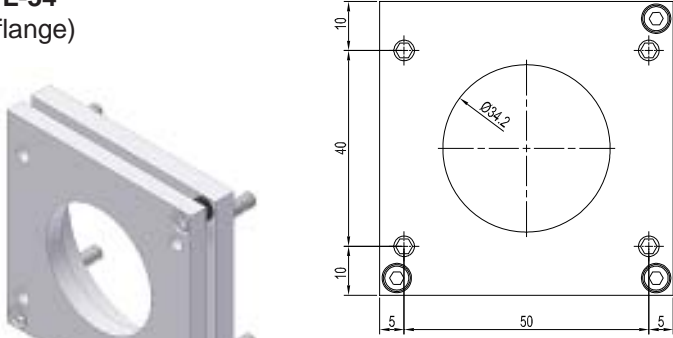
(please order separately)

- R-S-A1.1-(1.5)-1200-Y-22°/67°-UV
- R-S-A1.1-(1.5)-2000-Y-22°/67°-UV
- R-S-A2.0-(2.5)-600-Y-22°/67°-UV
- R-S-A2.0-(2.5)-1200-Y-22°/67°-UV
- R-S-A2.0-(2.5)-2000-Y-22°/67°-UV
- R-S-A3.0-(3.0)-600-Y-22°/67°-UV
- R-S-A3.0-(3.0)-1200-Y-22°/67°-UV
- R-S-A3.0-(3.0)-2000-Y-22°/67°-UV
- R-S-R1.1-(3x0.5)-1200-Y-22°/67°-UV
- R-S-R1.1-(3x0.5)-3000-Y-22°/67°-UV
- R-S-R2.1-(6x1)-600-Y-22°/67°-UV
- R-S-R2.1-(6x1)-1200-Y-22°/67°-UV
- R-S-R2.1-(6x1)-3000-Y-22°/67°-UV

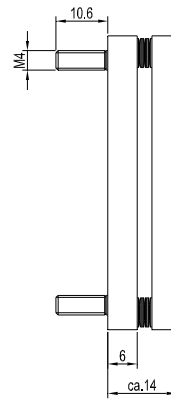


Mounting Accessories

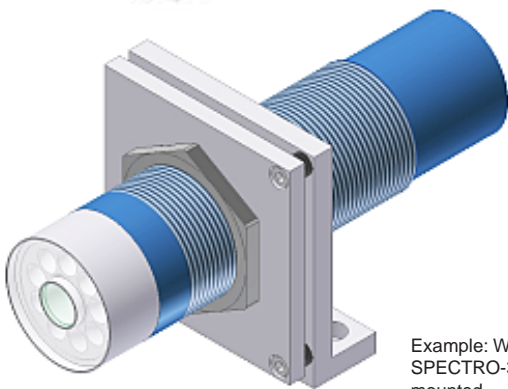
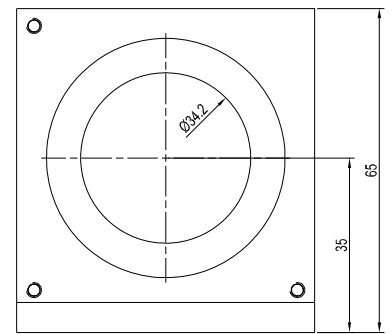
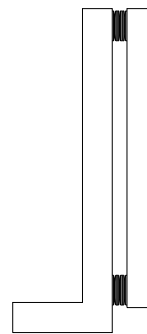
FL-34
(flange)



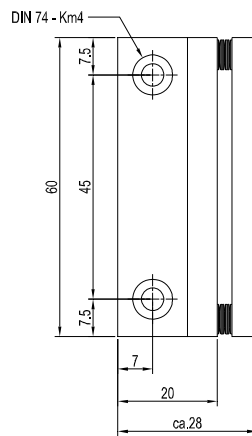
Example: FL-34 with
SPECTRO-3-30-DIL
mounted



WFL-34
(flange, angle type 90°)



Example: WFL-34 with
SPECTRO-3-30-DIL
mounted



(All dimensions in mm)